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First Periodic Evaluation

Groundwater Sustainability Plan for the Las Posas Valley Basin

AUGUST 2024

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Acronyms and Abbreviations

Acronym/Abbreviation	Definition
AF	acre-feet
AFY	acre-feet per year
AMI	automated metering infrastructure
ASR	Aquifer Storage and Recovery
CMWD	Calleguas Municipal Water District
CWD	Camrosa Water District
DWR	California Department of Water Resources
EBB	Extraction Barrier and Brackish water treatment project
ELPMA	East Las Posas Management Area
ET	evapotranspiration
FCA	Fox Canyon Aquifer
FCGMA	Fox Canyon Groundwater Management Agency
Forebay Management Area	Forebay Management Area of the Oxnard Subbasin
GCA	Grimes Canyon Aquifer
GDE	groundwater-dependent ecosystem
GSA	Groundwater Sustainability Agency
GSP	Groundwater Sustainability Plan
InSAR	Interferometric Synthetic Aperture Radar
Judgment	Judgment in Las Posas Valley Water Rights Coalition, et al., v. Fox Canyon Groundwater Management Agency
LAS	Lower Aquifer System
LPVB	Las Posas Valley Basin
mg/L	milligrams per liter
MWD	Metropolitan Water District of Southern California
MWTP	Moorpark Wastewater Treatment Plant
NNP	No New Projects
PAC	Policy Advisory Committee
PVB	Pleasant Valley Basin
SGMA	Sustainable Groundwater Management Act
SMC	sustainable management criteria
SVWQCP	Simi Valley Water Quality Control Plant
TAC	Technical Advisory Committee
TDS	Total Dissolved Solids
UAS	Upper Aquifer System
UWCD	United Water Conservation District
USP	Upper San Pedro Formation
VCWWD	Ventura County Waterworks District
VCWPD	Ventura County Watershed Protection District
VRGWFM	Ventura Regional Groundwater Flow Model
WLPMA	West Las Posas Management Area

ZMWC	Zone Mutual Water Company

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Executive Summary

The Fox Canyon Groundwater Management Agency (FCGMA), the Groundwater Sustainability Agency (GSA) for the portions of the Las Posas Valley Basin (LPVB) within its jurisdictional boundaries, and Watermaster for the entire LPVB, has prepared this first Periodic Evaluation of the LPVB Groundwater Sustainability Plan (GSP) in coordination with the Camrosa Water District-Las Posas Basin GSA and the Las Posas Basin Outlying Areas GSA (County of Ventura) and in compliance with the 2014 Sustainable Groundwater Management Act (SGMA) (California Water Code, Section 10720 et seq.)[1]. This first Periodic Evaluation of the GSP evaluates impacts of climate, water usage trends, and groundwater management decisions on groundwater conditions in the LPVB between water year 2015[2], the last water year reported in the GSP, and water year 2024.

The GSP was submitted to the Department of Water Resources (DWR) on January 13, 2020, and was approved by DWR on January 13, 2022. DWR's approval of the GSP included five recommended corrective actions, which FCGMA has worked to address over the past three years (Table ES-1).

Table ES-1. Recommended Corrective Actions and Corresponding FCGMA Activities

NO.	Summary of Recommended Corrective Action	Activities completed by FCGMA			Discussion of FCGMA Responses
		Technical Analysis or Study	New Project	Updated Monitoring Network	
1	Investigate the connectivity between surface water and groundwater in the ELPMA	✓	✓	✓	Section 2.7.1 and Appendix A
2	Discuss the impact of loss of storage on beneficial uses and users	✓			Section 2.3.1
3	Incorporate periodic land subsidence monitoring into the GSP's monitoring plan			✓	Sections 2.6.1 and 7.2
4	Elaborate on the use of groundwater levels as a proxy for degraded water quality	✓			Section 2.5.1
5	Develop an additional project or management action to ensure sustainability by 2040		✓		Section 3.1.1.1.4

Additionally, the FCGMA has been working to fill data gaps identified in the GSP, implement projects and management actions, and address legal actions taken in the LPVB. In particular, since the GSP was adopted, FCGMA has been focused on the action taken to adjudicate all groundwater rights in the LPVB (Las Posas Valley Water Rights Coalition, et al. v. Fox Canyon Groundwater Management Agency, Santa Barbara Sup. Ct. Case No. VENC100509700). The Santa Barbara Superior Court entered a statement of decision adopting a judgement (Judgment) that adjudicates groundwater rights, implements a physical solution, and appoints FCGMA as the Watermaster for the LPVB on July 10, 2023. In its role as the Watermaster, FCGMA has worked to implement the new administrative, fiscal, reporting, and stakeholder processes outlined in the Judgment, while simultaneously

[1] The GSAs that overlie that Oxnard Subbasin have not been modified since the GSP was submitted.
[2] A water year begins October 1 and ends September 30 to reflect the precipitation patterns in California. Under DWR's definition of a water year, water year 2024 began October 1, 2023 and ended September 30, 2024. Under the Judgment adopted in the LPVB adjudication (Las Posas Valley Water Rights Coalition, et al. v. Fox Canyon Groundwater Management Agency, Santa Barbara Sup. Ct. Case No. VENC100509700) water year 2024 begins on October 1, 2024 and will end on September 30, 2025.

implementing the GSP. Because the Judgment is still being implemented and subject to appellate court review, its effect on FCGMA's implementation of the LPVB GSP and sustainable management of the LPVB is uncertain.

In its role as the Watermaster for the LPVB, FCGMA will continue to coordinate with other local agencies and interested parties in the LPVB and the adjacent Pleasant Valley Basin (PVB) and Oxnard Subbasin to implement the GSP and the Judgment. Agencies and interested parties were engaged during the development of this first Periodic Evaluation through project development meetings, targeted workshops, and monthly FCGMA Board meetings. Feedback and suggestions solicited during these meetings have shaped the interpretations and recommendations presented in this document.

Current Groundwater Conditions

There are three hydrogeologically distinct management areas and four principal aquifers in the LPVB (FCGMA 2019). The management areas are the West Las Posas Management Area (WLPMA), the East Las Posas Management Area (ELPMA), and the Epworth Gravels Management Area. The principal aquifers are the Shallow Alluvial aquifer, the Epworth Gravels aquifer, the Fox Canyon aquifer (FCA), and the Grimes Canyon aquifer (GCA) (FCGMA 2019). The FCA and GCA are present in both the WLPMA and ELPMA, although hydrogeologic communication between the two management areas is limited by the Somis Fault. The Shallow Alluvial aquifer is only present in the East Las Posas Management Area (ELMPA), constrained to an area adjacent to Arroyo Simi–Las Posas. The Epworth Gravels aquifer is located geographically within the ELPMA, near Broadway Road, however it is hydrologically disconnected from the underlying FCA and, therefore, is defined as its own management area. This first Periodic Evaluation of the GSP evaluates the impacts of climate, water usage, and groundwater management decisions on groundwater conditions in the WLPMA, ELPMA, and Epworth Gravels Management Area between water year 2015[3], the last water year reported in the GSP, and water year 2024.

Groundwater elevations in the WLPMA reflect the influences of groundwater recharge and groundwater production between water year 2015 and water year 2024. In the western part of the WLPMA groundwater elevations in the FCA were higher in water year 2024 than they were in water year 2015. This part of the WLPMA is adjacent to United Water Conservation District's (UWCD) groundwater recharge operations in the Oxnard Subbasin, and groundwater elevation changes reflect the recent water years in which UWCD has been able to divert higher volumes of water from the Santa Clara River for recharge in the Oxnard Forebay. In contrast, groundwater elevations in the eastern part of the WLPMA were lower in water year 2024 than they were in water year 2015. These groundwater elevations reflect the ongoing groundwater production in this area with limited recharge.

Groundwater elevations in the ELPMA reflect the influences of surface water recharge from Arroyo Simi-Las Posas, Calleguas Municipal Water District (CMWD) aquifer storage and recovery (ASR) operations, and groundwater production. Between water year 2015 and water year 2024 groundwater elevations in the Shallow Alluvial aquifer, which are primarily influenced by flow in Arroyo Simi-Las Posas, were stable at the upstream wells in the ELPMA and increased by 1 to 6 feet in the downstream wells. Over the same time period, groundwater elevations in the northern and eastern portions of the FCA generally declined as a result of groundwater production in areas of limited groundwater recharge. Groundwater elevations central ELPMA near the CMWD ASR well field, and in the western ELPMA were stable, or increased, between 2015 and 2024, reflecting the CMWD recharge operations, and reduced spring agricultural demand in an area of the ELPMA that is influenced by recharge from Arroyo Simi-Las Posas. The groundwater elevation in the GCA remains a partial data gap that requires filling as the only well screened in the

[3] A water year begins October 1 and ends September 30 to reflect the precipitation patterns in California. Under DWR's definition of a water year, water year 2024 began October 1, 2023 and ended September 30, 2024.

GCA did not have sufficient measurements to evaluate the change in groundwater elevation between water year 2015 and water year 2024.

Groundwater elevations in the Epworth Gravels Management Area were higher in 2024 than they were in 2015, reflecting the combined influences of reduced groundwater production and increased precipitation in water years 2023 and 2024.

Relationship to the Sustainable Management Criteria

The GSP established minimum threshold and measurable objective groundwater elevations at 5 representative monitoring points, or "key wells", in the WLPMA, 14 key wells in the ELPMA, and 1 key well in the Epworth Gravels Management Area. As noted in the GSP, groundwater elevations below the minimum thresholds are likely to cause undesirable results. In 2015, groundwater elevations were above the minimum thresholds at 4 of the 5 key wells in the WLPMA, all of the key wells in the ELPMA, and the only key well in the Epworth Gravels Management Area (FCGMA 2019). Groundwater elevations in the fall of 2023 were below the minimum thresholds at 2 of the 5 key wells measured in the WLPMA. However, in the spring of 2024, groundwater elevations were above the minimum thresholds at all of the key wells measured in the WLPMA, ELPMA, and Epworth Gravels Management Area.

The eastern portion of the WLPMA was the only portion of the LPVB to experience undesirable results between 2015 and 2024. In this area, fall groundwater elevations were consistently below the minimum threshold between water year 2019 and water year 2024 at one key well. The prolonged period of minimum threshold exceedances at a single well was identified as an undesirable result in the GSP (FCGMA 2019). Projects currently being evaluated as part of the Judgment will need to address the groundwater elevation declines in the eastern portion of the WLPMA in order to avoid future undesirable results.

Water Supplies in the Subbasin

Water supplies in the LPVB consist of imported water, recycled water, and groundwater (Table ES-2). Total water supplies since 2015 (2016-2022) were approximately 4% higher than the historical average, largely due to an increase in groundwater production in the ELPMA and WLPMA and additional deliveries of recycled water. Additional groundwater production increases are currently planned for the LPVB under the Judgment as long as sufficient projects are developed to increase the sustainable yield and avoid undesirable results.

Table ES-2. Historical and Current Water Supplies in the Oxnard Subbasin

Water Source		Historical Average (1985 - 2015) [Acre-Feet per Year][a]	Current Average (2016 - 2022) [Acre-Feet per Year][a]
Groundwater	WLPMA	13,980	15,730
	ELPMA	18,480	20,720
	Epworth Gravels	1,290	460
Recycled Water		210	790
CMWD Imported Water		10,510	8,360
Camrosa Water District Deliveries		90	220
Total		**44,560**	**46,280**

a Rounded to the nearest ten (10) acre-feet.

Future Groundwater Conditions

The average groundwater production in water years 2021 and 2022, the most recent water years in which complete groundwater production rates were reported to FCGMA, exceeded the upper estimate of the sustainable yield of the WLPMA of by approximately 3,100 AFY and exceeded the upper estimate of the sustainable yield of the ELPMA by approximately 2,300 AFY. The average water year 2021 and 2022 groundwater production rate in the Epworth Gravels Management Area was within the estimated sustainable yield range for the Epworth Gravels aquifer. To address the groundwater production rates in excess of the sustainable yield in the WLPMA and ELPMA, FCGMA, with consultation, review, and comment from the LPVB policy advisory committee and technical advisory committee, will be evaluating a broader suite of projects and their benefits during development of a Basin Optimization Plan and Basin Optimization Yield Study mandated by the LPVB Judgment. Additionally, FCGMA will be evaluating a groundwater production "rampdown rate," as mandated by the LPVB Judgment. The rampdown rate assumes the "operating yield" of the basin is 40,000 AFY, and that decreases in groundwater production will occur linearly, over annual increments, between the year in which the rampdown begins and water year 2040[4].

Assessment of Progress Towards Sustainability

The primary sustainability goal for the LPVB is to "maintain a sufficient volume of groundwater in storage in each management area so that there is no significant and unreasonable net decline in groundwater or storage over wet and dry climatic cycles" (FCGMA 2019). Additionally, "groundwater levels in the WLPMA should be maintained at elevations that are high enough to not inhibit the ability of the Oxnard Subbasin to prevent net landward migration of the saline water impact front" in the Oxnard Subbasin after 2040 (FCGMA 2019). Groundwater elevations in the LPVB indicate that it is not currently experiencing undesirable results, although the WLPMA did experience undesirable results over the first five years of GSP implementation. FCGMA continues to work toward long-term sustainability in the LPVB in its dual role as the GSA and Watermaster for the Basin. Since adopting the GSP, FCGMA has:

- Conducted ongoing groundwater elevation and quality monitoring.
- Implemented projects that address data gaps,
- Development, evaluation, and implementation of projects that increase water supplies and the sustainable yield of the Subbasin.
- Begun to evaluate implementing a replenishment fee that could be used to purchase water for delivery in lieu of groundwater production in the WLPMA[5].

The information collected through these activities has improved groundwater condition monitoring, the hydrogeologic conceptual model of the LPVB, and the understanding of projects and management actions that are implementable and support sustainable groundwater management in the LPVB. This has resulted in improved estimates of the sustainable yield and potential improvements to the sustainable management criteria that will guide management over the next five years. The largest uncertainty is related to how the LPVB Judgment will impact FCGMA's ability to implement the GSP and sustainably manage the LPVB. Over the next five-years, FCGMA will continue to work towards sustainability and will re-evaluate the impacts of climate, water usage, project

[4] The Judgment defines the start of water year 2040 as October 1, 2040.
[5] The work conducted to evaluate the replenishment fee has been supplanted by the fee structure imposed in the LPVB Judgment.

implementation, and legal actions on groundwater conditions and groundwater management in the LPVB in accordance with the ongoing GSP evaluation process and adaptive management approach outlined in SGMA.

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1 Significant New Information

Table 1-1. Summary of New Information Since Groundwater Sustainability Plan

Significant New Information	Description	Aspects of Plan Affected	Warrant Changes to Any Aspects of the Plan
LPVB Adjudication			
Las Posas Valley Water Rights Coalition, et al., v. Fox Canyon Groundwater Management Agency	The Judgment adjudicates all groundwater rights in the LPVB, provides for the LPVB's sustainable management pursuant to SGMA, and appoints FCGMA as the Watermaster for the LPVB responsible for overseeing implementation of the Judgment.	Administrative Information	Yes
Basin Setting			
SVWQCP Discharges to Arroyo Simi-Las Posas	Since adoption of the GSP, the City of Simi Valley is no longer pursuing a program to increase recycled water use within their service area. As a result, FCGMA anticipates approximately more flow in Arroyo Simi-Las Posas than previously assumed for the GSP	Future water budgets; Sustainable Yield.	Yes.
Monitoring Network Information			
Interferometric Synthetic Aperture Radar (InSAR) Data	DWR InSAR data is now available to evaluate land subsidence in the LPVB.	Monitoring Network	Yes
Projects and Management Actions			
Water Supply Projects			
Infrastructure Improvements to Zone Mutual Water Company's water delivery system	This project increases the capacity of ZMWC's delivery system to physically transfer water between the ELPMA and WLPMA of the LPVB by converting the existing ZMWC delivery system from gravity to pressure (FCGMA 2022).	Projects and Management Actions	Yes
Moorpark Groundwater Desalter	This project constructs a new groundwater desalter facility located east of the Moorpark Water Reclamation Facility to improve water quality in the southern portion of the ELPMA and provide an additional source of potable water supply to the LPVB (FCGMA 2022).	Projects and Management Actions	Yes
Arroyo Las Posas Storm Flow Diversions for Recharge to the ELPMA	This project uses the stabilizer structure in the Arroyo Simi-Las Posas to divert storm flows during high flow events for recharge to the ELPMA (FCGMA 2022). The structure is, adjacent to the Moorpark Wastewater Water Reclamation Facility operated by VCWWD-1,	Projects and Management Actions	Yes

Table 1-1. Summary of New Information Since Groundwater Sustainability Plan

Significant New Information	Description	Aspects of Plan Affected	Warrant Changes to Any Aspects of the Plan
Projects to Address Data Gaps			
Installation of Additional Groundwater Monitoring Wells	This project proposes installation of multi-depth monitoring wells in the LPVB to assess groundwater conditions in the principal aquifers in the areas of the LPVB that lack data (FCGMA 2022).	Projects and Management Actions	Yes
Installation of Transducers in Monitoring Wells	This project proposes installation of transducers in representative monitoring points, or key wells, in the LPVB to reduce the temporal data gaps that currently exist in the record of aquifer conditions (FCGMA 2022).	Projects and Management Actions	Yes
Feasibility Studies			
Supplemental Water Supply Sources for the northern ELPMA	The studies will investigate the feasibility of providing supplemental water supplies to the northern area of the ELPMA where groundwater elevations have declined in excess of 250 feet, locally (FCGMA 2022).	Projects and Management Actions	Yes
Agency Coordination and Public Participation			
Formation of a Policy Advisory Committee (PAC)	The PAC serves as an advisory board to the LPVB Watermaster on policy-related matters of a non-technical nature. The PAC provides water rights holders with a voice and representation on policy matters in the LPVB.	Public Participation	No
Formation of a Technical Advisory Committee (TAC)	The TAC serves as an advisory board to the LPVB Watermaster on technical matters relating to groundwater management and sustainability of the LPVB.	Public Participation	No

2 Current Groundwater Conditions

2.1 Background

The Las Posas Valley Basin (DWR Bulletin 118 Groundwater Basin 4-008) is an alluvial groundwater basin, underlying the Las Posas Valley in Ventura County, California (Figure 2-1, Vicinity Map for the Las Posas Valley Basin). The Las Posas Valley Basin (LPVB) is divided into three management areas: the West Las Posas Management Area (WLPMA), the East Las Posas Management Area (ELPMA), and the Epworth Gravels Management Area (FCGMA 2019). The WLPMA and ELPMA are separated from each other by the Somis Fault, which limits the flow of groundwater across it. The Epworth Gravels Management Area is separated from the underlying ELPMA by low permeability sediments of the Upper San Pedro Formation (USP).

The WLPMA is in hydrologic communication with the Oxnard Subbasin to the west, and the Pleasant Valley Basin (PVB) to the south at Somis Gap. The boundary between the WLPMA and the Oxnard Subbasin is a jurisdictional boundary that follows parcel lines. The boundary between the WLPMA and the PVB is defined by the Springville – Simi - Santa Rosa fault zone. The ELPMA is connected to the PVB to the south via the Shallow Alluvial aquifer and Fox Canyon aquifer (FCA) along Arroyo Las Posas. The northern, southern, and eastern boundaries of the LPVB are delineated by the contact between the alluvial deposits and surface exposures of bedrock uplifted through regional faulting and folding associated with compressional forces along the western bend in the San Andreas Fault (FCGMA 2019).

There are four principal aquifers in the LPVB: the Shallow Alluvial aquifer in the ELPMA, the Epworth Gravels aquifer in the Epworth Gravels Management Area, the FCA in both the ELPMA and WLPMA, and the Grimes Canyon aquifer (GCA) in both the ELPMA and WLPMA (FCGMA 2019).

The primary sustainability goal for LPVB established in the Groundwater Sustainability Plan (GSP) is "to maintain a sufficient volume of groundwater in storage in each management area so that there is no significant and unreasonable decline in groundwater elevation or storage over wet and dry climatic cycles" (FCGMA 2019). Additionally, because the WLPMA is in hydraulic communication with the Oxnard Subbasin, the GSP established that "groundwater levels in the WLPMA should be maintained at elevations that are high enough to not inhibit the ability of the Oxnard Subbasin to prevent net landward migration of the saline water impact front after 2040.[6]"

Groundwater elevation minimum thresholds and measurable objectives were established at representative monitoring points, herein referred to as "key wells," in each management area of the LPVB (Figure 2-2, Representative Monitoring Points in the LPVB). In the WLPMA, minimum threshold groundwater elevations were selected to meet the sustainability goal of not inhibiting the ability of the Oxnard Subbasin to prevent net landward migration of the saline water impact front. In the ELPMA, the minimum threshold water levels were selected to limit reduction in storage to less than 20%, relative to the estimated 2015 groundwater storage volume, in areas of the ELPMA where the FCA may convert from being confined to unconfined. In areas where conversion of the FCA from confined to unconfined is not likely to occur, the minimum threshold water levels were selected based on the historical low water levels (FCGMA 2019). The minimum threshold groundwater level in the Epworth Gravels

6 Sources of water high in chloride in the Oxnard Subbasin include modern seawater as well as brines and connate water in fine-grained sediments and formations that underlie the subbasin. Therefore, the area of the Oxnard Subbasin impacted by concentrations of chloride greater than 500 milligrams per liter is referred to as the "saline water impact area," rather than the "seawater intrusion impact area," to reflect all the potential sources of chloride to the aquifers in this area.

Management Area was selected as the groundwater level that limits reduction in storage to less than 20% relative to the estimated 2015 groundwater storage volume. The measurable objective water levels in all three management areas of the LPVB are at least 20 feet higher than the minimum threshold groundwater levels to allow for operational flexibility (FCGMA 2019).

At the time the GSP was prepared, the groundwater elevations were below the minimum threshold groundwater elevations in the at four of the five key wells in WLPMA, the only key well in the Epworth Gravels Management Area, and one well in the ELPMA. Therefore, the GSP established interim milestone groundwater elevations for these wells (FCGMA 2019). Groundwater elevations are compared to the interim milestones for these wells in the following sections.

The groundwater elevation minimum thresholds and measurable objectives selected to meet the sustainability goal for the LPVB were used as a proxy for all other applicable sustainability indicators in the GSP (FCGMA 2019). These groundwater elevations are higher than or equal to the historical low groundwater elevations. Therefore, the minimum thresholds and measurable objective water levels will prevent chronic lowering of groundwater levels, significant and unreasonable reduction of groundwater storage, degraded water quality as a result of groundwater production, and land subsidence related to groundwater production (FCGMA 2019). Depletions of interconnected surface water that result in a significant and unreasonable loss of groundwater-dependent ecosystem (GDE) habitat, have not occurred within the LPVB because the potential GDEs in the ELPMA are supported by surface water discharges of treated wastewater and dewatering well water that occur upstream of the eastern boundary of the LPVB (FCGMA 2019). Although the Shallow Alluvial aquifer in the ELPMA is considered to be a principal aquifer, groundwater production in the ELPMA primarily occurs in the FCA and GCA (FCGMA 2019).

2.1.1 Department of Water Resources Recommended Corrective Actions

DWR's assessment and approval of the GSP included five "recommended corrective actions" that should be considered for the first periodic GSP evaluation. These recommended corrective actions and the applicable sustainability indicators are:

RECOMMENDED CORRECTIVE ACTION 1

Investigate the hydraulic connectivity of the Arroyo Simi-Las Posas, shallow aquifers, and principal aquifer to understand the reliance of the potential GDEs on the native flow and the depletion of interconnected surface water bodies. Also, identify specific locations where Arroyo Simi-Las Posas is connected to the underlying aquifer and conduct necessary investigation to quantify the depletion of interconnected surface water along with the timing of depletions.

Provide a schedule detailing when and how the data gaps identified in the GSP related to shallow groundwater monitoring near surface water bodies will be fulfilled and confirm the identification of potential GDEs.

Recommended corrective action 1 applies to depletions of interconnected surface water.

RECOMMENDED CORRECTIVE ACTION 2

Discuss the potential effects of the minimum thresholds and measurable objectives on beneficial uses and users of groundwater, particularly in the areas where groundwater levels will be maintained below 2015 and historical low levels. Provide an evaluation of the groundwater level and storage conditions when the groundwater storage loss will be 20% compared to 2015 conditions in the ELPMA and the Epworth Gravels Management Area, and, based on the result of the evaluation, discuss the effects of such conditions on beneficial users and users.

Recommended corrective action 2 applies to groundwater levels and groundwater in storage.

RECOMMENDED CORRECTIVE ACTION 3

By the first periodic evaluation of the GSP, the Agency should further describe efforts to evaluate the connection between groundwater production and groundwater quality, including the monitoring the Agency is conducting and any progress made toward evaluation of the causal relationship referenced in the GSP. The Agency should document specific details of the processes they will use to determine if groundwater management and extraction are causing adverse impacts to groundwater quality. This should include coordination with all interested parties, beneficial users of groundwater, water quality regulatory agencies, and water quality program administrators within the Basin.

Recommended corrective action 3 applies to water quality.

RECOMMENDED CORRECTIVE ACTION 4

Include periodic subsidence monitoring into the GSP to demonstrate that groundwater levels are appropriate to use as a proxy. Provide a technical basis that supports the Agency's decision of setting the minimum threshold for groundwater level below the historical low in some areas of the Basin and how that minimum threshold will avoid undesirable results related to land subsidence. Additionally, describe the potential impacts of land subsidence on beneficial uses and users of groundwater and the potential for land subsidence to impact critical infrastructure, especially for the area where the minimum threshold groundwater levels are lower than the historical low.

Recommended corrective action 4 applies to land subsidence.

RECOMMENDED CORRECTIVE ACTION 5

Develop and provide a new project or a management action as a contingency plan to include in the GSP. This alternate project or management action should address how the Basin intends to achieve its sustainability goal in the event that imported water is unavailable to use in lieu of groundwater production in the WLPMA, or if any of the project or management action included in the GSP is unable to produce expected benefit. Additionally, the project or management action provided should be developed so that it is ready to be implemented with the 20-year SGMA [Sustainable Groundwater Management Act] timeline.

> Recommended corrective action 5 does not apply to a specific sustainability indicator, but is addressed in Section 3.1.1, Management Actions. Additionally, new projects that will be evaluated over the next five years are summarized in Section 3.2, Newly Identified Projects and Management Actions.

2.1.2 Chapter 2 Structure

The following sections discuss the current groundwater conditions related to each of the sustainability indicators in the Subbasin. The groundwater levels relative to the SMC are discussed in Section 2.2, Groundwater Levels, along with a discussion of undesirable results related to groundwater levels, DWR recommended corrective actions related to groundwater levels, and progress toward achieving sustainability. Sections 2.3, Groundwater in Storage, through 2.7, Groundwater-Surface Water Connections, focus on the undesirable results, DWR recommended corrective actions, and the progress toward achieving sustainability for each sustainability indicator because the groundwater levels relative to the SMCs are discussed in Section 2.2, Groundwater Levels.

Changes to the SMC, if recommended, are discussed relative to each sustainability indicator.

2.2 Groundwater Levels

This section summarizes current (i.e., water year 2024) groundwater elevations in the LPVB as well as their relation to the SMCs, groundwater elevations measured at the start of the evaluation period (i.e., water year 2020), and groundwater elevations measured at the end of the GSP reporting period (i.e., calendar year 2015)[7]. Water year groundwater elevations are characterized using seasonal low and seasonal high measurements. Seasonal low groundwater elevations are characterized using measurements collected between October 2 and October 29 and seasonal high groundwater elevations are characterized using measurements collected between March 2 and March 29.

In fall 2023, groundwater elevations were measured in 17 of the 21 key wells established in the GSP (Figure 2-3, Fall 2023 Water Levels Relative to the SMCs). In spring 2024, groundwater elevations were measured in 15 of the 21 key wells (Figure 2-4, Spring 2024 Water Levels Relative to the SMCs).

2.2.1 Department of Water Resources Recommended Corrective Actions

DWR issued a recommended corrective action related to groundwater levels and storage (DWR 2022). This recommended corrective action states:

> Discuss the potential effects of the minimum thresholds and measurable objectives on beneficial uses and users of groundwater, particularly in the areas where groundwater levels will be maintained below 2015 and historical low levels. Provide an evaluation of the groundwater level and storage conditions when the groundwater storage loss will be 20 percent compared to 2015

7 For this periodic evaluation, water year is defined as the period from October 1 of the previous calendar year through September 30 of the current calendar year. For example, water year 2024 is defined as the period from October 1, 2023, through September 30, 2024.

conditions in the ELPMA and the Epworth Gravels Management Area, and, based on the result of the evaluation, discuss the effects of such conditions on beneficial users and users.

The following subsections discuss how this recommended corrective action was addressed since it was issued in 2022.

2.2.1.1 West Las Posas Management Area

In the WLPMA, the minimum thresholds and measurable objectives for the key wells are all above the 2015 and historical low groundwater elevations. As discussed in the GSP, the beneficial uses of groundwater in the WLPMA are anticipated to improve with these minimum thresholds and measurable objectives because they will prevent chronic lowering of groundwater levels and work in concert with the selected minimum thresholds and measurable objectives in the adjacent Oxnard Subbasin to limit further seawater intrusion into the coastal aquifers in that basin. The minimum thresholds and measurable objectives may impact beneficial users of groundwater in the WLPMA if additional projects are not developed for the region because users may be forced to reduce groundwater production in order to maintain groundwater elevations above the minimum thresholds. However, since the GSP was adopted, groundwater use in the LPVB has undergone adjudication. The Fox Canyon Groundwater Management Agency (FCGMA), as Watermaster for the LPVB, is working in consultation with the LPVB Policy Advisory Committee (PAC) and Technical Advisory Committee (TAC) to develop projects to minimize future pumping reductions while maintaining groundwater elevations above the minimum thresholds.

2.2.1.2 East Las Posas Management Area

In the ELPMA, groundwater elevation declines cause differential impacts depending on location within the management area. These impacts are expected to be greatest in parts of the ELPMA where groundwater in the FCA occurs under unconfined conditions or may convert from confined to unconfined conditions. In order to limit the area of the FCA that would convert from confined to unconfined conditions with declining water levels, the undesirable result associated with water level declines and loss of storage was defined as localized loss of storage in excess of 20% of the estimated 2015 groundwater storage (FCGMA 2019). The areas of the ELPMA prone to conversion from confined to unconfined conditions are on the northern and southern margins of the management area, and in the vicinity of the Moorpark anticline in the central portion of the management area (FCGMA 2019).

FCGMA reviewed well screen intervals and groundwater production in areas of the ELPMA that are prone to conversion from confined to unconfined conditions. The depth and groundwater production rates from the wells in this area indicate that they are agricultural wells and are not domestic or de minimis wells that produce less than 2 acre-feet per year (AFY). Of the 22 wells located within this area, groundwater elevation declines to the minimum threshold would result in projected groundwater elevations that are below the top of the well screen in nine wells (Table 2-1, Wells in the Area of the ELPMA Subject to Conversion of the FCA from Confined to Unconfined Conditions). Projections suggest that groundwater decline to the minimum threshold would expose greater than 50% of the well screen in four wells, and two of these wells would go dry (Table 2-1).

Table 2-1. Wells in the Area of the ELPMA Subject to Conversion of the FCA from Confined to Unconfined Conditions

State Well Number	Projected Groundwater Elevation at the Minimum Threshold (ft MSL)	Top Perforation (ft MSL)	Bottom Perforation (ft MSL)	Feet Below Top of Screen at Minimum Threshold (ft)	Loss of Production from Greater than 50% of the Well Screen	Projected Water Level Below the Bottom of the Well
03N20W26R03S	100	113	-347	13	No	No
03N20W34L02S	76	-175	-552	NA	No	No
02N20W01B03S	82	47	-151	NA	No	No
03N19W31E02S	108	75	-265	NA	No	No
03N19W31D03S	107	-420	-700	NA	No	No
03N19W31D02S	107	142	-108	35	No	No
03N19W31C02S	106	52	-378	NA	No	No
03N19W31D05S	107	0	-420	NA	No	No
03N20W33B03S	76	82	-453	6	No	No
03N20W33B01S	76	72	-248	NA	No	No
03N20W35G01S	100	-128	-425	NA	No	No
02N20W01A01S	74	222	-238	148	No	No
02N20W13F02S	193	100	-120	NA	No	No
03N19W30D01S	101	420	145	319	Yes	Yes
03N19W30D02S	101	451	126	350	Yes	Yes
03N19W19J01S	130	396	126	266	Yes	No
03N19W28N03S	130	262	72	132	Yes	No
03N19W31N02S	110	35	-267	NA	No	No
03N19W31M03S	108	-242	-442	NA	No	No
03N19W31M04S	108	38	-272	NA	No	No
03N19W31H01S	104	-196	-476	NA	No	No
03N20W27H03S	-28	16	-176	44	No	No

Notes: NA = "Not Applicable." Well is projected to go dry if the projected water level at the minimum threshold exposes more than 50% of the total screen interval.

The average groundwater production between 2015 and 2022 was 506 AFY for the nine wells in which groundwater elevations would fall below the top of the screen. The average groundwater production was 263 AFY from the 4 wells in which greater than 50% of the screen interval would be exposed. The GSP estimated the sustainable yield of the ELPMA to be between 15,500 and 20,100 AFY. Loss of production at the minimum threshold groundwater elevations represents a loss of between 1% and 3% of the total production from the management area.

In its role as LPVB Watermaster, FCGMA appointed members to two advisory committees: the LPVB TAC and LPVB PAC. As provided in the LPVB adjudication Judgment, the FCGMA, in consultation with the TAC and PAC, are currently working to develop a suite of projects to increase the sustainable yield of the basin and offset losses in yield because of groundwater elevation declines.

2.2.1.3 Epworth Gravels Management Area

The minimum threshold in the Epworth Gravels Management Area, which allows for up to 20% loss of storage compared to 2015 conditions, is above the historical low water level (FCGMA 2019). Many groundwater users with wells in the Epworth Gravels aquifer also have wells screened in the underlying FCA. As groundwater elevations decline in the Epworth Gravels aquifer, groundwater users in this management area rest their Epworth Gravels aquifer wells and rely on water from the FCA instead. In 2015, after several years of drought, groundwater elevations in the Epworth Gravels aquifer were 50 feet higher than the historical low water level because groundwater users reduced their pumping in this management area. Because the minimum threshold is higher than the historical low water level, groundwater users in this management area are familiar with and have historically implemented adaptive management strategies when the groundwater elevation declines, and the minimum threshold prevents chronic lowering of groundwater, the minimum threshold in the Epworth Gravels Management Area is anticipated to be protective of beneficial uses and users of groundwater in the LPVB.

The GSP reported on groundwater conditions through fall 2015. The change in water levels since 2015 varies geographically within the LPVB, reflecting both the influence of groundwater extraction and the availability and extent of groundwater recharge in the WLPMA, ELPMA, and Epworth Gravels Management Area.

2.2.2 Groundwater Elevation Changes in the Las Posas Valley Basin

2.2.2.1 West Las Posas Management Area

Upper San Pedro Formation

Groundwater elevations were measured in five wells in fall 2015 and fall 2023 and in six wells in spring 2015 and spring 2024 (Figure 2-5, Upper San Pedro Formation Groundwater Elevation Changes from Fall 2015 to 2023, and Figure 2-6, Upper San Pedro Formation Groundwater Elevation Changes from Spring 2015 to 2024). There are no key wells screened in the USP because it is not a primary aquifer, although it is a source of water to the underlying FCA. Between 2015 and 2024, groundwater elevations declined in the three nested wells in the central WLPMA (wells 02N21W11J04S, 02N21W11J05S, and 02N21W11J06S) and in well 02N21W15M03S (Figures 2-5 and 2-6). The only well in which groundwater elevations were higher in water year 2024 than they were in calendar year 2015 was well 02N21W16J01S in the western portion of the WLPMA (Figures 2-5 and 2-6).

Fox Canyon Aquifer

In the western part of the WLPMA, adjacent to the Oxnard Subbasin, fall 2023 and spring 2024 groundwater elevations in the FCA were approximately 55 to 35 feet higher than they were in fall 2015 and spring 2015, respectively (Figure 2-7, Fox Canyon Aquifer – Groundwater Elevation Changes from Fall 2015 to 2023, and Figure 2-8, Fox Canyon Aquifer – Groundwater Elevation Changes from Spring 2015 to 2024). Groundwater elevations in this part of the WLPMA were also higher than they were in fall 2019, the start of the current evaluation period (FCGMA 2021). Groundwater elevation recoveries in the western WLPMA since 2015 reflect the influence of UWCD's recharge operations in the Forebay Management Area of the Oxnard Subbasin, which promoted groundwater elevation recoveries in the Oxnard Subbasin of approximately 120 feet between 2015 and 2024 (FCGMA 2024a).

In contrast, groundwater elevations in the eastern part of the WLPMA were lower in the fall of 2023 than they were in fall 2015 (Figures 2-7)[8]. The largest groundwater elevation decline measured over this period was at well 02N20W06R01S, where the fall 2023 groundwater elevation was approximately 80 feet lower than fall 2015 (Table 2-2, Water Year 2024 Groundwater Elevations at Key Wells in the Las Posas Valley Basin; Figures 2-7 and 2-8). Groundwater elevation declines in the eastern WLPMA reflect ongoing groundwater production in an area with limited groundwater recharge.

Grimes Canyon Aquifer

No wells screened in the GCA had groundwater elevations measured in both fall 2015 and fall 2023 (Figure 2-9, Grimes Canyon Aquifer Groundwater Elevation Changes from Fall 2015 to 2023). Two wells, 02N21W28A02S and 02N21W22G01S, had groundwater elevations measured in both spring 2015 and spring 2024. Over this period, the groundwater elevation at these wells declined by approximately 7 and 10 feet, respectively (Figure 2-10, Grimes Canyon Aquifer Groundwater Elevation Changes from Spring 2015 to 2024). These wells are both located in the southern part of the WLPMA, within the Camarillo Hills, and the connectivity between water level elevations in these wells and other parts of the management area remains an area of uncertainty in the hydrogeologic conceptual model of the management area.

2.2.2.2 East Las Posas Management Area

Shallow Alluvial Aquifer

Groundwater elevations in the Shallow Alluvial aquifer have been stable since 2015 with elevations in upstream wells declining by 1 foot or less between calendar year 2015 and water year 2024. Groundwater elevations in downstream wells, adjacent to the PVB, increased by 1 to 6 feet over the same time period (Table 2-2; Figure 2-11, Shallow Alluvium – Groundwater Elevation Changes from Fall 2015 to 2024, and Figure 2-12, Shallow Alluvium Groundwater Elevation Changes from Spring 2015 to 2024). There are two key wells screened in the Shallow Alluvial aquifer. The groundwater elevation increased in well 02N20W09Q08S by 1 foot between fall 2019 and fall 2023 and increased by 0.5 feet between spring 2020 and spring 2024 (Table 2-2). Groundwater elevation was not measured in well 02N20W12MMW1 in water year 2024.

[8] There are insufficient measurements to provide a direct comparison of spring 2015 and spring 2024 groundwater elevations in the WLPMA.

Table 2-2. Water Year 2024 Groundwater Elevations at Key Wells in the Las Posas Valley Basin

State Well Number	Aquifer	Management Area	Fall Groundwater Elevations			Spring Groundwater Elevations			Minimum Threshold	Measurable Objective	2025 Interim Mile-stone
			2023	Change from 2019	Change from 2015	2024	Change from 2020	Change from 2015			
03N19W29F06S	Epworth Gravels	Epworth Gravels	608.0	13.7	9.4	619.0	12.8	17.5	555	585	581
02N20W09Q08S	Shallow Alluvial	ELPMA	272.0	1.0	1.0	275.0	1.0	2.4	170	270	—
02N20W12 - MMW1	Shallow Alluvial	ELPMA	369.0	0.0	—	NM	—	—	300	370	—
02N20W01B02S	FCA	ELPMA	134.0	—	—	143.0	—	—	80	120	—
02N20W03H01S	FCA	ELPMA	132.0	-4.0	-19.7	150.0	-8.0	-15.5	100	135	—
02N20W04F02S	FCA	ELPMA	NM	—	—	NM	—	—	100	145	—
02N20W10D02S	FCA	ELPMA	138.7	-3.5	-11.8	198.4	48.0	32.9	80	130	—
02N20W10G01S	FCA	ELPMA	250.2	-0.5	5.4	260.2	-0.1	0.6	100	230	—
02N20W10J01S	FCA	ELPMA	281.6	0.8	2.3	288.5	1.4	2.7	110	250	—
03N19W19J01S	FCA	ELPMA	154.8	-20	-21.4	158.2	-23.0	-21.5	130	160	—
03N19W28N03S	FCA	ELPMA	156.0	—	-25.0	158.0	—	-24.0	130	170	—
03N19W31B01S	FCA	ELPMA	128.7	-34.70	-17.8	NM	—	—	105	145	—
03N20W34G01S	FCA	ELPMA	133.8	—	-8.1	145.3	-8.5	0.2	75	130	—
03N20W35R03S	FCA	ELPMA	135.0	-48.1	-1.6	147.2	—	-8.4	105	145	139
03N20W26R03S	FCA	ELPMA	130.8	-44.0	—	144.4	—	-2.1	100	120	—
03N20W35R02S	FCA	ELPMA	136.0	-45.8	7.2	148.1	—	-8.5	105	145	133
02N20W06R01S	LAS	WLPMA	-235.6	—	-81.6	NM	—	—	-170	-125	-147
02N20W08F01S	LAS	WLPMA	NM	—	—	-163.8	—	—	-195	-150	—
02N21W16J03S	LAS	WLPMA	NM	—	—	NM	—	—	-75	-45	-71
02N21W11J03S	LAS	WLPMA	-71.3	-1.5	-2.3	-63.0	-4.9	-12.0	-70	-50	-64
02N21W12H01S	LAS	WLPMA	-33.4	10.1	—	-25.3	10.1	—	-70	-45	—

Notes: NM = Not Measured. "-" indicates that one or more measurements during the analysis window were not collected. FCA = Fox Canyon aquifer. LAS = Lower Aquifer System. ELPMA = East Las Posas Management Area; WLPMA = West Las Posas Management Area. Key Wells in the WLPMA are either screened in the FCA or across multiple aquifers of the LAS

[a] Positive values indicate that groundwater elevations at the key well have increased. Negative values indicate that groundwater elevations at the key well have declined.

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Upper San Pedro Formation

There are no key wells screened in the USP in the ELPMA because it is not a principal aquifer. However, it acts as a source of water to the underlying FCA. Only three wells in the USP had both fall 2015 and fall 2023 groundwater level measurements, and only one well screened in the USP had both spring 2015 and spring 2024 groundwater elevation measurements (Figures 2-7 and 2-8). The groundwater elevation declined by 12.8 feet between fall 2015 and fall 2023 and by 9.4 feet in well 03N20W35R04S between spring 2015 and spring 2024 (Figures 2-7 and 2-8). The groundwater elevation in well 02N19W07K03S declined by 0.6 feet between fall 2015 and fall 2023, whereas the groundwater elevation in well 02N19W06F01S increased by 2.9 feet over the same period (Figure 2-7).

Since the start of the evaluation period, fall groundwater elevations increased by approximately 20 feet at well 02N19W06F01S, but declined by approximately 1 and 5 feet at wells 02N19W07K03S and 03N20W35R04S, respectively (FCGMA 2021). Where measured, spring groundwater elevations changed by less than 2 feet between 2020 and 2024 (FCGMA 2021).

Fox Canyon Aquifer

Between fall 2015 and fall 2023 groundwater elevations in the FCA increased in the central portion of the ELPMA by up to 10 feet and generally declined by up to 25 feet in the balance of the ELPMA (Figure 2-7). The central part of the ELPMA is influenced by Calleguas Municipal Water District (CMWD) aquifer storage and recovery (ASR) operations.

A similar pattern of water level elevation change is observed from spring 2015 through spring 2024, with declines in the northern and eastern portions of the ELPMA and increases in groundwater elevation in the central ELPMA (Figure 2-8). However, the primary difference, is in the western part of the ELPMA, where spring 2024 groundwater elevations were higher than they were in spring 2015. This observed difference is based on groundwater elevations measured in an active agricultural well (02N20W10D02S), and likely reflects a seasonal change in local agricultural water demands.

Groundwater elevation measurements are available for nine key wells in both fall 2019 and fall 2023. Fall groundwater elevations decreased from less than a foot to 48 feet at eight wells and increased by less than a foot at one well between 2019 and 2023 (Table 2-2). Groundwater elevation measurements are available for six key wells in both spring 2020 and spring 2024 (Table 2-2). Spring groundwater elevations decreased by less than a foot to 23 feet in four wells and increased by approximately 1 foot to 48 feet in the other two between 2020 and 2024 (Table 2-2).

Grimes Canyon Aquifer

Only one well in the ELPMA, 03N20W27B01S, is screened solely within the GCA (Figures 2-9 and 2-10). This is not a key well. Sufficient measurements were not collected by the monitoring agency to evaluate the change in groundwater elevation for fall 2015 to fall 2023 and spring 2015 to spring 2024.

2.2.2.3 Epworth Gravels

Well 03N19W29F06S is the only key well in the Epworth Gravels Management Area. The fall 2023 groundwater elevation in this well was 9 feet higher than the fall 2015 and 14 feet higher than the fall 2019 (Table 2-1; Figure 2-13, Epworth Gravels Aquifer – Groundwater Elevation Changes from Fall 2015 to 2023). The spring 2024 groundwater elevation in this well was 13 feet and 18 feet higher than it was in both spring 2020 and spring 2015, respectively, (Table 2-1; Figure 2-14, Epworth Gravels Aquifer – Groundwater Elevation Changes from Spring 2015 to 2024).

2.2.3 Sustainable Management Criteria

2.2.3.1 Measurable Objectives

In 2015, the end of the GSP reporting period, groundwater elevations in the WLPMA were lower than the measurable objective water levels at three of the five key wells (FCGMA 2019). In the ELPMA, groundwater elevations were lower than the measurable objective water levels at two of the fifteen key wells (FCGMA 2019). In the Epworth Gravels management area, the groundwater elevation at the only key well was below the measurable objective (FCGMA 2019). The GSP defined interim milestones for the key wells with groundwater elevations below the measurable objectives, so that groundwater elevations would reach the measurable objectives by 2040 (FCGMA 2019).

Fall 2023 groundwater elevations were measured in three of the five key wells in the WLPMA. The elevations at two of these wells were below the measurable objectives (Table 2-2; Table 2-1; Figure 2-3 and Figure 2-15, Groundwater Elevation Hydrographs for Representative Monitoring Points in the WLPMA). Spring 2024 groundwater elevations were above the measurable objective groundwater elevations at two (02N20W08F01S and 02N21W12H01S) of the three of the key wells measured in the WLPMA (Table 2-2; Figures 2-4 and 2-15). FCGMA has relied on other agencies for monitoring data but recognizes the need for more consistent monitoring of groundwater elevations in the WLPMA and anticipates that groundwater elevations will rise between 2025 and 2040 with the implementation of projects and management actions in the WLPMA that are consistent with the GSP and Judgment.

In the ELPMA, fall 2023 groundwater elevations were measured in 14 key wells and were above the measurable objectives in seven of these wells. Spring 2024 groundwater elevations were measured in 12 of 15 key wells and were above the measurable objectives in 10 of these wells (Table 2-2; Figure 2-4; Figure 2-16, Groundwater Elevation Hydrographs for ELPMA Representative Monitoring Points Screened in the Shallow Alluvial Aquifer; and Figures 2-17a and 2-17b, Groundwater Elevation Hydrographs for ELPMA Representative Monitoring Points Screened in the FCA). FCGMA anticipates that groundwater elevations will stabilize between 2025 and 2040 with the implementation of projects and management actions in the ELPMA that are consistent with the GSP and Judgment.

In the only key well in the Epworth Gravels Management Area, the groundwater elevation was above the measurable objective groundwater in fall 2023 and spring 2024 (Table 2-2; Figures 2-3, 2-4, and 2-18, Groundwater Elevation Hydrographs for the Representative Monitoring Point in the Epworth Gravels Aquifer).

2.2.3.2 Minimum Thresholds

In 2015, the end of the GSP reporting period, groundwater elevations in the WLPMA were above than the minimum threshold water levels at four of the five key wells in the management area (FCGMA 2019). In the ELPMA, groundwater elevations were higher than the minimum threshold water levels at all of the key wells in the management area (FCGMA 2019). In the Epworth Gravels management area, the groundwater elevation at the only key well was above the minimum threshold.

Fall 2023 groundwater elevations were measured in three of the five key wells in the WLPMA. The elevations at two of these wells, wells 02N20W06R01S and 02N21W11J03S, were below the minimum thresholds (Table 2-1). Spring 2024 groundwater elevations were above the minimum threshold groundwater elevations at all of the key wells measured in the WLPMA (Table 2-1; Figures 2-4 and 2-15).

In the ELPMA, fall 2023 and spring 2024 groundwater elevations were higher than the minimum threshold at all measured key wells (Table 2-2; Figure 2-3, 2-16, 2-17a, and 2-17b).

The groundwater elevation in the only key well in the Epworth Gravels management area was above the minimum threshold groundwater elevation in the fall of 2023 and the spring of 2024 (Table 2-1; Figures 2-3, 2-4, and 2-18).

2.2.3.3 Interim Milestones

Fall 2023 groundwater elevations were below the 2025 interim milestones the two the key wells in the WLPMA that were measured in the fall of 2023 and had established interim milestones (Table 2-1). In the WLPMA, the spring 2024 groundwater elevation was above the 2025 interim milestones for the one key well in the WLPMA that was measured and had established interim milestone (Table 2-1).

Interim milestones were established for two wells in the ELPMA. The fall 2023 groundwater elevation was approximately 3 feet higher than the interim milestone for one of these wells and 4 feet lower in the other (Table 2-2). The spring 2024 groundwater elevations were above the interim milestones at both wells (Table 2-2).

Both the fall and spring groundwater elevations at the key well in the Epworth Gravels Management Area were above the 2025 interim milestone for this well (Table 2-1).

2.2.4 Undesirable Results

The GSP defined undesirable results for each management area of the LPVB. The WLPMA is expected to experience undesirable results if:

- In any single monitoring event, water levels in three of the five representative monitoring points are below their respective minimum threshold; or
- The groundwater elevation in any individual key well is below the minimum threshold for either three consecutive monitoring events or three of five consecutive monitoring events, where monitoring events are scheduled to occur in the spring and fall of each year.

During the evaluation period (water year 2019 through water year 2024) fall groundwater elevations were consistently below the minimum threshold at well 02N20W06R01S. While groundwater elevations are currently higher than the minimum thresholds at four of the five key wells, the prolonged period of minimum threshold exceedances at well 02N20W06R01S indicates that the WLPMA has experienced undesirable results since the GSP was adopted.

The ELPMA is expected to experience undesirable results if:

- In any single monitoring event, water levels in 5 of the 15 representative monitoring points are below their respective minimum threshold; or

- The groundwater elevation in any individual key well is below the minimum threshold for either three consecutive monitoring events or three of five consecutive monitoring events.

Neither of these conditions occurred in the ELPMA during the evaluation period (Figures 2-16 and 2-17).

The Epworth Gravels Management Area would experience undesirable results if the groundwater level in the key well was below the minimum threshold for either three consecutive monitoring events or in three of five consecutive monitoring events. Neither of these conditions occurred in the Epworth Gravels Management Area during the evaluation period (Figure 2-18).

2.2.5 Progress Toward Achieving Sustainability

In the fall of 2015, groundwater elevations were above the minimum thresholds at all the representative monitoring points in the LPVB. Groundwater elevations were also above the minimum thresholds at all the representative monitoring points measured in the spring of 2024. However, groundwater elevations at well 02N20W06R01S were below the minimum thresholds for three consecutive monitoring events in 2021 through 2023, indicating that the WLPMA experienced undesirable results between 2019 and 2024. The groundwater elevation in this well was not measured in the spring of 2024.

Although the WLPMA experienced undesirable results, as defined in the GSP, during the first 5 years of implementing the GSP, the groundwater level declines observed in the WLPMA were consistent with those anticipated at the time the GSP was prepared. The LPVB interested parties are currently working to alleviate declines in groundwater levels through the funding and implementation of projects. The project that will have the most impact in the WLPMA is in-lieu deliveries of groundwater. Historically, groundwater elevations in the WLPMA have recovered by over 100 feet during previous in-lieu delivery programs.

As part of the Judgment, FCGMA is developing a Basin Optimization Plan with PAC and TAC committee consultation that identifies and prioritizes a suite of technically feasible and economically viable projects that can be implemented in the LPVB prior to 2040 to maintain the yield of the basin at 40,000 AFY. Subsequently, FCGMA will develop a Basin Optimization Yield Study with committee consultation that quantifies the benefits of each project identified in the Basin Optimization Plan, ranks each project's ability to achieve and maintain sustainability in the LPVB, and establishes a Basin Optimization Yield and Rampdown Rate. Taken together, these documents will provide a more detailed path to sustainability that is consistent with both SGMA and the Judgment.

2.2.5.1 Adaptive Management Approaches

FCGMA has taken several steps to adaptively manage the LPVB since adoption of the GSP. These have included:

- The purchase of supplemental State Water Project (SWP) water in 2019 to support recharge in the Oxnard Forebay, which is a source of water to the WLPMA.
- The development and implementation of a new extraction allocation system to facilitate groundwater extraction reporting and management in a manner consistent with SGMA.
- The development of project evaluation criteria and process to prioritize water supply and infrastructure projects that support groundwater sustainability in the LPVB.

The Judgment imposes a new management strategy that supersedes the policy and management framework developed by the FCGMA prior to July 2023. The new management structure imposed by the Judgment includes:

- An updated allocation system.
- A framework for evaluating the need for, and rate of, Rampdown within the LPVB; and
- An updated process for evaluating projects that increase water supply and Operational Yield of the LPVB.

As Watermaster for the LPVB, FCGMA is responsible for implementing the management framework outlined in the Judgment. To support the initial implementation of this management framework, FCGMA has begun development of the Basin Optimization Plan and is coordinating development of the Basin Optimization Yield Study with the LPVB TAC. These planning activities are critical first steps in constraining future Rampdown, project implementation, and additional management actions.

2.2.5.2 Impacts to Beneficial Uses and Users of Groundwater

Beneficial uses and users of groundwater within the LPVB include environmental, agricultural, domestic, and municipal and industrial users (FCGMA 2019). Groundwater elevations that remain above the minimum thresholds are anticipated to maintain beneficial uses of groundwater in the LPVB by limiting chronic lowering of groundwater levels and limiting the area of the FCA that may convert from confined to unconfined conditions. Groundwater elevations in one key well in the WLPMA were below the minimum threshold groundwater elevation for three consecutive measurement periods, which, by definition in the GSP, means the WLPMA experienced undesirable results since 2019. However, groundwater conditions in the WLPMA have not impacted beneficial users of groundwater. No wells were reported to have gone dry, and there are no interconnected surface and groundwaters in the WLPMA. Groundwater elevations in the ELPMA and Epworth Gravels Management Area do not indicate that undesirable results are occurring in either of these management areas. Similarly, no wells were reported to have gone dry and groundwater elevations adjacent to Arroyo Las Posas have not declined since 2019.

2.2.5.3 Changes to Sustainable Management Criteria

The minimum threshold and measurable objectives for each representative monitoring point are listed in Table 2-3.

The evaluation following does not suggest the need to change the SMC for the LPVB: current groundwater levels, updated future model scenario results, projects and management strategies, and requirements of the Judgment. The minimum thresholds will prevent chronic declines in groundwater levels, significant and unreasonable loss of groundwater in storage, and, in the WLPMA, will not prevent the Oxnard Subbasin from achieving its sustainability goal. Minimum thresholds were selected based on historical low water levels and the simulated water levels that would limit storage loss to less than 20% of the 2015 groundwater in storage. The information gained and updated numerical modeling conducted for this periodic evaluation (see Section 5, Updated Numerical Modeling) suggest that these thresholds are appropriate to prevent undesirable results in the LPVB.

Table 2-3. LPVB Measurable Objectives and Minimum Thresholds

Well Number	Management Area	Aquifer	Minimum Threshold	Measurable Objective	Fall 2015 Water Level Low	
			(ft msl)	(ft msl)	(ft msl)	Date Measured
03N19W29F06S	Epworth Gravels	Epworth Gravels	555	585	580	10/21/2015
02N20W09Q08S	ELPMA	Shallow Alluvial	170	255	271	10/15/2015

Table 2-3. LPVB Measurable Objectives and Minimum Thresholds

Well Number	Management Area	Aquifer	Minimum Threshold	Measurable Objective	Fall 2015 Water Level Low	
			(ft msl)	(ft msl)	(ft msl)	Date Measured
02N20W12MMW1	ELPMA	Shallow Alluvial	300	345	369	9/15/2015
02N20W01B02S	ELPMA	FCA	80	120	129.8	9/23/2012
02N20W03H01	ELPMA	FCA	100	135	157	10/19/2015
02N20W04F02S[a]	ELPMA	FCA	—	—	157	9/18/2013
02N20W10D02S	ELPMA	FCA	80	130	150.5	10/27/2015
02N20W10G01S	ELPMA	FCA	100	230	244.8	10/27/2015
02N20W10J01S	ELPMA	FCA	110	250	279.3	10/27/2015
03N19W19J01S	ELPMA	FCA	130	160	176.2	10/21/2015
03N19W28N03S	ELPMA	FCA	130	170	180.9	10/15/2015
03N19W31B01S	ELPMA	FCA	105	145	146.5	10/15/2015
03N20W34G01S	ELPMA	FCA	75	130	141.9	10/29/2015
03N20W35R03S	ELPMA	FCA	105	145	136.6	10/29/2015
03N20W26R03S	ELPMA	FCA	100	120	131.9	11/2/2015
03N20W35R02S	ELPMA	GCA	105	145	128.7	10/15/2015
02N20W06R01S	WLPMA	LAS	−170	−125	−154	10/15/2015
02N20W08F01S	WLPMA	LAS	−195	−150	−121	7/1/2014
02N21W16J03S[b]	WLPMA	LAS	—	—	−79.8	12/14/2015
02N21W11J03S	WLPMA	LAS	−70	−50	−69	10/22/2015
02N21W12H01S	WLPMA	LAS	−70	−45	−41.9	3/10/2014

Notes:
[a] Well 02N20W04F02 was destroyed after the GSP was prepared.
[b] Well 02N21W16J03 has not been measured since 2019 and has been removed from the groundwater monitoring network (see Section 6, Monitoring Network).

In the LPVB, the measurable objectives are at least 20 feet higher than the minimum thresholds to allow for operational flexibility. In the WLPMA, these objectives were selected based on the groundwater level recovery observed in wells between 1995 and 2008 that resulted from an in-lieu water deliver program, and based on the model scenarios in which the Oxnard Subbasin was able to meet its sustainability goal (FCGMA 2019). In the ELPMA and Epworth Gravels Management Area, the measurable objectives were selected based on the simulated groundwater elevation at which water levels stabilized in future model scenarios. The updated ELPMA modeling suggests that groundwater elevations in the ELPMA may stabilize at a higher level than was simulated in the GSP because surface water recharge to the ELPMA is expected to be maintained at higher levels than were simulated previously (See Section 5, Updated Numerical Modeling). The measurable objectives were not adjusted in this periodic evaluation because uncertainty remains in the ongoing ability of the LPVB interested parties to rely on the recharge from this surface water that is discharged to Arroyo Simi-Las Posas upstream of the LPVB boundary. One of the potential future projects includes developing an agreement to maintain flows in the Arroyo (See Section 3, Status of Projects and Management Actions). If this project is implemented, the measurable objectives in the ELPMA may need to be adjusted in a future periodic evaluation.

As described in Section 6, Monitoring Network, two key wells were removed from the monitoring network: well 02N20W04F02S in the ELPMA and well 02N21W16J03S in the WLPMA. Well 02N20W04F02S was removed because the well was destroyed. Well 02N21W16J03S was removed because ongoing access issues has resulted in the well last being measured in 2019. The lack of measurements at these two wells creates data gaps in the characterization of groundwater conditions within the LPVB.

2.3 Groundwater in Storage

2.3.1 Department of Water Resources Recommended Corrective Actions

DWR issued a recommended corrective action related to groundwater in storage (DWR, 2021). This recommended corrective action states the following:

> Discuss the potential effects of the minimum thresholds and measurable objectives on beneficial uses and users of groundwater, particularly in the areas where groundwater levels will be maintained below 2015 and historical low levels. Provide an evaluation of the groundwater level and storage conditions when the groundwater storage loss will be 20 percent compared to 2015 conditions in the ELPMA and the Epworth Gravels Management Area, and, based on the result of the evaluation, discuss the effects of such conditions on beneficial users and users.

FCGMA's response to this corrective action is addressed in Section 2.2, Groundwater Levels.

2.3.2 Groundwater in Storage Changes in the Las Posas Valley Basin

Since adoption of the GSP, FCGMA has estimated the change in groundwater in storage in the LPVB annually using a series of linear regression models that relate measured groundwater elevations to simulated values of change in storage extracted from the Ventura Regional Groundwater Flow Model (VRGWFM; UWCD 2018) for the WLPMA and the CMWD numerical groundwater flow model for the ELPMA (CMWD 2018, FCGMA 2020, 2021, 2022, 2023, 2024b). The linear regressions utilized results from the VRGWFM for the historical period from 1985 through 2015 and from the ELPMA for the historical period from 1970 through 2015 (UWCD 2018, CMWD 2018).

As part of the periodic GSP evaluation, UWCD updated the VRGWFM to improve the hydrogeologic conceptual model of the Oxnard Subbasin and simulate groundwater conditions through September 30, 2022 (FCGMA 2024b). The CMWD model of the ELPMA is based on another hydrogeologic conceptual model; it has not been updated since the GSP. However, the model was extended to simulate groundwater conditions in the ELPMA through September 30, 2022 (See Section 5.1, Model Updates). The extended model is referred to in this document as the ELPMA model (See Section 5, Updated Numerical Modeling).

The change in storage values for the WLPMA summarized below are based on the model results from the updated VRGWFM (Table 2-4a, UWCD Model Water Budget for the West Las Posas Management Area Shallow Aquifer, Table 2-4b, UWCD Model Water Budget for the West Las Posas Management Area Lower Aquifer System). The change in storage values for the ELPMA summarized below are based on the results from the ELPMA model (Table 2-4c, ELPMA Model Water Budget). Because neither model simulates water years 2023 and 2024, the change in storage for the last 2 years of the evaluation period were estimated using model results from water years with similar starting and ending measured groundwater elevations. Because groundwater elevation changes in the LPVB vary across management area and by aquifer, different representative time periods were used to estimate the change in groundwater for water years 2023 and 2024 (Table 2-5, Change in Groundwater in Storage in the LPVB).

Table 2-4a. UWCD Model Water Budget for the West Las Posas Management Area Shallow Aquifer

WY	Inflows (Acre-Feet)			Outflows (Acre-Feet)			Total Inflows (Acre-Feet)	Total Outflows (Acre-Feet)	Change in Storage[a]
	Recharge	Subsurface flow from Oxnard Subbasin	Subsurface flow from Pleasant Valley Basin	Outflow to LAS	Pumping	Subsurface flow to Oxnard Subbasin			
2016[b]	3,390	1,282	173	-5,022	-478	0	4,845	-5,500	-655
2017	7,264	2,378	399	-9,317	-597	0	10,041	-9,914	127
2018	4,436	1,940	234	-6,959	-417	0	6,610	-7,376	-766
2019	6,773	3,545	386	-9,043	-300	0	10,704	-9,343	1,361
2020	4,961	3,837	299	-8,209	-223	0	9,097	-8,432	665
2021	2,240	2,780	384	-5,700	-277	0	5,404	-5,977	-573
2022	4,491	2,388	446	-7,349	-247	0	7,325	-7,596	-271
Average	**4,794**	**2,593**	**332**	**-7,371**	**-363**	**0**	**7,718**	**-7,734**	**-16**

Notes:
a Negative (-) values denote a reduction of groundwater in storage. Positive (+) values denote an increase in groundwater in storage.
b Represents the nine-month period from January 1, 2016, through September 30, 2022.

Table 2-4b. UWCD Model Water Budget for the West Las Posas Management Area Lower Aquifer System

WY	Inflows (Acre-Feet)					Outflows (Acre-Feet)				Total Inflows (Acre-Feet)	Total Outflows (Acre-feet)	Change in Groundwater in Storage (Acre-Feet)[b]
	Recharge from USP outcrops	Recharge	From Shallow Aquifer	Subsurface flow from Oxnard Subbasin	Subsurface flow from Pleasant Valley Basin	Subsurface flow to Oxnard Subbasin	Pumping	Subsurface flow to Pleasant Valley Basin	Subsurface flow to the ELPMA[a]			
2016[c]	713	977	5,022	0	0	-2,453	-9,856	-6	-874	6,712	-13,189	-6,477
2017	1,890	2,241	9,317	0	498	-2,763	-13,109	0	-1,232	13,946	-17,104	-3,158
2018	764	1,195	6,959	0	482	-2,388	-13,979	0	-1,179	9,401	-17,546	-8,145
2019	1,778	2,121	9,043	0	1,078	-754	-13,687	0	-951	14,021	-15,392	-1,372
2020	1,284	1,392	8,209	134	1,237	0	-14,031	0	-713	12,256	-14,744	-2,489
2021	147	379	5,700	0	912	-169	-15,360	0	-464	7,139	-15,993	-8,855
2022	1,064	1,140	7,349	0	804	-472	-13,755	0	-410	10,357	-14,638	-4,281
Average	**1,092**	**1,349**	**7,371**	**19**	**716**	**-1,286**	**-13,397**	**-1**	**-832**	**10,547**	**-15,515**	**-4,968**

Notes:
a Represents simulated underflows from the East Las Posas Management Area
b Negative (-) values denote a reduction of groundwater in storage. Positive (+) values denote an increase in groundwater in storage.
c Represents the nine-month period from January 1, 2016, through September 30, 2022.

Table 2-4c. ELPMA Model Water Budget for the East Las Posas Management Area

Water Year	Groundwater Inflows (Acre-Feet)				Groundwater Outflows (Acre-Feet)					Total Inflow	Total Outflow	Change in Groundwater in Storage (Acre-Feet)[a]
	Recharge except Arroyo Las Posas (Includes Moorpark WWTP)	Injected ASR Water	Inflow at Basin Boundary	Inflow from Arroyo Simi-Las Posas percolation	Subsurface Outflow to PV1	Riparian ET	Extraction	Outflow to WLPMA	Outflow at Basin Boundary			
2016	9,816	898	2,265	11,941	1,556	1,318	23,181	147	920	24,920	27,122	-2,202
2017	9,972	4,066	2,157	13,262	1,713	1,491	22,192	147	929	29,458	26,472	2,986
2018	9,466	1,987	2,178	11,740	1,598	1,424	24,380	148	915	25,371	28,466	-3,094
2019	9,788	6,804	2,231	12,808	1,715	1,378	19,813	149	929	31,630	23,983	7,647
2020	9,877	2,856	2,026	12,069	1,681	1,406	21,430	150	899	26,828	25,566	1,262
2021	9,468	561	2,065	12,725	1,792	1,428	26,037	150	906	24,819	30,313	-5,494
2022	9,248	947	2,101	12,503	1,754	1,471	24,448	150	904	24,799	28,728	-3,929
Average	**9,662**	**2,588**	**2,146**	**12,435**	**1,687**	**1,417**	**23,069**	**149**	**915**	**26,832**	**27,236**	**-403**

Notes: Water Budget represents the combined water budget for all principal aquifers in the ELPMA, and includes the Upper San Pedro formation and confining layers that separate principal aquifers.
a Negative (-) values denote a reduction of groundwater in storage. Positive (+) values denote an increase in groundwater in storage.

2.3.2.1 West Las Posas Management Area

Upper Aquifer System

The GSP reported on the change in groundwater in storage in the LPVB through the end of calendar year 2015. Between January 1, 2016, and September 30, 2022, the VRGWFM estimates that groundwater in storage in the UAS decreased by approximately 110 AF (Table 2-4a). Between water years 2004 and 2010[9], the VRGWFM estimates that groundwater in storage in the UAS decreased by approximately 580 AF (Table 2-5). Adding these estimates to the simulation results for water years 2016 through 2022 suggests that since 2016, groundwater in storage in the UAS has decreased by approximately 690 AF (Table 2-4b).

Lower Aquifer System

Between January 1, 2016, and September 30, 2022, the VRGWFM estimates that groundwater in storage in the LAS decreased by approximately 34,780 AF (Table 2-5). During the 2004 through 2010 period, the VRGWFM estimates that groundwater in storage in the LAS increased by approximately 1,810 AF (Table 2-5). Adding these estimates to the simulation results for water years 2016 through 2022 suggest that groundwater in storage in the LAS has decreased by approximately 32,970 AF since 2015 (Table 2-5).

Table 2-5. Change in Groundwater in Storage in the LPVB

Management Area	Aquifer / Aquifer System	Simulated 2016 - 2022 Change in Storage (acre-feet)[a]	Estimated Change in Storage for Water Years 2023 and 2024		Estimated 2016 – 2024 Change in Storage (acre-feet)[a]
			Change in Storage (acre-feet)[a]	Representative Time Period (Water Year(s))	
West Las Posas	UAS[b]	-110	-580	2004-2010[d]	-690
	LAS[c]	-34,780	1,810		-35,970
Epworth Gravels	Epworth Gravels	1,100	-380	2004 – 2008	720
East Las Posas	Shallow Alluvial Aquifer	210	380	2018	590
	FCA	2,680	10,700	2009 – 2011	13,380
	GCA	370	1,600		1,970

Notes:

[a] Values rounded to the nearest 10 acre-feet. Negative (-) values denote a reduction in groundwater in storage. Positive (+) values denote in increase in groundwater in storage.
[b] In the WLPMA, the Upper Aquifer System (UAS) does not host any principal aquifers of the LPVB.
[c] In the WLPMA, the Lower Aquifer System (LAS) consists of the Upper San Pedro Formation (age-equivalent to the Hueneme aquifer in the adjacent Oxnard Subbasin), the FCA, and the GCA.
[d] Due to the limited availability of complete measurements at key wells in the WLPMA, the 2004-2010 period was selected using a single well (02N21W12H01S).

[9] Groundwater elevation changes measured in the WLPMA during the 2004 to 2010 period were similar to those measured between October 1, 2022, and September 30, 2024. Because of this, the simulated change in storage for the period from 2004 to 2010 was used as an estimate of the change in storage for water years 2023 and 2024.

2.3.2.2 East Las Posas Management Area

The ELPMA model estimates that groundwater in storage increased by approximately 15,400 AF in the FCA and GCA since 2015 (Table 2-5). These model estimates of change in storage include imported water temporarily stored in the ELPMA through CMWD's ASR program. Over the 2016 to 2024 period, CMWD injected a net volume of approximately 16,600 AF of imported water into the ELPMA for temporary storage. These data suggest that the change in groundwater in storage not associated with the CMWD ASR operations was a decline of approximately 1,200 AF.

In the Epworth Gravels Management Area, the ELPMA model suggests that since 2016, groundwater in storage has increased by approximately 600 AF.

2.3.3 Undesirable Results

Groundwater levels are used as a proxy for undesirable results associated with groundwater in storage in all three management areas of the LPVB. As described in Section 2.2.4, the WLPMA experienced undesirable results during the evaluation period. Groundwater in storage has declined in this management area by approximately 33,000 AF.

Since the GSP was adopted, the ELPMA and Epworth Gravels Management Area have not experienced undesirable results. However, as described above, the change in groundwater in storage in the ELPMA largely reflects CMWD's operation of their ASR well field.

2.3.3.1 Adaptive Management Approaches

FCGMA's approach to adaptive management is described in Section 2.2.5.1.

2.3.3.2 Impacts to Beneficial Uses and Users of Groundwater

The benefits of GSP implementation on beneficial uses and users of groundwater in the LPVB are described in Section 2.2.5.1.

2.3.3.3 Changes to Sustainable Management Criteria

Groundwater levels are used as a proxy for groundwater in storage. As described in Section 2.2.5.3, no revisions to the SMC of the LPVB are recommended as part of this GSP evaluation.

2.4 Seawater Intrusion

Seawater intrusion is not an undesirable result that applies to the LPVB. Direct seawater intrusion has not occurred historically in the LPVB, and future numerical model simulations do not indicate that seawater intrusion will occur in the LPVB. Therefore, specific criteria for undesirable results related to seawater intrusion were not established in the GSP.

2.5 Groundwater Quality

This section summarizes groundwater quality conditions in the LPVB. Due to the variation in groundwater quality monitoring schedules across the LPVB, groundwater quality is characterized using the most recent groundwater samples collected over a 5-year window, during the period from 2019 through 2023 (Figure 2-19, Most Recent TDS (mg/L) Measured 2019-2023, through Figure 2-23, Most Recent Boron (mg/L) Measured 2019-2023). For the GSP, groundwater quality conditions were characterized using the most recent groundwater samples collected during the period from 2011 through 2015.

The FCGMA adopted Basin Management Objectives (BMOs) for nitrate, chloride, and total dissolved solids (TDS) in the LPVB as part of its 2007 Groundwater Management Plan (FCGMA 2007). Additionally, the Water Quality Control Plan: Los Angeles Region (Basin Plan) specifies water quality objectives for TDS, chloride, nitrate, sulfate, and boron (LARWQCB 2014). The change in groundwater quality concentrations related to each constituent relative to the 2011 to 2015 period is summarized below.

2.5.1 Department of Water Resources Recommended Corrective Actions

DWR issued a recommended corrective action related to groundwater quality (DWR 2021). This recommended corrective action states:

> By the first periodic evaluation of the GSP, the Agency should further describe efforts to evaluate the connection between groundwater production and groundwater quality, including the monitoring the Agency is conducting and any progress made toward evaluation of the causal relationship referenced in the GSP. The Agency should document specific details of the processes they will use to determine if groundwater management and extraction are causing adverse impacts to groundwater quality. This should include coordination with all interested parties, beneficial users of groundwater, water quality regulatory agencies, and water quality program administrators within the Basin.

FCGMA partners with local agencies, including VCWPD, UWCD, and CMWD, to monitor groundwater quality in the LPVB. For this first periodic update, changes in groundwater quality were mapped, by constituent to assess areas of the LPVB in which groundwater quality may be deteriorating (Figures 2-19 through 2-23). For those wells in which groundwater quality declined since 2015, a Mann Kendall analysis of water quality trends was performed. The results of that analysis are shown in Table 2-6, LPVB Water Quality Trend Statistics.

Table 2-6. LPVB Water Quality Trend Statistics

Well Number	Management Area	Aquifer	TDS	Chloride	Nitrate	Sulfate	Boron
02N20W06R01S	WLPMA	FCA	No Trend	No Trend	—	No Trend	No Trend
02N20W17L01S	WLPMA	Unknown	No Trend	No Trend	No Trend	No Trend	No Trend
02N21W11A02S	WLPMA	FCA	No Trend	No Trend	—	No Trend	No Trend
02N21W17N03S	WLPMA	Unknown	No Trend	**Increasing**	**Increasing**	**Increasing**	No Trend
02N21W18H12S	WLPMA	Multiple	No Trend	No Trend	No Trend	No Trend	No Trend

Table 2-6. LPVB Water Quality Trend Statistics

Well Number	Management Area	Aquifer	TDS	Chloride	Nitrate	Sulfate	Boron
02N21W18H14S	WLPMA	FCA	No Trend	**Increasing**	—	No Trend	No Trend
02N21W22G01S	WLPMA	FCA	—	—	—	—	—
02N19W07B02S	ELPMA	Unknown	No Trend	No Trend	**Increasing**	Decreasing	No Trend
02N20W03J01S	ELPMA	FCA	—	—	—	—	—
02N20W04F01S	ELPMA	FCA	**Increasing**	No Trend	—	No Trend	No Trend
02N20W09Q05S	ELPMA	Unknown	—	—	—	—	—
02N20W09Q07S	ELPMA	Unknown	No Trend	No Trend	No Trend	No Trend	No Trend
03N19W29K06S	ELPMA	Unknown	No Trend	No Trend	No Trend	**Increasing**	—
03N19W30E06S	ELPMA	Unknown	No Trend	No Trend	No Trend	No Trend	—
03N19W31B01S	ELPMA	FCA	No Trend	No Trend	—	No Trend	No Trend
03N19W31H01S	ELPMA	FCA	—	—	—	—	—
03N20W36A02S	ELPMA	FCA	—	—	—	—	—
03N20W36G01S	ELPMA	FCA	—	—	—	—	—

Notes: FCA = Fox Canyon Aquifer.
Statistical significance was determined via Mann Kendall analysis. "-" indicates wells with fewer than four water quality measurements since 2015. A trend cannot be determined for these wells. "No Trend" means there were sufficient data to determine whether there was a statistically significant increase or decrease, and none was found.

2.5.1.1 West Las Posas Management Area

In the WLPMA, wells 02N21W18H14S and 02N21W17N03S had statistically significant increasing chloride concentrations since 2015 (Table 2-6). Well 02N21W17N03S also had increasing nitrate and sulfate concentrations. Both wells are located on the boundary between the WLPMA and the Oxnard Subbasin (Figures 2-26 through 2-28). Water quality in this area has been impacted by historical land uses and is generally tied to groundwater elevation (FCGMA 2019). Higher groundwater elevations in these wells are correlated with increased spreading at the UWCD groundwater recharge facilities, where diverted surface water from the Santa Clara River lowers the concentration of TDS, chloride, nitrate, sulfate, and boron in the groundwater. The observed increases in concentration of these constituents reflects the ongoing drought from 2015 through 2022. UWCD manages the spreading and distribution of surface water from the Santa Clara River to mitigate impacts to groundwater quality in this region. FCGMA will continue to coordinate with UWCD to monitor groundwater quality in these wells.

2.5.1.2 East Las Posas Management Area

In the ELPMA, only well 02N20W04F01S in the western portion of the ELPMA near the Somis Fault, had a statistically significant increasing trend in TDS (Table 2-6, Figure 2-24, Change in TDS Concentration (mg/L) between the period from 2011-2015 and 2019-2023). Wells 03N19W29K06S and 02N19W07B02S had statistically significant increasing trends in sulfate and nitrate, respectively (Table 2-6, Figure 2-26 and Figure 2-27). Well 03N19W29K06S is in the northeastern portion of the ELPMA, whereas 02N19W07B02S is near the Arroyo Simi. Historically, as treated wastewater discharges and discharges from groundwater dewatering wells upstream of the LPVB reached the ELPMA, TDS, chloride, nitrate, sulfate, and boron increased (FCGMA 2019). Therefore, if the increase in nitrate at well 02N19W07B02S were related to groundwater production induced migration of infiltrated surface water, each of the constituents in this well would be expected to increase. In contrast, the TDS, chloride, and boron concentrations in this had no statistically significant trend, and the nitrate concentration in this well had a statistically significant increasing trend. Therefore, the increase in nitrate at well 02N19W07B02S is not likely related to surface water infiltration and subsequent groundwater migration from the Arroyo Simi-Las Posas.

The increasing concentrations of sulfate in 03N19W29K06S is also not related to groundwater production induced migration from Arroyo Las Posas, because this well is located in the northern part of the ELPMA north of the Moorpark Anticline. Recharge from Arroyo Simi-Las Posas does not reach the northeastern portion of the ELPMA, and groundwater quality in this area is better than it is in the southern part of the ELPMA, adjacent to Arroyo Simi-Las Posas (Figures 2-19 through 2-23).

The increase in TDS observed in well 02N20W04F01S is unlikely to be related to the migration of the non-native recharge from Arroyo Simi-Las Posas as an increasing trend was not observed at well 02N20W09Q07S, which is between the Arroyo Simi-Las Posas and well 02N20W04F01S. There is no evidence for widespread migration of the area of degraded groundwater quality as a result of groundwater production.

The new information gathered since the GSP was prepared has helped fill in water quality data gaps surrounding the potential linkage between groundwater production and the migration of non-native recharge with higher concentrations of TDS, chloride, nitrate, sulfate, and boron. While recent data doesn't suggest a link between groundwater quality degradation and groundwater production during the evaluation period, FCGMA will continue to collaborate with UWCD, VCWPD, and CMWD to monitor groundwater quality and evaluate the potential link between these processes in the future.

2.5.2 Groundwater Quality Changes in the Las Posas Valley Basin

2.5.2.1 West Las Posas Management Area

Total Dissolved Solids (TDS)

There are no geographic patterns in the observed change in TDS concentrations in the WLPMA since the GSP was prepared (Figure 2-24). The concentration of TDS increased by approximately 50 to 160 milligrams per liter (mg/L) in three wells on the western boundary of the WLPMA, approximately 50 to 70 mg/L in two wells in the Camarillo Hills, and approximately 80 to 90 mg/L in two wells in the central and eastern WLPMA (Figure 2-24). The concentration of TDS decreased by approximately 10 to 90 mg/L in all the other wells in the WLPMA since the GSP was prepared. In general, TDS concentrations decreased in wells screened in the FCA and GCA and increased in wells screened in the USP or unknown aquifers (Figure 2-24). TDS concentration data do not indicate that groundwater production since 2015 has caused degradation of groundwater quality or migration of contaminant plumes in the WLPMA.

Chloride

Although the concentration of chloride declined in six wells in the WLPMA since 2015, it increased by 1 to 19 mg/L in the remaining wells in the monitoring network (Figure 2-25, Change in Chloride Concentration (mg/L) between the period from 2011-2015 and 2019-2023). Wells 02N21W17N03S and 02N21W18H14S, on the western margin of the WLPMA were the only two wells with statistically significant increasing trend since 2015 (Section

2.5.1, Department of Water Resources Recommended Corrective Actions). The change in chloride concentration was not correlated with depth, as some wells screened in the FCA had increases in chloride concentration and others had decreases in chloride concentrations. This was also observed in wells screened in the GCA, and wells with unknown screen intervals (Figure 2-25). Similar to TDS, changes in chloride concentrations since 2015 do not indicate that groundwater production has caused degradation of groundwater quality or migration of contaminant plumes in the WLPMA.

Nitrate

Nitrate concentrations increased since 2015 in approximately half of the wells in the monitoring network and decreased in the other half of the wells (Figure 2-26). Nitrate concentration decreases ranged from approximately 100 mg/L (at well 02N20W18H01S) to less than 1 mg/L (at well 02N21W11A03S). Nitrate concentration increases ranged from less than 1mg/L to approximately 10 mg/L (at well 03N21W36Q01S). Well 02N21W17N03S was the only well found to have a statistically significant increasing nitrate concentration trend in the WLPMA (Table 2-6). There is no clear geographic or aquifer specific pattern to the changes in concentration. Areas of high nitrate concentration in the WLPMA tend to be the result of legacy land use practices and septic discharges (FCGMA 2019). The changes in nitrate concentration do not suggest that groundwater production has caused migration of localized areas of higher nitrate concentrations to areas with lower nitrate concentrations.

Sulfate

Sulfate concentrations, and changes in sulfate concentrations since 2015, are variable across the WLPMA (Figures 2-22 and 2-27). Concentrations range from under 100 mg/L to over 500 mg/L without a clear pattern in geographic distribution or depth. Similarly, the concentration of sulfate increased in approximately half of the wells in the WLPMA since 2015 and decreased in the other half. Only well 02N21W17N03S was found to have a statistically significant trend of increasing sulfate concentration in the WLPMA (Table 2-6). The variability in concentration and the lack of a pattern in the change in concentration does not indicate that groundwater production has caused degradation of water quality in the WLPMA.

Boron

Boron concentrations were below 1 mg/L throughout the WLPMA (Figure 2-28). These concentrations are similar to the concentrations of boron measured in groundwater during the 2011 to 2015 period (Figure 2-23). There was no significant change in boron concentrations in the WLPMA since 2015 (Figure 2-28).

2.5.2.2 East Las Posas Management Area

Total Dissolved Solids (TDS)

There are no geographic patterns in the observed change in TDS concentrations in the ELPMA since 2015 (Figure 2-24). The concentration of TDS increased by approximately 20 to 140 mg/L in eleven wells in the monitoring network and decreased by approximately 9 to 170 mg/L in 20 wells in the monitoring network. Importantly, evaluation of the trends in TDS concentration since 2015 indicate that well 02N20W04F01S is the only well with a statistically significant increase in TDS concentration in the ELPMA (Table 2-6). TDS concentration data do not indicate that groundwater production since 2015 has caused degradation of groundwater quality or migration of contaminant plumes in the ELPMA.

Chloride

Similar to TDS, there are no geographic patterns in the observed change in chloride concentrations in the ELPMA since 2015 (Figure 2-25). The concentration of chloride increased in 20 wells and decreased in the remaining 11 wells in the monitoring network. Only ten wells in the monitoring network have chloride concentrations greater than 100 mg/L (Figure 2-20, Most Recent Chloride (mg/L) Measured 2019-2023). Although the concentration of chloride increased in the majority of these wells since 2015, no well in the ELPMA had a statistically significant increasing trend in chloride concentration (Table 2-6). Chloride concentration data do not indicate that groundwater production since 2015 has caused degradation of groundwater quality or migration of contaminant plumes in the ELPMA.

Nitrate

Nitrate concentrations increased by 0.3 to 8.2 mg/L throughout much of the ELPMA, although only well 02N19W07B02S was found to have a statistically significant trend of increasing nitrate concentration in the ELPMA (Table 2-6; Figure 2-26). If groundwater migration were responsible for the observed increases in concentrations, the area of increase should be limited to the edge of a migrating groundwater plume. This is not consistent with the widespread geographic distribution of the increasing nitrate concentrations in the ELPMA (Figure 2-26). This suggests that the observed changes may be the result of land use practices, rather than migration of groundwater associated with groundwater pumping.

Sulfate

Sulfate concentrations, and changes in sulfate concentrations since 2015, are variable across the ELPMA (Figures 2-22 and 2-27). Concentrations range from under 100 mg/L in the central and northern parts of the ELPMA, to over 600 mg/L in the southern and western portions of the ELPMA. Well 03N19W29K06S, in the northeastern ELPMA, is the only well with a statistically significant trend of increasing sulfate concentration since 2015 (Table 2-6). The most recent concentration in this well, however, was 33.9 mg/L, which is the lowest sulfate concentration measured in the ELPMA (Figure 2-22). As with other constituents, the lack of a distinct geographic area in which sulfate concentrations are increasing in the ELPMA suggests that the observed changes in concentration since 2015 are not related to degradation of water quality associated with groundwater production.

Boron

Boron concentrations were below 1 mg/L throughout the ELPMA (Figure 2-23). These concentrations are similar to the concentrations of boron measured in groundwater during the 2011 to 2015 period. Boron concentrations generally changed by less than 0.2 mg/L in the ELPMA, except at well 02N20W04R03, where the concentration increased by 0.4 mg/L (Figure 2-28). This localized increase is surrounded by wells in which the concentration of boron did not change.

2.5.2.3 Epworth Gravels Management Area

Groundwater quality samples were not collected from wells in the Epworth Gravels Management Area. The lateral and vertical extent of this management area is small, and groundwater quality has historically been influenced by the volume of recharge received (FCGMA 2019).

2.5.3 Sustainable Management Criteria

The GSP did not establish specific groundwater quality minimum thresholds, measurable objectives, or interim milestones (FCGMA 2019). The SMC for groundwater quality were based on the groundwater elevations that would prevent undesirable results related to chronic declines in groundwater elevation and significant and unreasonable loss of groundwater in storage.

2.5.4 Undesirable Results

Groundwater elevations in the WLPMA indicated that the management area experienced undesirable results related to chronic declines in groundwater elevation between 2019 and 2024 (Section 2.2.4, Undesirable Results). However, no wells were reported to have gone dry during that period and changes in the groundwater quality do not appear to be correlated with decreases in groundwater elevation. The ELPMA and Epworth Gravels Management Areas did not experience undesirable results related to chronic declines in groundwater elevation or significant and unreasonable loss of groundwater in storage.

A review of the most recent concentrations of TDS, chloride, nitrate, sulfate, and boron, as well as the changes in concentration of those constituents since 2015, does not indicate that the LPVB is experiencing degraded groundwater quality related to groundwater production.

2.5.5 Progress Toward Achieving Sustainability

FCGMA has begun to address DWR's recommended corrective action related to groundwater quality and is working to improve the groundwater quality monitoring network.

2.5.5.1 Adaptive Management Approaches

The adaptive management approaches taken in the LPVB are discussed in Section 2.2.5.1.

2.5.5.2 Impacts to Beneficial Uses and Users of Groundwater

Evaluation of the changes in water quality presented in Section 2.5.2 does not indicate that beneficial uses and users of groundwater have been impacted by water quality degradation since 2015. Additionally, beneficial uses and users of groundwater in the LPVB have not reported any impacts as a result of groundwater quality changes since the GSP was prepared.

2.5.5.3 Changes to Sustainable Management Criteria

The GSP did not define specific SMC for groundwater quality. No changes related to groundwater quality SMC are warranted at this time.

2.6 Land Subsidence

2.6.1 Department of Water Resources Recommended Corrective Actions

DWR issued a recommended corrective action related to land subsidence (DWR 2022). This recommended corrective action states:

> Incorporate periodic subsidence monitoring into the GSP's monitoring plan that can be used to quantify whether land subsidence is occurring and whether the groundwater level proxy is avoiding undesirable results associated with land subsidence. As an option, the Department provides statewide InSAR data that can be used for monitoring land subsidence.

The majority of the minimum threshold groundwater levels in the LPVB are higher than or equal to historical low groundwater elevations. The only area where the minimum threshold is lower than the historical lows is in the northern part of the ELPMA. In this area, the minimum threshold is within 30 feet of the current water level. This area has experienced over 20 feet of decline in groundwater elevation since 2015, and there has been less than 2.5 inches of decline in the land surface elevation since that time. While this decline in groundwater elevation may be the source of changes in the land surface elevation, it is challenging to disentangle changes due to groundwater production from those due to tectonic forces in the LPVB. Because of the limited area in which groundwater elevation will decline below historical lows, and the changes in land surface elevation over the last 10 years have not impacted land use, groundwater management under the GSP is not anticipated to cause land subsidence that would significantly impact future land uses and critical infrastructure. To monitor these conditions in the future, FCGMA has incorporated periodic subsidence monitoring into the GSP monitoring network. Subsidence monitoring will be performed using DWR's statewide InSAR datasets (Section 6.4, Functionality of Additional Monitoring Network).

2.6.2 Land Subsidence in the Las Posas Valley Basin

Since 2015, DWR's InSAR data indicates that land surface elevations have changed by less than approximately 2.5 inches (Figure 2-29). These land surface deformations have not impacted land uses or critical infrastructure within the LPVB.

2.6.3 Sustainable Management Criteria

Groundwater elevations in the WLPMA indicated that the management area experienced undesirable results related to chronic declines in groundwater elevation between 2019 and 2024 (Section 2.2.4, Undesirable Results). However, no wells were reported to have gone dry during that period and changes in land surface elevation do not appear to be correlated with decreases in groundwater elevation. The ELPMA and Epworth Gravels Management Areas did not experience undesirable results related to chronic declines in groundwater elevation or significant and unreasonable loss of groundwater in storage. At this time, FCGMA will incorporate regular subsidence monitoring into its monitoring program. However, groundwater level minimum thresholds are anticipated to be protective against land subsidence related to groundwater production that impacts surface infrastructure.

2.6.4 Undesirable Results

The LPVB has not experienced undesirable results related to land subsidence since the GSP was prepared.

2.6.4.1 Adaptive Management Approaches

The adaptive management approaches taken in the LPVB are discussed in Section 2.2.5.1.

2.6.4.2 Impacts to Beneficial Uses and Users of Groundwater

Evaluation of the changes in land surface elevation shown in Figure 2-29 does not indicate that beneficial uses and users of groundwater have been impacted by land subsidence since 2015. Additionally, beneficial uses and users of groundwater in the LPVB have not reported any impacts as a result of land subsidence since the GSP was prepared.

2.6.4.3 Changes to Sustainable Management Criteria

The GSP did not define specific SMC for land subsidence. No changes related to land subsidence SMC are warranted at this time.

2.7 Groundwater–Surface Water Connections

2.7.1 Department of Water Resources Recommended Corrective Actions

DWR issued a recommended corrective action related to groundwater- surface water interactions (DWR, 2021). This recommended corrective action states:

> Investigate the hydraulic connectivity of the Arroyo Simi-Las Posas, shallow aquifers, and principal aquifer to understand the reliance of the potential GDEs on the native flow and depletion of interconnected surface water bodies. Also, identify specific locations where Arroyo Simi-Las Posas is connected to the underlying aquifer and conduct necessary investigation to quantify the depletion of interconnected surface water along with the timing of depletions.
>
> Provide a schedule detailing when and how the data gaps identified in the GSP related to shallow groundwater monitoring near surface water bodies will be fulfilled and confirm the identification of potential GDEs.

FCGMA has taken multiple steps to address this recommended corrective action. First, FCGMA conducted an additional review of historical aerial photography and groundwater elevations to better identify the timing of vegetation growth along Arroyo Simi-Las Posas and its connection to the advent of non-native flows (Appendix A). Second, FCGMA sought funding through DWR's Sustainable Groundwater Management Grant Program to install multiple monitoring wells in the LPVB, including a well located on Arroyo Simi-Las Posas that would be used to investigate the connection between the shallow aquifers and principal aquifer; however, grant funding was not awarded. Third, FCGMA has developed a schedule, which is dependent on the availability of funding, for closing the data gaps identified in the GSP related to shallow groundwater monitoring. This schedule may be updated or modified based on PAC and TAC consultation and funding that may become available through basin assessments authorized under the Judgment.

2.7.2 Undesirable Results

The loss of GDE habitat is the undesirable results associated with depletion of interconnected surface water in the LPVB. The primary cause of groundwater conditions in the LPVB that would lead to loss of GDE habitat would be loss of non-native flow in Arroyo Simi-Las Posas. Satellite based estimates of habitat greenness indicate areas of declining plant coverage since 2019 (TNC 2024). It is important to note, however, that the habitat greenness indicators in 2023 are still higher than they were in 1985, when non-native surface water flows began infiltrating into the ELPMA (TNC 2024). The areas where satellite imagery indicates declining plant cover may be related to shifting flow patterns within the arroyo, with decreasing greenness on the banks of the arroyo and decreasing greenness in the downstream portion of the arroyo, adjacent to the PVB. In contrast, since 2015, the non-native flow in Arroyo Simi-Las Posas has been sufficient to maintain both fall 2023 and spring 2024 groundwater elevations in the Shallow Alluvial aquifer at levels that are approximately equal to or higher than they were in the fall of 2015 and spring of 2015, respectively (Figures 2-11 and 2-12). The difference between the satellite-based estimates of habitat health and the groundwater elevation data suggests that the changes in plant coverage are not related to deepening of the groundwater and loss of interconnected surface water. Based on the measured groundwater elevations, undesirable results associated with depletion of interconnected surface water resulting from groundwater production has not occurred during the evaluation period.

2.7.3 Progress Toward Achieving Sustainability

Groundwater levels are used as a proxy for depletion of interconnected surface waters and GDEs. The minimum threshold and measurable objective water levels were selected to limit chronic declines in groundwater elevation and loss of interconnected surface water and groundwater. Groundwater elevations have remained constant in the Shallow Alluvial aquifer since the GSP was adopted.

2.7.3.1 Adaptive Management Approaches

FCGMA's approach to adaptive management is described in Section 2.2.5.1.

2.7.3.2 Impacts to Beneficial Uses and Users of Groundwater

Groundwater elevations in the Shallow Alluvial aquifer have remained stable since 2015 (Figure 2-11 and 2-12). Therefore, environmental uses and users of groundwater have not been impacted by declines in groundwater elevation because of groundwater production or loss of non-native recharge. However, as discussed above, satellite-based estimates of habitat greenness indicate areas of declining plant coverage since 2019 (TNC 2024). Changes in habitat greenness along Arroyo Simi-Las Posas may indicate impacts to habitat health independent of access to groundwater.

2.7.3.3 Changes to Sustainable Management Criteria

The GSP did not define specific SMC for interconnected surface water and groundwater. No changes related to interconnected surface water and groundwater SMC are warranted at this time.

3 Status of Projects and Management Actions

The GSP identified three projects and one management action that support groundwater sustainability in the LPVB (FCGMA 2019). These projects are: (1) Purchase of Imported Water from CMWD for Basin Replenishment, (2) Arroyo Simi-Las Posas Arundo Removal, and (3) Arroyo Simi-Las Posas Water Acquisition. The management action identified in the GSP was Reduction in Groundwater Production from the LPVB. Since adoption of the GSP, FCGMA and other agencies in the basin have identified additionally projects that increase water supplies, reduce groundwater demands, and address data gaps identified in the LPVB.

As described in Section 1, Significant New Information, the LPVB is now managed under the Judgment. As part of this, projects are required to be prioritized, funded, and implemented according to a specific process and criteria developed though the LPVB Basin Optimization Plan. Additionally, the Judgment requires the development of a Basin Optimization Yield study, which defines the Basin Optimization Yield[10] and Rampdown Rate[11] for the LPVB. Development of the Basin Optimization Yield and Rampdown Rate will directly inform the rate of reduction in groundwater production required to reach and maintain groundwater sustainability. Both the Basin Optimization Plan and Basin Optimization Yield Study are developed by FCGMA, as Watermaster for the LPVB, with consultation, review, and recommendation from the LPVB PAC and TAC. FCGMA has begun development of each plan.

This section of the GSP evaluation provides an assessment of the projects and management actions identified in the GSP, summarizes all new projects that have been identified in the LPVB that support implementation of the GSP and Judgment, and describes the process for public notice and engagement throughout the implementation of projects and management actions in the LPVB.

10 The Judgment defines the Basin Optimization Yield as, “the estimated yield that is projected to be available to achieve sustainable groundwater management by 2040.... The Basin Optimization Yield will take into account: (i) the water available from native groundwater inflows; (ii) Return Flows; (iii) reasonably anticipated enhanced yield (i.e., managed replenishment excluding water stored and dedicated and (iv) opportunities for optimization of the Sustainable Yield achieving by relocating Extraction and transmission of water to avoid Undesirable Results. The Basin Optimization Yield will also, through Adaptive Management, take into account circumstances including: (a) improved understanding of Basin conditions and hydrogeologic parameters as a result of new data over time; (b) the current status of Basin Optimization Projects; and (c) changing hydrological conditions.”

11 The Judgment defines the Rampdown Rate as, “The rate of Rampdown beginning in Water Year 2025 and each Water Year thereafter, which will result from the Basin Optimization Yield Study” and defines that the Rampdown Rate shall be calculated, “by dividing the amount of any deficit between the then-effective Operating Yield (e.g. 40,000 AFY) and the Basin Optimization Yield by fifteen (i.e. fifteen annual increments).” Note that the Judgment defines the start of water year 2025 as October 1, 2025.

3.1 Evaluation of Projects and Management Actions Identified in the Groundwater Sustainability Plan

3.1.1 Management Actions

3.1.1.1 No. 1: Reduction in Groundwater Production

3.1.1.1.1 Description of Management Action No. 1

The primary management action proposed in the GSP is Reduction in Groundwater Production from the LPVB. FCGMA has had the authority to monitor and regulate groundwater production in the LPVB since 1983. The FCGMA Board has used its authority to reduce groundwater production from the LPVB in the past and will continue to exert its authority over groundwater production as a Groundwater Sustainability Agency (GSA) and the Watermaster for the LPVB.

In the WLPMA, the estimated long-term rate of groundwater production that will prevent chronic declines in groundwater levels, loss of storage, and subsidence due to groundwater withdrawal and will also allow the prevention of seawater intrusion in the Oxnard Subbasin, is approximately 11,400[12] AFY with an estimated uncertainty of approximately ±1,200 AFY. In the ELPMA, the estimated long-term rate of groundwater production that will prevent chronic declines in groundwater levels, loss of storage, and subsidence due to groundwater withdrawal is approximately 19,200 AFY ±2,300 AFY[13] (Section 5.2.3, Estimates of the Future Sustainable Yield).

3.1.1.1.2 Progress Toward Implementing Management Action No. 1

Allocation System

In 2019, FCGMA adopted an ordinance to establish a new fixed extraction allocation system that supports managing groundwater demand in the LPVB in a manner consistent with SGMA and the GSP. Under this allocation system, FCGMA adopted ordinance amendments and resolutions to facilitate transition to the new ordinance and provided policies and procedures for seeking variances. Additionally, FCGMA adopted resolutions increasing tiered groundwater surcharge rates for extractions that exceed allocation. This allocation system was in effect beginning October 1, 2020, through September 30, 2023.

12 The sustainable yield estimate for the WLPMA was updated as part of this Groundwater Sustainability Plan (GSP) evaluation.
13 The sustainable yield estimate for the East Las Posas Management Area (ELPMA) was updated as part of this GSP evaluation.

The Judgment adjudicated water rights in the basin and established an allocation system based on those water rights. The Judgment allocations supersede the allocations developed and adopted by FCGMA in 2019. The Judgment grants four types of allocations - Agricultural, Commercial, Domestic, and Mutual Water Company Allocations – that are based on a Landowners' Overlying Rights and the amount of groundwater used rather than the amount of groundwater extracted. The initial allocations are based on the LPVB's Operating Yield[14].

Rampdown Framework

The Judgment defines a framework for a Rampdown in groundwater production such that by 2040, sustainable groundwater management is achieved in the LPVB. Rampdown is based on the difference between the then-effective Operating Yield and Basin Optimization Yield of the LPVB.

The Judgment defines that the initial Operating Yield for the LPVB be equal to 40,000 AFY through at least water year 2024 (i.e., October 1, 2024, through September 30, 2025, based on the Judgment's Water Year definition). Under the Judgment, Rampdown will begin in Water Year 2025, following completion of the *Basin Optimization Plan* and *Basin Optimization Yield Study*, and will continue through Water Year 2039. The amount of annual Rampdown will be calculated by dividing the amount of any deficit between the then-effective Operating Yield and the Basin Optimization Yield by fifteen (i.e., fifteen annual increments). Rampdown is re-evaluated every 5 years based on an updated *Basin Optimization Study.*

3.1.1.1.3 Benefits and Impacts of Management Action No. 1

Realized Benefits

This management action has not yet been implemented in the LPVB. Under the Judgment, reduction in groundwater production will commence in Water Year 2025 (beginning October 1, 2025).

Expected Benefits

This management action is expected to help maintain groundwater elevations to prevent declines in groundwater elevation, loss of storage, and land subsidence.

Impacts to beneficial uses and users

Maintaining groundwater elevations with reduced extraction would help maintain groundwater storage and potential groundwater-surface water connections. Reduction in groundwater production may have short-term negative operational impacts on groundwater users that are required to reduce groundwater extraction. However, over the long-term, reduction in groundwater production will have a positive impact on beneficial uses and users by avoiding undesirable results in the LPVB.

14 The Judgment defines the "Operating Yield" as the cumulative amount of Allocated Groundwater that may be sustainably Extracted from the Basin for Use in any particular Water Year under the terms of this Judgment, excluding the Use of any Groundwater pursuant to a right of Carryover. Consistent with the definition of "Total Safe Yield" in the Phase 1 Order, the components of the Operating Yield include all native and non-native sources of water within the Basin, or within either subbasin (as the contexts requires), presently and in the future, including native Groundwater, surface water underflow, Return Flows from the use of imported water within the Basin, recharge from treated wastewater, recharge from septic systems, storm water recharge (intentional or otherwise), recharge from natural and non-natural sources originating inside or outside the Basin, excepting augmented yield physically existing within, and recoverable from, the Basin as a result of the Calleguas ASR Project, if any.

3.1.1.1.4 Department of Water Resources Recommended Corrective Action

DWR's evaluation and approval of the LPVB GSP included the following recommended corrective action:

> Develop and provide a new project or a management action as a contingency plan to include in the GSP. This alternate project or management action should address how the Basin intends to achieve its sustainability goal in the event that imported water is unavailable to use in lieu of groundwater production in the WLPMA, or if any of the project or management action included in the GSP is unable to produce expected benefit. Additionally, the project or management action provided should be developed so that it is ready to be implemented with the 20-year SGMA [Sustainable Groundwater Management Act] timeline.

Since the GSP was adopted, FCGMA has worked with other agencies and interested parties in the LPVB to identify projects that were not incorporated in the GSP. Concurrently, the Judgment identified additional projects that must be evaluated as part of the Basin Optimization Yield study. The Judgment adopted a physical solution that requires FCGMA, acting in its capacity as the Watermaster, to prepare studies documenting how the LPVB can maintain an annual operating yield of at least 40,000 AFY. FCGMA, in consultation with the LPV PAC and TAC, will evaluate identified projects, including those called out in the Judgment, as part of the Basin Optimization Yield Study, which is required by the Judgment. Results from the Basin Optimization Yield Study will be incorporated into future evaluations and, as appropriate, amendments to the GSP.

3.1.2 Projects

Projects identified in the LPVB GSP have not been implemented as of this evaluation. As discussed above, the Judgment established a new process for evaluating, prioritizing, funding, and implementing projects consistent with SGMA and the Judgment. This process will be implemented through FCGMA's development of a Basin Optimization Plan in consultation with the PAC and TAC, which is presently underway. The Basin Optimization Plan will include the following elements:

1. Criteria for determining the priority and feasibility of each Basin Optimization Project.
2. A description of the Basin Optimization Projects that are likely to be practical, reasonable, and cost-effective to implement prior to 2040 to maintain the Operating Yield at 40,000 AFY or as close thereto as achievable.
3. An analysis of whether any of the Basin Optimization Projects (i) are consistent with SGMA and the achievement of Sustainable Groundwater Management, and (ii) will prevent or alleviate, or cause or exacerbate, Undesirable Results or Material Injury.
4. A prioritization schedule of the Basin Optimization Projects to be implemented.
5. A schedule for the Basin Optimization Projects that are to be implemented to be evaluated, scoped, designed, financed, and developed.
6. A 5-year budget for the costs of capital improvements, and the operation and maintenance, of the Basin Optimization Projects.

The subsections below provide a summary of the projects originally considered in the GSP and the anticipated benefits upon project completion.

3.1.2.1 Project No. 1: Purchase of Imported Water from Calleguas Municipal Water District for Basin Replenishment

3.1.2.1.1 Description of Project No. 1

The Purchase of Imported Water from CMWD for Basin Replenishment Project (Purchase of Imported Water from CMWD Project) would supply imported water to the eastern part of the WLPMA in lieu of groundwater production (FCGMA 2018). This project would directly result in decreased groundwater production from discrete wells in the WLPMA. This project is limited to water purveyors with ability to receive water from CMWD (FCGMA 2019).

3.1.2.1.2 Benefits and Impacts of Project No. 1

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized. Feasibility of implementing this project in the LPVB will be evaluated through the Basin Optimization Plan.

Expected Benefits

The project is expected to help to assist with water level recoveries and prevent declines in groundwater elevation, loss of storage, and land subsidence by reducing groundwater demands in the eastern part of the WLPMA.

Impacts to beneficial uses and users

In lieu deliveries to the WLPMA would help to maintain groundwater in storage in the WLPMA and prevent chronic lowering of groundwater levels, thereby having a positive impact on beneficial uses and users.

3.1.2.2 Project No. 2: Arroyo Simi-Las Posas Arundo Removal

3.1.2.2.1 Description of Project No. 2

The Arroyo Simi–Las Posas Arundo Removal Project involves removing the invasive plant species Arundo donax from approximately 324 acres of land along the Arroyo Simi–Las Posas corridor (FCGMA 2019). Arundo would be replaced with native riparian plant species, which are estimated to consume approximately 6 to 25 AFY per acre less water than Arundo. If all of the Arundo within the 324-acre area is removed, this project could result in up to an additional 2,680 AFY of recharge to the ELPMA (FCGMA 2018).

3.1.2.2.2 Benefits and Impacts of Project No. 2

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized. Feasibility of implementing this project in the LPVB will be evaluated through the Basin Optimization Plan.

Expected Benefits

Surface water infiltration through the bottom of Arroyo Simi–Las Posas is a primary recharge mechanism for the ELPMA. Arundo that lines the banks of Arroyo Simi–Las Posas consumes more water than native riparian vegetation would. Therefore, removing Arundo will make additional water available to recharge the groundwater aquifers of the ELPMA.

Impacts to beneficial uses and users

This project is anticipated to have a positive impact on groundwater recharge, as well as a positive impact on the health of riparian habitat along Arroyo Simi–Las Posas.

3.1.2.3 Project No. 3: Arroyo Simi-Las Posas Water Acquisition

3.1.2.3.1 Description of Project No. 3

The Arroyo Simi–Las Posas Water Acquisition Project would involve the purchase of recycled water from the City of Simi Valley (Simi Valley) (FCGMA 2018). In return, Simi Valley would commit to continuing to discharge the purchased or leased water from its shallow dewatering wells or the Simi Valley Water Quality Control Plant (SVWQCP) to Arroyo Simi–Las Posas for downstream recharge to the LPVB.

3.1.2.3.2 Benefits and Impacts of Project No. 3

Realized Benefits

Since adoption of the GSP, the City of Simi Valley has decided not to pursue its plans to increase recycled water utilization within its service area. As a result, the City of Simi Valley continued to discharge water produced at the SVWQCP to Arroyo Simi-Las Posas. Over the 2016 to 2023 period, these discharges averaged approximately 8,000 AFY, which is 300 AFY higher than projected in the GSP.

A formal agreement to ensure future maintenance of these non-native flows will be evaluated as through the Basin Optimization Plan.

Expected Benefits

As noted above, surface water infiltration through the bottom of Arroyo Simi–Las Posas is a primary recharge mechanism for the ELPMA. Maintaining SVWQCP discharges to Arroyo Simi-Las Posas will make additional water available to recharge the groundwater aquifers of the ELPMA; help to prevent declines in groundwater levels and storage; help to support the health of riparian habitat along Arroyo Simi-Las Posas; and increase the sustainable yield of the ELPMA.

Impacts to beneficial uses and users

This project is expected to benefit all beneficial uses and users in the ELPMA by providing a reliable, supplemental source of recharge.

Table 3-1. Status of Projects and Management Actions Identified in the Groundwater Sustainability Plan

Name	Description	Status	Expected Schedule	Benefits Observed to Date	Estimated Accrued Benefits at Completion
Management Actions					
Reduction in Groundwater Production	Reduce Groundwater production by monitoring and imposing quantitative limits on pumpers; with governing authority from the FCGMA Board.	Not Implemented	Not defined	▪ Establishment of a revised allocation system ▪ Establishment of a Rampdown framework and timeline	Recovery of groundwater levels that have contributed to seawater intrusion in the Oxnard Subbasin.
Projects					
Purchase of Imported Water from CMWD for Basin Replacement	Purchase of imported from CMWD for basin replenishment to supply water to the eastern part of WLPMA	Not Implemented	Not defined	N/A	Reduce groundwater production from WLPMA without limiting total quantity of water available
Arroyo Simi-Las Posas Arundo Removal	Removal of invasive Arundo donax from the Arroyo Simi-Las Posas Corridor	Not implemented	Not defined	N/A	Increase in sustainable yield
Arroyo Simi-Las Posas Water Acquisition	Purchase of recycled water from the City of Simi Valley to maintain non-native flows in the Arroyo Simi-Las Posas	Not implemented	Not defined	N/A	Increase in sustainable yield

3.2 Newly Identified Projects and Management Actions

FCGMA and the interested parties in the LPVB have identified projects that increase water supplies in the LPVB and support implementation of the GSP and Judgment. These projects were not included in the GSP. A portion of these projects were incorporated into the GSP through the 2021 GSP Annual Report for the LPVB (FCGMA 2022). These projects are summarized below and in Table 3-2.

In addition to these projects, the Judgment identifies additional projects to be evaluated as part of the Basin Optimization Plan. These are summarized in Section 3.2.2, Projects Identified through the Judgment.

3.2.1 Project No. 4: Infrastructure Improvements to Zone Mutual Water Company's Water Delivery System

3.2.1.1 Description of Project No. 4

This project is intended to increase the capacity of Zone Mutual Water Company (ZMWC) delivery system to physically transfer water between the ELPMA and WLPMA of the LPVB by converting the existing ZMWC delivery system from gravity to pressure. The conversion will require: the replacement of approximately 4.5 miles of concrete gravity pipeline with PVC, HDPE, or steel pipeline and associated appurtenances, and instrumenting the delivery system with system automation controls to provide on-demand services. Implementation of this project would contribute to GSP Project No. 1, Purchase of Imported Water from CMWD for Basin Replenishment, by allowing for in-lieu deliveries to farmers within, and potentially surrounding, the ZMWC service area. In addition, this project would increase water use efficiency through pipeline upgrades and system automation and increase the capacity to deliver blending water to agricultural well owners impacted by poor quality groundwater. It is estimated that this project would result in approximately 500 AFY of water savings and would decrease groundwater demand in the LPVB by 2,300 AFY.

3.2.1.2 Benefits and Impacts of Project No. 4

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized.

Expected Benefits

The project should aid in the achievement of measurable objectives and minimum thresholds for the four sustainability indicators applicable to the LPVB. This project will: (1) help raise groundwater levels, thereby increasing the volume of groundwater in storage and reducing the potential for land subsidence related to groundwater withdrawal, and (2) improve groundwater quality by providing blending water to agricultural pumpers impacted by low quality groundwater. Higher groundwater levels will also reduce pump lift, and therefore energy consumption, for municipal and agricultural pumpers.

It is estimated that implementation of this project would decrease groundwater demand in the LPVB by approximately 500 AFY.

Impacts to beneficial uses and users

This project benefits beneficial uses and users in the WLPMA by helping to raise groundwater levels and storage.

3.2.2 Project No. 5: Moorpark Groundwater Desalter

3.2.2.1 Description of Project No. 5

This project proposed by the Ventura County Waterworks District No. 1 (VCWWD-1) consists of construction of a new groundwater desalter facility located east of the Moorpark Water Reclamation Facility, along Los Angeles Avenue. The project goals are to improve water quality in the southern portion of the ELPMA and provide an additional source of potable water supply to the LPVB. The project aims to achieve these goals by pumping and treating high-TDS groundwater from the southern portion of the ELPMA. In doing this, the project would: (1) assist the wastewater treatment plants in the Calleguas Creek Watershed in compliance with the Regional Water Quality Control Board total maximum daily load limit for chloride, sulfate, and TDS, (2) reduce the dependence on imported water in the LPVB by providing new local potable supplies, (3) improve groundwater quality in the southern portion of the ELPMA, and (4) create additional underground storage within the ELPMA. Preliminary analyses of the project anticipate that the Moorpark Desalter operate at a maximum sustainable rate of 7,600 AFY.

Project components include: (1) construction of new groundwater extraction wells to pump high-TDS groundwater from the ELPMA, and (2) construction of a desalter facility that would treat the low-quality groundwater prior to incorporation into the VCWWD-1 delivery system. Preliminary analyses for the proposed desalter have been completed and the project is in the planning phase.

3.2.2.2 Benefits and Impacts of Project No. 5

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized. Feasibility of implementing this project in the LPVB will be evaluated in the Basin Optimization Plan.

Expected Benefits

Depending on the operational conditions and distribution of desalted water, this project should aid in the achievement of measurable objectives and minimum thresholds for the four sustainability indicators applicable to the LPVB. This project would aid in achieving these metrics by: (1) removing constituents of concern from the southern portion of the ELPMA, which directly addresses undesirable results associated with degraded water quality, and (2) reducing groundwater demands in the LPVB. In addition, this project would be complementary to GSP Project No. 3, *Arroyo Simi-Las Posas Water Acquisition*, which aims to maintain dewatering well and/or SVWQCP discharges to the Arroyo Simi-Las Posas for downstream recharge to the LPVB, by increasing the available storage capacity in the aquifers underlying Arroyo Simi-Las Posas.

Impacts to beneficial uses and users

This project would benefit beneficial uses and users by improving groundwater quality conditions in the Southern ELPMA and helping to prevent groundwater elevation declines by providing a new source of water supply throughout the LPVB.

3.2.3 Project No. 6: Arroyo Las Posas Storm Flow Diversions for Recharge to the East Las Posas Management Area

3.2.3.1 Description of Project No. 6

This project proposes to divert storm flows from Arroyo Simi-Las Posas for recharge to the ELPMA. The proposed diversions would occur during high flow events via a new surface intake located near the existing stabilizer structure in the Arroyo Simi-Las Posas adjacent to the Moorpark Wastewater Water Reclamation Facility operated by VCWWD-1. The storm flows would then be delivered to the existing percolation ponds to recharge the aquifers in the ELPMA. The project proposes to use the entire 40 acres of the existing percolation ponds and anticipates that the diversions would provide up to 2,000 AFY of recharge. The 2,000 AFY estimated recharge may increase the sustainable yield of the ELPMA up to the corresponding amount, provided adequate storage is available in the aquifers.

3.2.3.2 Benefits and Impacts of Project No. 6

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized. Feasibility of implementing this project will be evaluated in the Basin Optimization Plan.

Expected Benefits

The project should aid in the achievement of measurable objectives and minimum thresholds for the four sustainability indicators applicable to the LPVB. This project will: (1) help raise groundwater levels throughout the ELPMA by providing 2,000 AFY of additional recharge to the basin, thereby increasing the volume of groundwater in storage and reducing the potential for land subsidence related to groundwater withdrawal, and (2) improve groundwater quality in the southern portion of the ELPMA by recharging higher-quality water compared to the base flows in Arroyo Las Posas that are composed predominantly of discharges from the SVWQCP. Higher groundwater levels that result from this recharge project may also reduce pump lift, and therefore energy consumption, for municipal and agricultural pumpers.

This project is estimated to increase the sustainable yield of the ELPMA by up to 2,000 AFY.

Impacts to beneficial uses and users

This project would positively impact beneficial uses and users in the ELPMA.

3.2.4 Project No. 7: Installation of Additional Groundwater Monitoring Wells

3.2.4.1 Description of Project No. 7

This project proposes installation of multi-depth monitoring wells in the WLPMA and ELPMA of the LPVB to assess groundwater conditions in the principal aquifers of the LPVB that lack data. The GSP determined that there were spatial data gaps in the understanding of aquifer conditions and identified four potential new well locations that would help fill the identified gaps. In the WLPMA, the GSP identified the boundary between the WLPMA and the Oxnard Subbasin as an area that would benefit from additional groundwater monitoring to improve characterization of groundwater gradients across the basin boundary. In the ELPMA, the GSP identified the potential groundwater dependent ecosystem located along Arroyo Simi-Las Posas as a region that would benefit from additional groundwater monitoring. A new multi-depth groundwater monitoring well in this location would provide data on whether the vegetation in the riparian corridor relies on groundwater or soil moisture from infiltrating surface water. In addition, the GSP notes that there are no dedicated monitoring wells screened in the GCA in the ELPMA and that adding a monitoring well would improve the understanding of groundwater gradients between the FCA and GCA.

Since submittal of the GSP, well 02N20W04F02S, a key well in the ELPMA, was destroyed. A new dedicated monitoring well to replace this well would provide better characterization of groundwater conditions in the western part of the ELPMA. In the WLPMA, FCGMA identified the pumping depression in the eastern portion of the management area as an area that would benefit from a new dedicated monitoring well. Additionally, well 02N21W16J03S, the only key well in the central part of the WLPMA, has not been measured since 2016. This part of the WLPMA would benefit from a new dedicated monitoring well.

3.2.4.2 Benefits and Impacts of Project No. 7

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized.

Expected Benefits

The expected benefits of this project lie in the additional data gathered from the well installation process and the ongoing monitoring of the groundwater conditions at the well sites. These data can be used to refine the conceptual and numerical models of the LPVB. Such refinement may result in reevaluation and adjustment of the minimum thresholds or measurable objectives.

Impacts to beneficial uses and users

This project is anticipated to benefit beneficial uses and users in the LPVB by improving characterization and management of the basin.

3.2.5 Project No. 8: Installation of Transducers in Groundwater Monitoring Wells

3.2.5.1 Description of Project No. 8

This project proposes installation of transducers in representative monitoring points, or key wells, in the LPVB. The GSP determined that there were temporal data gaps in the understanding of aquifer conditions. These data gaps limit the number of wells that can be used to contour spring high and fall low groundwater conditions. These temporal data gaps also impact estimates of the change in groundwater in storage in the LPVB. The temporal data gaps have persisted in each annual report prepared after the GSP was submitted to DWR. Additionally, as most key wells are agricultural irrigation wells, transducers will help assure that measured groundwater levels are static water levels unaffected by recovery or potential well interference. The addition of transducers will help ensure that spring high and fall low groundwater levels are collected from representative monitoring points within a 2-week window, as recommended by DWR, and will provide a clearer understanding of groundwater conditions during the spring and fall measurement events. This will allow better comparison for annual change in storage estimates and will facilitate sustainable management of the LPVB.

3.2.5.2 Benefits and Impacts of Project No. 8

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized.

Expected Benefits

The expected benefits of this project lie in the collection of data from a 2-week window each spring and fall and the ongoing monitoring of the groundwater conditions at the well sites including a better understanding of potential well interference and non-static conditions on the water level measurements. This data can be used to inform management decisions depending on the observed groundwater conditions.

Impacts to beneficial uses and users

This project is anticipated to benefit beneficial uses and users in the LPVB by improving characterization and management of the basin.

3.2.6 Project No. 9: Feasibility Study to Identify Possible Supplemental Water Supply Sources for the Northern East Las Posas Management Area

3.2.6.1 Description of Project No. 9

This project seeks to understand the feasibility of providing supplemental water supplies to the northern area of the ELPMA. The GSP identified the area of the ELPMA north of the Moorpark anticline as a region where groundwater elevations have exhibited historical declines that locally exceed 250 feet. Groundwater elevation trends in this part of the ELPMA differ from those measured in the southern portion of the ELPMA, where groundwater elevations have experienced periods of recovery in response to increasing flow in Arroyo Simi-Las Posas. Groundwater elevations north of the Moorpark anticline are less responsive to flows in Arroyo Simi-Las Posas and are primarily influenced by groundwater production and CMWD's ASR operations. Supplemental water supplies to this area will reduce groundwater demand in this part of the ELPMA.

3.2.6.2 Benefits and Impacts of Project No. 9

Realized Benefits

This project is conceptual; thus, benefits have not yet been realized.

Expected Benefits

This feasibility study is expected to provide a clear understanding of the volume of supplemental water supplies, and corresponding piping infrastructure, required to offset groundwater demands and maintain groundwater elevations above the minimum thresholds in the northern portion of the ELPMA. In addition, this feasibility study will provide stakeholders with estimated costs associated with the supplemental water deliveries and corresponding infrastructure requirements and will also provide stakeholders with an estimate of the potential increase to the sustainable yield of the ELPMA.

Impacts to beneficial uses and users

This project is anticipated to benefit beneficial uses and users in the ELPMA by identifying the feasibility of implementing projects that help to reduce groundwater demands in the northern part of the basin, which impacts the sustainable yield of the ELPMA.

3.3 Additional Projects Identified in the Judgment

The Judgment identifies nine projects that must be considered in the *Basin Optimization Plan* for the LPVB:

1. Removing, and periodic removal maintenance, of Arundo donax from the Las Posas Valley Watershed in an environmentally safe manner.
2. Importing of surplus water.
3. Arroyo Las Posas storm water capture and recharge.
4. Constructing desalter(s) to address water quality issues in the Arroyo Simi Creek.
5. Formalizing an agreement with the City of Simi Valley to maintain up-stream wastewater treatment plant discharges, or treated effluent, into the Arroyo Simi Creek.
6. Formalizing an agreement with the City of Simi Valley for recycled water deliveries to Las Posas Valley users via pipeline.
7. Designing and constructing new or modified infrastructure in order to deliver In Lieu Water to deficit areas for Use in Lieu of Extracted Groundwater and to increase water conveyance within the LPVB.
8. Developing a program for least cost acquisition of Allocation Basis or Annual Allocations, or Carryover as an alternative to replenishment.
9. Using CMWD facilities for replenishment.

The current understanding of projects 1 through 5 and 7 are summarized in Sections 3.1, Evaluation of Projects and Management Actions Identified in the Groundwater Sustainability Plan, and 3.2, Newly Identified Projects and Management Actions. Projects 6, 8, and 9, are projects that have been newly identified in the LPVB through the Judgment. These newly identified projects will be evaluated in the Basin Optimization Plan

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Table 3-2. Summary of New Projects and Management Actions

Name	Description	Status	Expected Schedule	Benefits Observed to Date
New Projects				
Infrastructure Improvements to Zone Mutual Water Company's water delivery system	Conversion of existing ZMWC delivery system from gravity to pressure	Not Implemented	Not defined	N/A
Moorpark Groundwater Desalter	Groundwater desalter facility locate east of the Moorpark Water Reclamation Facility	Not Implemented	Not defined	N/A
Arroyo Las Posas Storm Flow Diversions for Recharge to the ELPMA	Construction of a new surface water intake and percolation ponds along Arroyo Simi-Las Posas	Not Implemented	Not defined	N/A
Installation of Additional Groundwater Monitoring Wells	Installation of up to four (4) new dedicated monitoring wells in the ELPMA and WLPMA	Not Implemented	Not defined	N/A
Installation of Transducers in Groundwater Monitoring Wells	Installation of transducers in key wells in the LPVB.	Not Implemented	Not defined	N/A
Feasibility Study to identify possible supplemental water supply sources for the northern ELPMA	Feasibility study to evaluate providing supplement water supplies to the northern area of the ELPMA.	Not Implemented	Not defined	N/A
Formalizing an agreement with the City of Simi Valley for recycled water deliveries to Las Posas Valley users via pipeline	Not Defined.	Not Defined.	Not Defined.	N/A
Developing a program for least cost acquisition of Allocation Basis or Annual Allocations, or Carryover as an alternative to replenishment	Not Defined.	Not Defined.	Not Defined.	N/A
Using CMWD facilities for replenishment	Not Defined.	Not Defined.	Not Defined.	N/A

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4 Basin Setting Review

4.1 Hydrogeologic Conceptual Model

There are three hydrogeologically distinct management areas (WLPMA, ELPMA, and Epworth Gravels Management Area) and four principal aquifers (the Shallow Alluvial aquifer, Epworth Gravels aquifer, FCA, and GCA) in the LPVB (FCGMA 2019). The FCA and GCA are present in both the WLPMA and ELPMA, although hydrogeologic communication between the two management areas is limited by the Somis Fault. The Shallow Alluvial aquifer is only present in the East Las Posas Management Area (ELMPA), constrained to an area adjacent to Arroyo Simi–Las Posas. The Epworth Gravels aquifer is located geographically within the ELPMA, near Broadway Road, however it is hydrologically disconnected from the underlying FCA and, therefore, is defined as its own management area. The Upper San Pedro formation, while not a principal aquifer in the LPVB, acts as a source of water to the underlying FCA. This section of the GSP evaluation summarizes new information that helps to improve understanding of the groundwater conditions within each principal aquifer.

4.1.1 New Information and Data

4.1.1.1 Hydrostratigraphic Information

WLPMA

UWCD maintains the three-dimensional (3D) hydrostratigraphic model of the Oxnard Subbasin, PVB, and WLPMA. This 3D hydrostratigraphic model maps the lateral extents, thicknesses, and properties of the six water-bearing aquifers in the LPVB. The 3D model was designed during development of the VRGWFM and integrates geophysical logs (e-logs) and lithologic data from approximately 575 wells in the Oxnard Subbasin, PVB, and WLPMA with structural geologic information into a 3D model developed using the Rockworks software (UWCD 2018). Since adoption of the GSP, UWCD has continued development of the 3D hydrostratigraphic model of the region. UWCD has focused their hydrostratigraphic model updates on areas in the Oxnard Subbasin underlying the Naval Base Ventura County installations at Point Mugu and Port Hueneme, where groundwater is impacted by seawater intrusion. These revisions impact the interpretation of aquifer thicknesses and extents along the coastline of the Oxnard Subbasin.

While these hydrostratigraphic model updates are not specific to the LPVB, they help to improve understanding of the impacts of groundwater conditions in the WLPMA of the LPVB on seawater intrusion in the Oxnard Subbasin. These revisions are described in FCGMA (2024a). Projects have been identified to install additional monitoring wells and transducers in existing wells that would address data gaps in the ELPMA (Sections 3.2.4 and 3.2.5.) FCGMA applied for DWR SGMA Implementation Grant funding for these projects but was not awarded funds. These projects will be evaluated further in the Basin Optimization Plan.

ELPMA and Epworth Gravels

No new information is available that would improve or update the understanding of the hydrogeologic conceptual model of the ELPMA and Epworth Gravels Management Area. Data gaps in the hydrogeologic conceptual model still exist in both management areas. Projects have been identified to install additional monitoring wells and transducers in existing wells that would address data gaps in the ELPMA (Sections 3.2.4 and 3.2.5). FCGMA applied for DWR SGMA Implementation Grant funding for these projects but was not awarded funds. These projects will be evaluated further in the Basin Optimization Plan.

4.1.2 Groundwater Conditions

New data made available since adoption of the GSP that help to improve characterization of groundwater conditions in the LPVB include DWR's InSAR data and the Nature Conservancy's satellite-based estimates of riparian habitat health along Arroyo Simi-Las Posas. These data are described in Sections 2.6, Land Subsidence, and 2.7, Groundwater–Surface Water Connections, and improve understanding of the relationship between groundwater extractions, groundwater levels, and undesirable results in the LPVB.

4.1.3 Updates to the Hydrogeologic Conceptual Model

4.1.3.1 Recharge Areas

The majority of groundwater production from the LPVB occurs from the San Pedro and Santa Barbara formations, which host the FCA and GCA. These formations are expressed at land surface along South Mountain and along the base of the Oak Ridge and Santa Susana Mountains (Figure 4-1, Potential Recharge Areas of the Las Posas Valley Basin). While a portion of these areas lie outside of the LPVB, these outcrops act as recharge areas for the principal aquifers of the LPVB.

4.2 Data Gaps in the Hydrogeologic Conceptual Model

The GSP identified data gaps in the hydrogeologic conceptual model of the LPVB (FCGMA 2019). These data gaps create uncertainty in the understanding of the impacts of water level changes on change in storage in each aquifer. Since adoption of the GSP, no additional information has been collected that address these data gaps. However, projects have been identified to install additional monitoring wells and transducers in existing wells that would address data gaps in both the ELPMA and WLPMA (Sections 3.2.4 and 3.2.5.) FCGMA applied for DWR SGMA Implementation Grant funding for these projects but was not awarded funds. These projects will be evaluated further in the Basin Optimization Plan. A summary of the data gaps identified in the GSP is included in Table 4-1, Summary of Actions Taken to Address Data Gaps Identified in the GSP.

Table 4-1. Summary of Actions Taken to Address Data Gaps Identified in the GSP

Data Gap Identified in the GSP		Status of Data Gap
No.	Description	
1	Distributed measurements of aquifer properties from wells screened solely in a single aquifer	▪ These data gaps remain in the LPVB. ▪ Projects that begin to address these data gaps are being evaluated and prioritized for implementation over the next 5 years in a manner consistent with the GSP and Judgment.
2	Distributed measurements of groundwater quality from wells screened solely in a single aquifer	
3	The volume of leakage between the USP and underlying FCA	

4	The connectivity and vertical flow between multiple distinct water-bearing zones within the USP	

4.3 Water Use Changes and Associated Water Budget

The GSP characterized historical land uses and water supplies within the LPVB through December 31, 2015. This section summarizes the water supplies in the LPVB since 2015. Land use changes within the LPVB since 2015 are provided as context.

4.3.1 Land Use Change

Land use change in the LPVB was evaluated using DWR's statewide land use data for 2014 and 2022. Land uses were grouped into three categories: agriculture, urban, and idle/unclassified. Between 2014 and 2022, the area of agricultural land increased by approximately 499 acres, area of urban land increased by approximately 395 acres, and area of idle/unclassified land increased by approximately 487 acres (Table 4-2, Land Use Change 2014 - 2022). The total mapped land use in the LPVB in DWR's published data sets varies by 1,381 acres between 2014 and 2022 pointing to uncertainty in the data which should be considered when evaluating the land-use changes.

Table 4-2. Land Use Change 2014–2022

Land Use	2014 (acres)	2022 (Acres)	Difference (acres)	Percent Change
Agriculture	18,403	18,902	499	3%
Urban	6,892	7,287	395	6%
Idle/Unclassified	108	595	487	453%

Source: DWR 2024.
Notes: DWR's land use mapping totals to 25,403 acres in 2014 and 26,784 in 2022. The difference in total mapped land use reflects uncertainty in the Statewide mapping and not a change in the areal extent of the LPVB.

4.3.2 Water Supplies during the Evaluation Period

Water supplies in the LPVB consist of imported water, recycled water, and groundwater. This section of the GSP evaluation summarizes the total water supplies in the LPVB and provides a comparison to historical usage. Because the GSP provides data on water supplies through 2015, water supply data are summarized here for water years 2016 through 2023. However, water-use trends over the evaluation period are characterized using data for the period of water years 2020 through 2023[15]. Data for water year 2024 (Judgment Water Year 2023) were not available at the time of reporting.

[15] Groundwater extraction trends for the evaluation period are summarized using data from two years: water year 2021 and 2022. Due to the transition from calendar year to water year reporting in 2021, there is uncertainty in the estimate of groundwater extractions for water year 2021. Water year 2023 was not included because, at the time of reporting, Fox Canyon Groundwater Management Agency (FCGMA) had only received and/or processed extraction reports for approximately 80% of the operators in the Subbasin.

4.3.2.1 Groundwater

On December 14, 2020, the FCGMA adopted a new Ordinance to Establish an Extraction Allocation System for the Las Posas Valley Groundwater Basin. The prior system provided an efficiency allocation to agricultural pumpers based on the crop type, number of acres planted, and water-year type. This enabled increased groundwater extractions if more water-intensive crops were planted, or additional acres were brought into production. The new system established fixed extraction allocations assigned to each production well, a change that was needed to sustainably manage the basin. The ordinance additionally transitioned extraction reporting from calendar year to water year. The allocation system went into effect on October 1, 2021 (start of water year 2022[16]) through September 30, 2023. The Judgment adjudicated water rights in the basin and established an allocation system based on those water rights. The Judgment allocations supersede the allocations developed and adopted by FCGMA in 2019. The initial allocations are based on the LPVB's Operating Yield[17].

Table 4-3, Reported Annual Groundwater Extractions in the WLPMA by Aquifer System and Water Use Sector, and Table 4-4, Reported Annual Groundwater Extractions in the ELPMA by Aquifer System and Water Use Sector, summarize groundwater extractions from the LPVB since 2015. Because groundwater extractions are not reported monthly, groundwater production prior to calendar year 2021 cannot be reported on a water-year basis. Therefore, the groundwater extractions for 2016 through 2020 reported in Tables 4-3 and 4-4 follow the historical precedent and represent calendar year extractions.

Due to the transition from calendar-year to water-year reporting, the water year 2021 groundwater extractions reported in Tables 4-3 and 4-4 represent: (i) a combination of reported and estimated extractions for the period from October 1, 2020, through December 31, 2020, and (ii) a combination of reported and estimated extractions for the period from January 1, 2021, through September 30, 2021. Agricultural extractions between October and December 2020 were estimated using monthly automated metering infrastructure (AMI) data that were validated against the 2020 calendar year extraction reports. Municipal and domestic extractions between October and December 2020 were estimated by assuming that 50% of the reported extraction between June and December occurred between October and December.

The water year 2023 extractions presented in Tables 4-3 and 4-4 represent the extractions reported to FCGMA over the 2023 reporting period as of January 26, 2024, and do not include estimates of extractions from non-reporting wells based on AMI data. FCGMA had received complete reporting from approximately 70% of the operators within the LPVB. In water year 2022, extraction from the operators with incomplete reporting accounted for approximately 15% of the total extractions in the basin.

Comparison to Historical Groundwater Supplies

During the 1985 to 2015 period, approximately 35,100 AFY of groundwater was extracted from the LPVB (FCGMA 2019). Approximately 86% was used for agriculture, 14% was used for municipal supply, and less than 2% was

16 Water year 2022 covers the period from October 1, 2021, through September 30, 2022.

17 The Judgment defines the "Operating Yield" as the cumulative amount of Allocated Groundwater that may be sustainably Extracted from the Basin for Use in any particular Water Year under the terms of this Judgment, excluding the Use of any Groundwater pursuant to a right of Carryover. Consistent with the definition of "Total Safe Yield" in the Phase 1 Order, the components of the Operating Yield include all native and non-native sources of water within the Basin, or within either subbasin (as the contexts requires), presently and in the future, including native Groundwater, surface water underflow, Return Flows from the use of imported water within the Basin, recharge from treated wastewater, recharge from septic systems, storm water recharge (intentional or otherwise), recharge from natural and non-natural sources originating inside or outside the Basin, excepting augmented yield physically existing within, and recoverable from, the Basin as a result of the Calleguas ASR Project, if any.

reportedly used for domestic purposes. Available data characterizing groundwater extractions in water years 2021 and 2022 indicate that groundwater extractions from the LPVB averaged approximately 42,400 AFY (Tables 4-3 and 4-4), or 15% higher than the 1985 to 2015 average. In water years 2021 and 2022, approximately 86% of the pumped groundwater was used for agriculture, 13% was used for municipal supply, and 1% was used for domestic purposes.

The higher than historical average groundwater extractions over the 2020 and 2021 water years reflect a general increase in groundwater demands and reduction in imported water usage. Additionally, in-lieu deliveries to both the ELPMA and WLPMA were discontinued in 2016; these deliveries have historically reduced groundwater demands within the LPVB (Section 4.3.2.2, Imported Water, and Section 4.3.2.4, Calleguas Municipal Water District Aquifer Storage and Recovery Project and In-Lieu Storage).

Comparison to Projected Groundwater Supplies

Future projections of groundwater extractions were updated as part of this 5-year GSP evaluation (Section 5.2). Under baseline conditions, groundwater extractions from the LPVB are projected to average approximately 36,100 AFY. This is approximately 10% lower than the average annual groundwater extractions over the 2021 and 2022 water years.

Importantly, groundwater extractions from the LPVB are now managed under the Judgment, which establishes the initial Operating Yield of the LPVB at 40,000 AFY. This Operating Yield will remain in effect through Water Year 2024 (October 1, 2024, through September 30, 2025), after which FCGMA may implement Rampdown to support sustainable groundwater management of the LPVB. The rate of, and need for, Rampdown will be developed through the Basin Optimization Yield Study.

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Table 4-3. Reported Annual Groundwater Extractions in the WLPMA by Aquifer System and Water Use Sector

Year	Reporting Complete / Estimated Percentage Complete (%)[a]	Shallow Alluvial System (acre-feet)				Lower Aquifer System (acre-feet)				Wells in Unassigned Aquifer Systems (acre-feet)				Total (acre-feet)
		AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	
CY 2016	Yes	1,365	0	1	1,366	9,442	2,356	0	11,799	2,168	197	32	2,398	15,562
CY 2017	Yes	1,372	0	1	1,372	10,497	2,294	0	12,791	1,735	204	43	1,982	16,146
CY 2018	Yes	920	0	1	921	9,625	1,627	0	11,252	2,294	206	41	2,540	14,714
CY 2019	Yes	619	0	0	619	8,737	2,109	0	10,846	2,773	132	41	2,946	14,411
CY 2020	Yes	883	0	1	883	9,269	2,086	0	11,355	3,591	212	73	3,877	16,115
WY 2021	Yes	892	0	1	893	10,989	2,207	0	13,196	3,690	173	30	3,893	17,982
WY 2022	Yes	384	0	0	385	8,554	2,123	0	10,677	3,856	214	65	4,135	15,197
WY 2023[b]	No/70%	362	0	0	362	5,930	1,412	0	7,342	2,202	178	30	2,410	10,114
2016-2022 Average		**919**	**0**	**1**	**920**	**9,588**	**2,115**	**0**	**11,702**	**2,872**	**191**	**46**	**3,110**	**15,732**
2021 - 2022 Average		**638**	**0**	**1**	**639**	**9,772**	**2,165**	**0**	**11,937**	**3,773**	**194**	**47**	**4,014**	**16,589**

Notes: AG = Agriculture; Dom = domestic; M&I = Municipal and Industrial; CY = Calendar Year (January 1 through December 31); WY = Water Year (October 1 through September 30)

[a] Qualifier indicates whether extraction reporting is complete for the given year. "Yes" indicates no additional reporting is anticipated. "No" indicates that additional reporting is anticipated. The percentage included after the "No" qualifier represents the estimated total percentage of operators who have reported extractions to FCGMA as of January 26, 2024.

[b] Groundwater extractions are preliminary and expected to change. Additional extraction reporting is anticipated.

Table 4-4. Reported Annual Groundwater Extractions in the ELPMA by Aquifer System and Water Use Sector

Year	Reporting Complete / Estimated Percentage Complete (%)[a]	Epworth Gravels Aquifer (acre-feet)				Upper San Pedro Formation (acre-feet)				Fox Canyon Aquifer (acre-feet)				Grimes Canyon Aquifer (acre-feet)				Wells in Multiple or Unassigned Aquifers (acre-feet)				Total (acre-feet)
		AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	AG	M&I	Dom	Sub-total	
CY 2016	Yes	1,009	0	0	1,009	583	0	0	583	11,233	1,128	0	12,361	89	87	0	176	5,969	98	20	6,087	20,216
CY 2017	Yes	875	0	0	875	580	0	0	580	12,305	1,093	0	13,398	105	91	0	197	6,328	131	30	6,489	21,539
CY 2018	Yes	712	0	0	712	562	0	0	562	11,471	1,392	0	12,863	78	92	0	171	6,167	419	30	6,616	20,924
CY 2019	Yes	716	0	0	716	217	0	0	217	11,050	1,289	0	12,339	77	99	0	177	3,954	134	20	4,109	17,557
CY 2020	Yes	817	0	0	817	133	0	0	133	11,729	1,616	0	13,345	106	121	0	228	5,540	272	21	5,833	20,356
WY 2021	Yes	773	0	0	773	152	0	0	152	13,073	1,926	0	14,998	93	172	0	266	10,258	167	34	10,459	26,648
WY 2022	Yes	155	0	0	155	216	0	0	216	11,087	3,187	0	14,274	90	52	0	142	5,635	557	21	6,213	21,002
WY 2023[b]	No/70%	388	0	0	388	185	0	0	185	5,535	2,733	0	8,268	57	115	0	172	6,438	114	170	6,722	15,735
2016 - 2022 Average		**722**	**0**	**0**	**722**	**349**	**0**	**0**	**349**	**11,707**	**1,662**	**0**	**13,368**	**91**	**102**	**0**	**194**	**6,265**	**254**	**25**	**6,544**	**21,177**
2021 - 2022 Average		**464**	**0**	**0**	**464**	**184**	**0**	**0**	**184**	**12,080**	**2,556**	**0**	**14,636**	**92**	**112**	**0**	**204**	**7,947**	**362**	**27**	**8,336**	**23,825**

Notes: AG = Agriculture; Dom = domestic; M&I = Municipal and Industrial; CY = Calendar Year (January 1 through December 31); WY = Water Year (October 1 through September 30)

a Qualifier indicates whether extraction reporting is complete for the given year. "Yes" indicates no additional reporting is anticipated. "No" indicates that additional reporting is anticipated. The percentage included after the "No" qualifier represents the estimated total percentage of operators who have reported extractions to FCGMA January 26, 2024

b Groundwater extractions are preliminary and expected to change. Additional extraction reporting is anticipated.

4.3.2.2 Imported Water

Imported water supplies in the LPVB consist of:

- Imported Metropolitan Water District of Southern California potable water (State Water Project and/or Colorado River water) delivered by CMWD to water purveyors in the basin.
- Groundwater pumped from the PVB and Arroyo Santa Rosa Valley Basin served by Camrosa Water District (CWD).
- Non-potable water served by CWD.

CMWD is the largest imported water supplier to the LPVB and has provided approximately 97% (or 8,400 AFY) of the imported water since water year 2015 (Table 4-5. Sales and Usage of CMWD Imported Water Supplies). Approximately 27% of the imported water by CMWD delivered to purveyors during the evaluation period was used to support agriculture and the remainder was used for municipal and industrial purposes (Table 4-5). Since 2015, CWD has imported an average of approximately 200 AFY of imported groundwater and non-potable water (Table 4-6, Other Imported and Recycled Water Supplies).

Comparison to Historical Imported Water Supplies

During the 1985 to 2015 period, CMWD delivered an average of approximately 10,500 AFY of imported water in the LPVB. Approximately 89% was delivered and used within the ELPMA and approximately 11% was delivered and used within the WLPMA. In the ELPMA, approximately 74% (or 6,800 AFY) of the imported water delivered by CMWD to purveyors was used for municipal and industrial purposes and the remainder was used for agriculture. In the WPLMA, approximately 77% (or 900 AFY) was used for municipal and industrial purposes (FCGMA 2019). CMWD's imported water deliveries during the 2016 to 2023 period were approximately 20% lower than the 1985 to 2015 average.

During the 1985 to 2015 period, CWD imported water was served by purveyors for an average of approximately 90 AFY for agricultural and municipal and industrial use in the ELPMA (FCGMA 2019). CWD's imported water delivered to purveyors in the ELPMA during the 2016 to 2022 period was approximately twice their historical delivery amounts (Table 4-6).

Comparison to Projected Imported Water Supplies

In their 2015 and 2020 UWMPs, CMWD included imported water demand projections for Berylwood Heights Mutual Water Company, California-American Water Company, CWD, Crestview Mutual Water Company, Solana Verde Mutual Water Company, VCWWD-1, VCWWD-19, and ZMWC. Over the 2020 to 2025 period, these projections average approximately 8,900 AFY (CWMD 2016; CMWD 2021). Under normal, single year dry, and multi-year dry scenarios, CMWD does not anticipate experiencing water supply shortages that would impact their ability to meet these demands (CWMD 2016; CMWD 2021). Over the 2020 to 2023 period, the CMWD delivered approximately 7,700 AFY to water purveyors in the LPVB. This is approximately 1,200 AFY, or 5% lower, than the projections in CMWD's 2015 and 2020 UWMP.

CWD projects that they will be able to provide approximately 370 AFY of imported non-potable water to users in ELPMA through the next 50-year planning horizon. Their 2016 to 2023 deliveries of Conejo Creek Project water were approximately 200 AFY lower than these projections. CWD does not anticipate continuing the delivery of groundwater pumped from the Arroyo Santa Rosa Valley Basin and PVB for use in the ELPMA.

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Table 4-5. Sales and Usage of CMWD Imported Water Supplies (Acre-Feet)

Water Year	BHMWC	Cal-Am[a]	CWD			Crest-view MWC	Solana Verde MWC[b]			VCWWD No. 1[c]			VCWWD No. 19[d]							Zone MWC[e]			Total Imported Water Deliveries						
	ELPMA	WLPMA	ELPMA			WLPMA	WLPMA			ELPMA			WLPMA			ELPMA				WLPMA	ELPMA		WLPMA			ELPMA			
	AG	M&I	AG	M&I	Sub-total	M&I	AG	M&I	Sub-total	AG	M&I	Sub-total	AG	M&I	Sub-total	AG	M&I	Sub-total	Sub-total	AG		Sub-total	AG	M&I	Sub-total	AG	M&I	Sub-total	Total
2016	16	404	75	54	129	165	310	16	327	1,707	5,122	6,830	271	112	383	181	75	256	639	181	121	301	762	697	1,460	2,100	5,251	7,350	8,810
2017	6	413	69	51	121	72	272	14	286	1,826	5,478	7,305	100	41	141	67	28	94	235	0	0	0	372	541	912	1,968	5,557	7,525	8,437
2018	0	461	71	53	124	347	324	17	341	2,057	6,171	8,228	448	186	633	298	124	422	1,056	0	0	0	772	1,011	1,783	2,427	6,348	8,775	10,558
2019	0	414	73	54	127	178	235	12	248	1,711	5,133	6,845	149	62	210	99	41	140	350	0	0	0	384	666	1,050	1,883	5,228	7,112	8,162
2020	0	438	92	69	161	40	249	13	262	1,798	5,394	7,192	117	49	166	78	32	110	276	0	0		366	539	905	1,968	5,495	7,463	8,368
2021	0	221	67	51	118	473	349	18	368	2,001	6,002	8,002	3	1	4	2	1	3	7	0	0	0	352	714	1,066	2,069	6,053	8,122	9,188
2022	6	401	64	49	113	73	306	16	323	1,561	4,683	6,244	40	17	57	27	11	38	95	0	0	0	347	506	853	1,658	4,742	6,401	7,254
2023	0	328	45	48	94	0	180	9	190	1,347	4,041	5,389	39	16	55	26	11	37	92	0	0	0	219	353	572	1,418	4,100	5,519	6,091
2016-2023 Average	**3**	**385**	**70**	**54**	**123**	**168**	**278**	**15**	**293**	**1,751**	**5,253**	**7,004**	**146**	**60**	**206**	**97**	**40**	**137**	**344**	**23**	**15**	**43**	**447**	**629**	**1,075**	**1,936**	**5,347**	**7,283**	**8,359**
2020 - 2023 Average	**2**	**347**	**67**	**54**	**121**	**146**	**271**	**14**	**285**	**1,677**	**5,030**	**6,706**	**50**	**21**	**70**	**33**	**14**	**47**	**117**	**0**	**0**	**0**	**321**	**528**	**849**	**1,778**	**5,098**	**6,876**	**7,725**

Notes: M&I = Municipal and Industrial; Ag = Agriculture; CMWD = Calleguas Municipal Water District; BHMWC = Berylwood Heights Mutual Water Company; Cal-Am = California-American Water Company; CWD = Camrosa Water District; Crestview MWC = Crestview Mutual Water Company; Solan Verde MWC = Solana Verde Mutual Water Company; VCWWD No. 1 = Ventura County Waterworks District No. 1; VCWWD No. 19 = Ventura County Waterworks District No. 19; Zone MWC – Zone Mutual Water Company; WLPMA = West Las Posas Management Area; ELPMA = East Las Posas Management Area.

[a] Estimated using the fraction of California-American Water Company's service area that overlies the LPVB. Approximately 3% of the total CMWD sales to California-American Water Company.

[b] Total water sales provided by CMWD. Consistent with the GSP, total water sales were divided by assuming that 95% of the imported water was used for agriculture and 5% of the total water sales was used for M&I.

[c] Total water sales provided by CMWD. Consistent with the GSP, total water sales were divided by assuming that 75% of the imported water was used for agriculture and 25% of the total water sales was used for M&I (Ventura County Public Works Agency, Waterworks District email 4-19-2016).

[d] Total water sales provided by CMWD. Consistent with the GSP, total water sales were divided by assuming that 60% was used in the WLPMA and 40% was used in the ELPMA. Within each management area, it was assumed that approximately 70% of the imported water was used for agriculture and 30% was used for M&I (Ventura County Public Works Agency, Waterworks District email 4-19-2016).

[e] Total water sales provided by CMWD. Consistent with the GSP, total water sales were divided by assuming that 60% of the imported water was used in the WLPMA and 40% of the imported water was used in the ELPMA.

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Table 4-6. Other Imported and Recycled Water Supplies (Acre-Feet)

Water Year[a]	MWTP		Camrosa Water District Deliveries Used in the ELPMA					Total M&I	Total AG	Total
	Recycled Water for M&I	Recycled Water for AG	Pleasant Valley Basin groundwater used for M&I	Pleasant Valley Basin groundwater used for AG	Arroyo Santa Rosa Valley Basin groundwater used for M&I	Arroyo Santa Rosa Valley Basin groundwater used for AG	Non-potable water for AG			
2016	582	0	10	14	21	29	114	613	157	770
2017	723	0	9	13	33	44	100	765	157	922
2018	864	0	10	13	33	44	96	906	154	1,060
2019	842	0	9	13	26	35	143	876	190	1,066
2020	861	0	11	15	17	24	130	889	169	1,058
2021	746	0	12	16	12	16	114	770	146	916
2022	949	0	20	28	14	20	103	983	150	1,133
2023	718	18	0	0	0	0	370	718	388	1,105
2016 - 2023 Average	**786**	**2**	**10**	**14**	**19**	**26**	**146**	**815**	**189**	**1,004**
2021 - 2022 Average	**818**	**5**	**11**	**15**	**11**	**15**	**179**	**840**	**213**	**1,053**

Notes: NR = Not Reported. MWTP = Moorpark Wastewater Treatment Plant; AG = Agriculture; M&I = Municipal and Industrial

[a] Data for water years 2016 through 2020 were provided on a calendar year basis. To estimate water year usage, 25% of the imported water from a given calendar year was assigned to the following water year, and 75% of the imported water from a current calendar year was assigned to the same water year.

4.3.2.3 Recycled Water Supplies

VCWWD No. 1 delivers recycled water produced at the Moorpark Wastewater Treatment Plan (MWTP) for use in the ELPMA (Table 4-6). Between 2003 and 2022, recycled in the ELPMA was used exclusively for municipal and industrial uses. In 2023, VCWWD No. 1 began delivering recycled water produced at the MWTP for agricultural uses (Table 4-6).

Comparison to Historical Recycled Water Supplies

VCWWD No. 1 began delivering recycled water in the ELPMA in 2003. Between 2003 and 2015, VCWWD No. 1 delivered an average of approximately 500 AFY of recycled water for municipal and industrial use in the ELPMA (FCGMA 2019). VCWWD No. 1's recycled water deliveries during the 2020 to 2023 period were approximately 65% higher than the 2003 to 2015 average (Table 4-6).

Comparison to Projected Recycled Water Supplies

VCWWD No. 1 projects an increase in recycled water demands within their service area through 2040 (VCWWD No. 1 2021). In 2020, total recycled water demands in their service area equaled approximately 941 AF. By 2040, VCWWD No. 1 anticipates that recycled water demands in their service area will equal 2,200 AFY (VCWWD No. 1 2021). These demands are within the MWTP's current treatment capacity of 3.0 mgd (3,360 AFY) (VCWWD No. 1).

In 2020, VCWWD No. 1 served a total of 941 AF of recycled water produced at MWTP within their service area (VCWWD No. 1). Approximately 90% of this was served within the LPVB (Table 4-6). Using this percentage to estimate the projected recycled water supplies available to the LPVB, it is estimated that approximately 2,000 AFY of recycled water would be available for use in the LPVB in the future. The 2020 to 2023 average recycled water usage within the LPVB is approximately 60% lower than this estimate.

4.3.2.4 Calleguas Municipal Water District Aquifer Storage and Recovery Project and In-Lieu Storage Program

CMWD has injected water into the ELPMA since 1993 through their ASR program (FCGMA 2019). Additionally, as part of a program supported by MWD, CMWD has historically delivered imported water to LPVB users in lieu of groundwater pumping in both the WLPMA and ELPMA. In 2015, the end of the reporting period for the GSP, CMWD had 25,192 AF of storage in the WLPMA and 11,398 AF of storage in the ELPMA (FCGMA 2019).

Table 4-7, CMWD Aquifer Storage and Recovery Program, summarizes CMWD's ASR operations for the period from 2016 through 2023. At the end of the 2023 water year, CMWD had approximately 25,192 AF of storage in the WLPMA and 28,168 AF of storage in the ELPMA.

Table 4-7. CMWD Aquifer Storage and Recovery Program (Acre-Feet)

Year[a]	In Lieu Water Deliveries		Net ASR System Injection in ELPMA	Cumulative Storage[b]			ASR		Calc Net ASR System Injection in ELPMA
	WLPMA	ELPMA		WLPMA	ELPMA	Total	Injections	Extractions	
CY 2016	0	155	3,004	25,192	14,559	39,751	3,110	106	3,004
CY 2017	0	0	2,538	25,192	17,099	42,291	2,581	43	2,538
CY 2018	0	0	1,138	25,192	18,238	43,430	1,568	431	1,138
CY 2019	0	0	8,068	25,192	26,308	51,500	8,322	255	8,068
CY 2020	0	0	808	25,192	27,119	52,311	1,230	421	808
Transition Period									
2021	0	0	445	25,192	27,566	52,758	611	166	445
WY 2021	0	0	-1,355	25,192	26,230	51,422	1,057	2,412	-1,355
WY 2022	0	0	1,936	25,192	28,168	53,360	4,059	2,123	1,936

Notes: CY = Calendar Year; WY = Water Year; Transition Period = Period from January 1, 2021, through September 30, 2021.

[a] Water year is defined as October 1 of the preceding year through September 30 of the current year. For example, WY 2021 is October 1, 2020, through September 30, 2021

[b] Includes CMWD's storage prior to 2016.

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5 Updated Numerical Modeling

Numerical groundwater flow modeling of the LPVB was performed using two different models:

- **Coastal Plain Model:** a version of the VRGWFM MODFLOW numerical model developed and maintained by UWCD, which covers the entirety of the WLPMA, Oxnard Subbasin, PVB, and Mound Subbasin (UWCD 2018).
- **ELPMA Model:** a MODFLOW numerical model developed by CMWD, which covers the entirety of the ELPMA and Epworth Gravels Management Area (CMWD 2018).

As part of this GSP evaluation of the LPVB, both the VRGWFM and ELPMA model were updated to re-evaluate projected future conditions in the LPVB and validate each model's ability to reproduce groundwater elevations measured between January 1, 2015, and September 30, 2022. Section 5.1, Model Updates, describes the updates to each model since development of the GSP and Section 5.2, describes the updated future scenario modeling performed for this GSP evaluation, along with updated estimates of the sustainable yield of the LPVB.

5.1 Model Updates

5.1.1 West Las Posas Management Area Model

For the GSP, numerical groundwater flow modeling for the WLPMA was performed using the VRGWFM (UWCD 2018). UWCD actively maintains the VRGWFM to support regional groundwater management. The version of the VRGWFM used during development of the GSP covered the entirety of Oxnard and Mound subbasins and the majority of the WLPMA and PVB (UWCD 2018). Following adoption of the GSP, UWCD expanded the VRGWFM to cover the entirety of WLPMA and PVB and include the Santa Paula, Piru, and Fillmore Subbasins (UWCD 2021a). As part of this, UWCD updated their hydrogeologic conceptual model of the Oxnard, Santa Paula, Piru, and Fillmore Subbasins to improve representation of local hydrogeologic conditions and, in the Oxnard Subbasin, better represent groundwater elevations along the coast and their influence on seawater intrusion.

Due to the complexity of simulating the effects of Santa Clara River flows on groundwater conditions in the Santa Paula, Piru, and Fillmore subbasins, with a daily model timestep, UWCD maintains a localized version of the VRGWFM that excludes these upper basins and uses a monthly timestep. This branch-off of the VRGWFM is informally referred to as the Coastal Plain Model. Consistent with the GSP modeling, the Coastal Plain Model represents interactions between the Oxnard Subbasin and the upgradient Santa Paula Subbasin using a general head boundary condition (UWCD 2018). While the Coastal Plain Model is distinct from the VRGWFM, the model design and structure are consistent with the model used during development of the GSP. Therefore, the Coastal Plain Model is considered an update to the GSP model and was used for the 5-year GSP evaluation modeling.

Improvements to the Coastal Plain Model compared to the GSP model include revised estimates of subsurface exchanges with the Santa Paula Subbasin (Basin No. 4-004.04), and updated hydrostratigraphy in the vicinity of Port Hueneme and Point Mugu. These updates are summarized in FCGMA (2024a).

In the WLPMA, UWCD updated the boundary condition used to represent the Somis Fault, which separates the WLPMA and ELPMA (FCGMA 2019). For the GSP modeling, this boundary was represented using a no-flow boundary condition. The Coastal Plain Model now includes a general head boundary condition along the southeastern portion of the fault. As a result, the Coastal Plain Model simulates subsurface flows from the WLPMA to the ELPMA (Table 2-4c). These modeled flows are not integrated into the modeling conducted for the ELPMA.

While groundwater elevation measurements on the east and west side of the Somis Fault are limited, available data suggest that the Somis Fault is a significant barrier to groundwater flow (FCGMA 2024b, FCGMA 2019). The groundwater elevation gradient is from the ELPMA to the WLPMA (FCGMA 2024b, FCGMA 2019). FCGMA anticipates coordinating with UWCD, in consultation with the LPVB TAC, to better coordinate the representation of this boundary between the ELPMA and WLPMA in both LPVB models. This coordination will occur ahead of, and during development, the Basin Optimization Yield Study. Resulting revisions to the models will be incorporated into future modeling of the LPVB.

A broader discussion of updates to the Coastal Plain Model will be detailed in a technical memorandum prepared by UWCD[18].

5.1.1.1 Model Extension and Recalibration

As part of this 5-year evaluation, UWCD extended the Coastal Plain Model to simulate groundwater conditions in the WLPMA through the end of water year 2022 (i.e., September 30, 2022). During the model update and extension process, UWCD re-calibrated the Coastal Plain Model. This re-calibration effort involved incremental adjustments to local hydraulic conductivity, storativity, and boundary conductance values and resulted in better simulation of groundwater conditions along the coastline and simulation of groundwater conditions in the WLPMA (details to be included in UWCD's Coastal Plain Model update technical memorandum).

5.1.2 East Las Posas Management Area Model

For the GSP, numerical groundwater flow modeling for the ELPMA and Epworth Gravels Management Area was performed using the ELPMA model (CMWD 2018). CMWD no longer maintains this model but has provided the model to FCGMA to support management of the LPVB. As discussed in Section 4.1, Hydrogeologic Conceptual Model, no new information that warranted revisions to the hydrogeologic conceptual model used in the numerical model was identified in the ELPMA and Epworth Gravels Management Area. Because of this, the ELPMA model was not revised for this GSP evaluation.

5.1.2.1 Model Extension

As part of this 5-year evaluation, FCGMA extended the ELPMA model to simulate groundwater conditions in the ELPMA and Epworth Gravels through the end of water year 2022 (i.e., September 30, 2022). The model was not re-calibrated as part of this effort. The ELPMA model extension, and validation, will be detailed in a technical memorandum prepared by FCGMA[19].

18 United Water Conservation District anticipates publishing the Coastal Plain Model update technical memorandum in fall 2024.
19 FCGMA anticipates publishing the ELPMA extension and validation technical memorandum in fall 2024.

simulation of future groundwater conditions. In addition, the future modeling time period was updated to account for the extension in the historical modeling period. Results from the updated future model scenarios were used to estimate the sustainable yield of the LPVB under different project and management scenarios.

Revisions to the simulation time period, baseline extractions, future hydrology, and suite of projects considered in the future scenarios are described in Section 5.2.1, Updated Future Scenario Assumptions. The suite of future scenarios, and associated model results, are summarized in Section 5.2.2, Projected Water Budgets. Resulting revisions to the estimates of the future sustainable yield of the Subbasin are summarized in Section 5.2.3, Estimates of the Future Sustainable Yield.

5.2.1 Updated Future Scenario Assumptions

This section describes the set of assumptions used for the updated modeling and provides a comparison to the assumptions used for the GSP.

5.2.1.1 Updated Simulation Time Period

The future scenarios developed for this 5-year evaluation simulate groundwater conditions in the LPVB over the 47-year period from October 1, 2022, through September 30, 2069 (i.e., water years 2023 through 2069). This simulation period, combined with the 2020, 2021, and 2022 water-year simulation results (Sections 5.1.1, West Las Posas Management Area Model, and 5.1.2, East Las Posas Management Area Model), provides a 50-year GSP projection horizon as required under 23 CCR §354.18.

Comparison to the GSP Modeling

The future scenarios developed for the GSP simulated groundwater conditions in the LPVB over the 50-year period from January 1, 2020, through December 31, 2069 (FCGMA 2019). Because water years 2020, 2021, and 2022 were incorporated into the historical modeling, the future scenarios were updated to begin in water year 2023[20].

5.2.1.2 Updated Baseline Extraction Rates

The future baseline groundwater extraction rates used for the 5-year evaluation modeling are equal to the 2016 to 2022 average[21]. Groundwater extractions over this period consist of both reported and estimated extractions. Estimated extractions were based on available AMI data for wells with missing extraction reports (for example, see FCGMA 2023).

Comparison to the GSP Modeling

For the GSP, the future baseline extraction rates were equal to the average 2015 to 2017 extraction rates. The 2015 to 2017 extraction rate for the LPVB was equal to approximately 36,000 AFY. The updated baseline extraction rates are approximately equal to those simulated for the GSP (FCGMA 2019; Sections 5.2.2.1.2, Future Baseline Scenario, and 5.2.2.2.2, No New Projects Scenario).

20 For the GSP modeling, water year is defined as October 1 of the previous calendar year through September 30 of the current calendar year. For example, water year 2020 refers to the period from October 1, 2019, through September 30, 2020.

21 Water year 2020 was not included in the calculation. FCGMA transitioned extraction reporting from calendar year to water year in 2020; therefore 2020 extraction reporting only spanned 9 months (January 1 through September 30).

5.2.1.3 Updated hydrology

The future hydrology used for this 5-year evaluation modeling is the 1933 through 1979 hydrology, adjusted by DWR's 2070 central tendency climate change factors., with the noted exception that water year 1933 hydrology was replaced with water year 1978 hydrology. Average annual precipitation over this 47-year period is approximately equal to the long-term average and includes periods of drought as well as wetter-than-average conditions.

Water year 1933 hydrology was approximately 40% drier than the long-term historical average. Conversely, precipitation measured in water year 2023 in the LPVB was approximately 220% higher than the long-term historical average, and the volume of Santa Clara River water diverted for recharge in the Forebay Management Area of the Oxnard Subbasin was approximately 230% of the long-term historical average (FCGMA 2024a). To represent the wet 2023 water year in the future projections, the hydrologic record for water year 1933 was replaced with the hydrologic record for water year 1978. Water year 1978 was selected because flows available for diversion from the Santa Clara River were similar to those in water year 2023 – recharge in the Oxnard Subbasin Forebay associated with these diversions provide a source of recharge to the WLPMA.

Comparison to the GSP Modeling

The future scenarios developed for the GSP used hydrology measured during the 1930 to 1979 period, adjusted by DWR's 2070 central tendency climate change factors. This hydrology represented the future hydrology for the period from January 1, 2020, through December 31, 2069 (FCGMA 2019). The hydrology used for this 5-year evaluation modeling is consistent with the hydrology used for the GSP, with the noted exception that water year 1933 hydrology was replaced with water year 1978 hydrology.

5.2.1.4 Future Projects and Water Supply

The suite of projects incorporated into the future scenario modeling are summarized in Table 5-1, Projected Future Water Supplies and Projects in the LPVB, and in Section 5.2.2, Projected Water Budgets. In addition to the existing and planned water supply projects and programs in the LPVB, FCGMA and other agencies in the adjacent Oxnard Subbasin and PVB are implementing projects that increase water supplies in each basin. These include projects that increase Santa Clara River diversions, the delivery and use of State Water Project water, and delivery of recycled throughout the Oxnard Subbasin and PVB. These projects are summarized in FCGMA (2024a). While these projects will not be implemented in the LPVB, projects that increase recharge in the Forebay Management Area of the Oxnard Subbasin will benefit the WLPMA.

As noted in Section 3.3, Additional Projects Identified in the Judgment, FCGMA, with consultation, review, and comment from the LPVB PAC and TAC, will be evaluating a broader suite of projects and their benefits during development of the Basin Optimization Plan and Basin Optimization Yield Study. FCGMA will, as appropriate, integrate these new projects into the GSP based on the findings of these two planning documents.

Table 5-1. Projected Future Water Supplies and Projects in the Las Posas Valley Basin

Source of Future Water Supply	Existing Projects and Programs			Planned Water Supply Projects		
	Description	Project Proponent	Projected Future Water Supply/In Lieu Delivery (acre-feet)	Project Name or Description	Project Proponent	Projected Reduction in Groundwater Demands (acre-feet)
Imported Water	CMWD Imported Water Deliveries to Purveyors	CMWD	8,900			
	Groundwater Pumped from the ASRV and used in the LPVB	CWD	0			
	Groundwater Pumped from the PVB and used in the LPVB	CWD	0			
Non-potable and Recycled Water	CWD Deliveries	CWD	370			
	MWTP Discharges to Percolation Ponds in the ELPMA	VCWWD-1	360			
	MWTP Deliveries to AG and M&I Operators	VCWWD-1	2,000[a]			
	Maintenance of SVWQCP discharges in Arroyo Simi-Las Posas	FCGMA	2,400 - 3,600			
Demand Reduction				Water Delivery Infrastructure Improvements	ZMWC	500
				Purchase of Imported Water from CMWD for Basin Replenishment	FCGMA	1,762
				Arroyo Simi-Las Posas Arundo Removal	FCGMA	1,900
Total Anticipated Water Supply from Existing Projects and Programs (Acre-Feet)			**14,030 – 15,230**	**Total Anticipated Demand Reduction from Potential Future Projects (acre-feet)**		**4,162**

Notes: CMWD = Calleguas Municipal Water District; CWD = Camrosa Water District; VCWWD No. 1 = Ventura County Waterworks District No. 1; ZMWC = Zone Mutual Water Company; FCGMA = Fox Canyon Groundwater Management Agency; ND = Not Defined.

[a] Estimated based on VCWWD No. 1 projections in their 2020 UWMP and actual deliveries within the LPVB in water year 2020.

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5.2.2 Projected Water Budgets

Five model scenarios were developed for this 5-year evaluation in accordance with the SGMA guidelines, and consistent with the GSP, to evaluate the future sustainable yield of the LPVB. These scenarios are:

- Future Baseline Scenario
- No New Projects Scenario
- Projects Scenario
- Basin Optimization Scenario
- Extraction Barrier Brackish (EBB) Water Treatment Project Scenario

The Basin Optimization and EBB Water Treatment Project Scenario are only applicable to the WLPMA because they evaluate the effects of projects specific to the Oxnard Subbasin; these projects do not provide a new source of water supply for, or impact groundwater conditions in, the ELPMA and Epworth Gravels Management Area.

As noted in Section 5.2.1, Updated Future Scenario Assumptions, the scenarios cover a 47-year period from October 1, 2022, through September 30, 2069 (i.e., water year 2023 through water year 2069). Consistent with the GSP, the period from 2023 through 2039 is referred to as the “implementation period” and the period from 2040 to 2069 is referred to as the “sustaining period.” Due to the connection between the WLPMA and Oxnard Subbasin, the sustainable yield was evaluated using the model runs that resulted in: (1) no net flux of seawater into either the UAS or LAS of the Oxnard Subbasin,, (2) no landward migration of the saline water impact front in the Oxnard Subbasin, and (3) no chronic lowering of groundwater levels in WLPMA. These metrics were evaluated over the 30-year sustaining period, with consideration of the uncertainty in Coastal Plain Model’s predictions (FCGMA 2019).

The Coastal Plain Model includes both the Oxnard Subbasin and the PVB in the model domain, and the modeling assumptions associated with each scenario discussed below include the assumptions made for these adjacent basins.

5.2.2.1 West Las Posas Management Area Modeling

5.2.2.1.1 Evaluation Metrics

A total of eight (8) model simulations were completed for the WLPMA under the five scenarios referenced above. Results from each model run were analyzed to characterize the effects of different pumping distributions, projects, and management actions on:

- Groundwater conditions in the WLPMA
- Underflows between the WLPMA and Oxnard Subbasin
- Seawater flux in the Oxnard Subbasin
- Landward migration of the saline water impact front in the Oxnard Subbasin

The methods for characterizing these four model-estimates are summarized below.

Groundwater Conditions in the WLPMA

The effects of pumping, projects, and management actions on groundwater conditions in the WLPMA were evaluated by comparing the simulated groundwater elevations at key wells in the central and eastern part of the WLPMA to the minimum thresholds and measurable objectives established at each well. In this part of the WLPMA, the minimum thresholds were established based on the average low historical groundwater elevations in the early 1990s, before in-lieu surface water deliveries to the WLPMA began (FCGMA 2019). The measurable objectives were selected based on the groundwater level recovery observed between 1995 and 2008 (FCGMA 2019). These minimum threshold and measurable objective groundwater elevations are anticipated to provide sufficient operational flexibility for groundwater elevation declines and recovery in response to multi-year periods of drought and wet climate cycles, without causing undesirable results associated with chronic lowering of groundwater levels, reduction of groundwater in storage, degradation of water quality, and/or land subsidence.

Model simulations in which the projected groundwater elevations were below these thresholds were not considered sustainable.

Underflows between the WLPMA and Oxnard Subbasin

The Coastal Plain Model simulates underflows between the Oxnard Subbasin, PVB, and WLPMA. Results from the Coastal Plain Model were used to calculate the average underflows across each boundary, and by aquifer system, during the 30-year sustaining period to characterize the impacts of pumping, projects, and management actions implemented in one basin on groundwater conditions in an adjacent basin.

Seawater Flux in the Oxnard Subbasin

The Coastal Plain Model provides an estimate of the volume of water entering and leaving the Oxnard Subbasin along the coastline on a monthly timestep. This estimate is evaluated along four coastal segments: (1) from the northern boundary of the Subbasin, south to Channel Islands Harbor, (2) Channel Islands Harbor to Perkins Road, which is south of Port Hueneme, (3) Perkins Road to Arnold Road, and (4) Arnold Road to Point Mugu (Figure 5-1, Modeled Seawater Flux Coastal Segments). The coastal segment from Channel Islands Harbor to Point Mugu (segments 2 through 4) represents the approximate coastal boundary of the Saline Intrusion Management Area and the portion of the Subbasin that has historically been impacted by seawater intrusion (FCGMA 2019).

Net seawater flux for each model run was calculated by averaging the annual flow of seawater into the Oxnard Subbasin south of Channel Islands Harbor during the sustaining period. Net seawater flux was calculated separately for both the UAS and LAS to develop an estimate of sustainable yield by aquifer system.

Landward Migration of the Saline Water Impact Front

The landward migration of the saline water impact front in the Oxnard Subbasin was characterized using particle tracking for a subset of the model runs. Initial particle positions were set along the current interpretation of the 2020 saline water impact front in each aquifer. The particles were released at the start of the model simulation to provide a 50-year trajectory of the saline water migration throughout the Oxnard Subbasin.

Particle tracks were analyzed concurrently with the estimates of seawater flux to characterize the likelihood of ongoing landward migration of saline water and seawater intrusion over the 30-year sustaining period.

Scenarios with UWCD's EBB Project

The approach for evaluating seawater intrusion in the Oxnard Subbasin differs between the scenarios that do and do not include UWCD's EBB project. This approach is described in detail in Section 5.2.2.1.6, Extraction Barrier and Brackish Water Treatment Scenario.

5.2.2.1.2 Future Baseline Scenario

SGMA requires that the GSP include an assessment of "future baseline" conditions. The Future Baseline scenario developed for this 5-year evaluation built on the GSP modeling and was designed to assess whether current groundwater extractions from the Oxnard Subbasin, PVB, and WLPMA are sustainable. To do this, the average annual 2016 to 2022 extraction rates, adjusted by surface- and recycled-water deliveries, were simulated. Future surface water deliveries in the Oxnard Subbasin and PVB were estimated by UWCD using their Surface Water Distribution Model (UWCD 2021b) with the GSP evaluation hydrology (Section 5.2.1.3, Updated Hydrology). Estimates of recycled water available for use in lieu of groundwater in the Oxnard Subbasin and PVB were provided by the City of Camarillo, CWD, and the City of Oxnard. In addition, the Future Baseline Scenario included all existing projects that are either funded or currently under construction in the Subbasin in the Oxnard Subbasin, PVB, and WLPMA (Table 5-1; FCGMA 2024a, FCGMA 2024c).

Adjusting the 2016 to 2022 average groundwater extractions by projected surface water and recycled water supplies leads to an average annual groundwater extraction rate over the sustaining period of approximately 68,300 AFY in the Oxnard Subbasin, 13,900 AFY in the PVB, and 13,500 AFY in the WLPMA.

Future Baseline Model Assumptions

The Future Baseline model simulation assumptions included the following:

- Average annual extractions from the WLPMA equal to the 2016 to 2022 average.
- Starting groundwater levels equal to the September 30, 2022, groundwater levels from the Coastal Plain Model.
- Precipitation and streamflow for the 1933 to 1979 period, adjusted by DWR's 2070 central tendency climate change factors, with 1933 hydrology replaced by 1978 hydrology (Section 5.2.1.3, Updated Hydrology).
- Estimates of Santa Clara River water available for diversion, prepared by UWCD using the 5-year GSP evaluation hydrology and calculated using their Surface Water Distribution Model.
- Estimates of recycled water availability in the Oxnard Subbasin and PVB provided by the City of Oxnard, City of Camarillo, and CWD.

In addition to these assumptions, all existing projects in the WLPMA were included in the Future Baseline model scenario (Table 5-1).

Future Baseline Model Results

During the sustaining period, groundwater elevations in the eastern part of the WLPMA were higher than the minimum thresholds at three of the four key wells in the management area but were only higher than the measurable objective at one well (Figures 5-2a and 5-2b, Key Well Hydrographs in the West Las Posas Management

Area)[22]. Additionally, results from this model simulation indicate that groundwater pumping at the average 2016 to 2022 rate in the Oxnard Subbasin, PVB, and WLPMA would cause ongoing seawater intrusion into the Oxnard Subbasin and landward migration of the current saline water impact front (Table 5-2, Summary of WLPMA Modeling Results; Figures 5-3 through 5-9). The average annual seawater flux into the UAS and LAS of the Oxnard Subbasin was approximately 2,100 AFY and 3,400 AFY, respectively (Table 5-2). In the UAS and LAS, particle tracks indicate that the current saline water impact front would migrate landward (Figures 5-3 through 5-10). Based on these factors, the average 2016 to 2022 pumping distribution in the Oxnard Subbasin, PVB, and WLPMA was determined not to be sustainable.

Under the Future Baseline conditions, there was approximately 4,400 AFY of underflow from the Oxnard Subbasin to the WLPMA (Table 5-2). These underflows impact groundwater elevations, seawater flux, and saline water migration in the Oxnard Subbasin.

22 The simulated groundwater elevations were adjusted so that the October 2022 simulated heads were approximately equal to those measured at each key well.

Table 5-2. Summary of WLPMA Modeling Results

Future Scenario		Average Annual Extraction and Flow Rates Over the Sustaining Period (2040 – 2069; AFY)							
		Future Baseline	No New Projects			Basin Optimization	Projects	EBB	
			NNP1	NNP2	NNP3			Baseline	Projects
Groundwater Extractions[a]	SA	-400	-300	-400	-300	-400	-300	-400	-300
	LAS	-13,100	-10,500	-13,100	-11,100	-11,800	-11,100	-13,100	-11,100
	Total	**-13,500**	**-10,800**	**-13,500**	**-11,400**	**-12,200**	**-11,400**	**-13,500**	**-11,400**
Seawater Flux into the Oxnard Subbasin[b]	UAS	2,100	-1,000	-1,100	-600	-400	1,300	6,900	6,200
	LAS	3,400	500	200	1,000	1,100	2,900	4,000	3,400
	Total	**5,500**	**-500**	**-900**	**400**	**700**	**4,200**	**10,900**	**9,600**
Flux across the Current Saline Water Impact Front in the Oxnard Subbasin[c]	UAS	—	—	—	—	—	—	3,200	3,800
	LAS	—	—	—	—	—	—	500	600
	Total	—	—	—	—	—	—	**3,700**	**4,200**
Underflows from PVB to the Oxnard Subbasin [d]	UAS	900	700	600	700	900	1,600	1,100	1,800
	LAS	300	-1,200	-2,000	-1,000	-1,000	600	500	900
	Total	**1,200**	**-500**	**-1,400**	**-300**	**-100**	**2,200**	**1,600**	**2,700**
Underflows from WLPMA to the Oxnard Subbasin [d]	UAS	-4,900	-4,400	-4,500	-4600	-4500	-4,400	-5,000	-4,500
	LAS	500	-1,000	-1,800	-700	300	700	500	800
	Total	**-4,400**	**-5,400**	**-6,300**	**-5,300**	**-4,200**	**-3,700**	**-4,500**	**-3,700**

Notes: SA = shallow aquifer system; NNP = No New Projects; AFY = acre-feet per year; PVB = Pleasant Valley Basin; WLPMA = West Las Posas Management Area of the Las Posas Valley Basin

[a] Negative (-) values denote discharges, or outflows, from the Oxnard Subbasin. Positive (+) values denote recharge, or inflows, to the Subbasin.

[b] Represents the average annual simulated seawater flux across the coastline south of Channel Islands Harbor in the Oxnard Subbasin.

[c] Represents sum of fluxes across the interpreted 500 mg/L chloride concentration contour in each principal aquifer. Positive (+) values indicate that fresh groundwater is migrating toward the coast and UWCD's EBB extraction wells. Results are shown only for the EBB scenarios because seawater flux across the coastline in all other scenarios is an indication of ongoing seawater intrusion.

[c] Positive (+) values represent net underflow into the Oxnard Subbasin. Negative (-) values represent net underflows out of the Oxnard Subbasin.

5.2.2.1.3 No New Projects Model Scenario

The No New Projects (NNP) Scenario was designed to provide a direct simulation of the groundwater pumping distributions in the Oxnard Subbasin, PVB, and WLPMA that limit seawater flux into the Oxnard Subbasin and the landward migration of the 2020 saline water impact front. Three separate model runs were conducted under the NNP Scenario: NNP 1, NNP2, and NNP3. Each model run incorporated all the assumptions included in the Future Baseline scenario (Section 5.2.2.1.2, Future Baseline Scenario) but used different sets of assumptions for groundwater production.

The NNP Scenario model runs evaluated different pumping distributions and reductions to provide the FCGMA Board of Directors information to evaluate potential future projects and management actions and their relation to sustainable groundwater management of the WLPMA, Oxnard Subbasin, and PVB.

Additionally, and importantly, FCGMA as the Watermaster for the LPVB, will be developing a Basin Optimization Plan that evaluates and prioritizes projects that increase the sustainable yield of the WLPMA (Section 3.1.2, Projects). Information developed as part of the Basin Optimization Plan will be integrated into future evaluations and, as appropriate, amendments to the LPVB GSP.

No New Projects Scenario Assumptions

As described above, the NNP Scenario included all the assumptions from the Future Baseline Scenario, except for the distribution of groundwater production. Groundwater production distributions were adjusted by basin and aquifer system in each of the three model runs. The specific distributions used in each model run are described below.

No New Projects 1

The NNP1 model run incorporated a 20% reduction in pumping in the UAS of the Oxnard Subbasin, an 80% reduction in pumping in the LAS of the Oxnard Subbasin, and a 20% reduction in pumping from both aquifer systems in the PVB and WLPMA (Table 5-2). This reduction in groundwater production, adjusted by surface and recycled water availability, resulted in an average annual groundwater production rate of approximately 39,100 AFY in the Oxnard Subbasin, 13,200 AFY in the PVB, and 10,800 AFY in the WLPMA.

No New Projects 2

The NNP2 model run was designed to evaluate the impacts of pumping in the PVB and WLPMA on seawater flux in the LAS of the Oxnard Subbasin. To do this, a 10% reduction in pumping was implemented in the UAS of the Oxnard Subbasin, a 100% reduction in pumping was implemented in the LAS of the Oxnard Subbasin, and no pumping reductions were implemented in the PVB and WLPMA. Implementing this reduction in groundwater production resulted in an average annual groundwater production rate of approximately 37,800 AFY in the Oxnard Subbasin, 14,000 AFY in the PVB, and 13,500 AFY in the WLPMA. The NNP2 run was specifically to evaluate flows between the basins and not as a potential management scenario.

No New Projects 3

The NNP3 model run was designed to evaluate future groundwater conditions using a revised estimate of the sustainable yield of the Oxnard Subbasin, PVB, and WLPMA. The revised estimate was developed using a multi-parameter system of linear regressions developed using results from the Future Baseline, NNP1, and NNP2 model runs. The NNP3 scenario incorporated a 15% reduction in pumping in the UAS of the Oxnard Subbasin, a 65% reduction in pumping in the LAS of the Oxnard Subbasin, and a 15% reduction in pumping in both aquifer systems of the PVB and WLPMA (Table 5-2). Implementing this reduction in groundwater production results in an average annual groundwater production rate of approximately 44,700 AFY in the Oxnard Subbasin, 13,400 AFY in the PVB, and 11,400 AFY in the WLPMA.

No New Projects Scenario Model Results

No New Projects 1

In the NNP1 scenario, groundwater elevations during the sustaining period were, on average, 30 feet higher than the Future Baseline scenario and were higher than the measurable objectives at two of the four key wells (Figure 5-2a and 5-2b). Over this time, approximately 1,000 AFY of groundwater discharged to the Pacific Ocean through the UAS south of Channel Islands Harbor, and approximately 500 AFY of seawater entered the Oxnard Subbasin through the LAS south of Channel Islands Harbor (Table 5-2, Figures 5-3 and 5-4). Particle tracks were not conducted for this model run.

The NNP1 pumping distribution resulted in approximately 4,400 AFY of underflows from the UAS of the Oxnard Subbasin to the WLPMA – this is a 10% reduction in underflow recharge compared to the Future Baseline conditions (Table 5-2). In the LAS, approximately 1,000 AFY of underflows from the Oxnard Subbasin to the WLPMA. This is a change in both the direction and magnitude of LAS underflows, compared to the Future Baseline Scenario.

No New Projects 2

The NNP1 model simulation indicates that pumping in the WLPMA influences seawater flux into the Oxnard Subbasin by capturing underflows that would otherwise be recharging the Oxnard Subbasin. The effects of this are more pronounced in the LAS, where differential reductions in pumping between the Oxnard Subbasin, PVB, and WLPMA result in a change in the direction and magnitude of underflows between basins. To better characterize this process, the NNP2 simulation included a complete reduction in pumping in the LAS of the Oxnard Subbasin while maintaining groundwater production in the PVB and WLPMA at the Future Baseline rates.

The NNP2 pumping distribution resulted in approximately 1,800 AFY of underflows from the LAS of the Oxnard Subbasin to the WLPMA (Table 5-2). This represents a loss of approximately 2,300 AFY in underflow recharge to the LAS of the Oxnard Subbasin from the WLPMA, compared to the Future Baseline scenario. In the UAS, underflows from the Oxnard Subbasin to the WLPMA were similar to the NNP1 simulation (Table 5-2).

The increased underflows from the Oxnard subbasin helped to raise groundwater elevations in the eastern part of the WLPMA. Over the sustaining period, groundwater elevations in the four key wells were approximately 15 feet higher than the Future Baseline scenario, despite the fact that groundwater production in the WLPMA was the same in both scenarios. Groundwater elevations were higher than the minimum threshold at all four key wells and remained higher than the measurable objective at two key wells.

In the NNP2 simulation, approximately 1,100 AFY of groundwater discharged to the Pacific Ocean through the UAS south of Channel Islands Harbor and approximately 200 AFY of seawater entered the Oxnard Subbasin through the LAS south of Channel Islands Harbor (Table 5-2; Figures 5-3 and 5-4). Particle tracks were not conducted for this model run.

No New Projects 3

In the NNP3 model run, approximately 600 AFY of groundwater discharged to the Pacific Ocean through the UAS south of Channel Islands Harbor and approximately 1,000 AFY of seawater entered the Subbasin through the LAS south of Channel Islands Harbor (Table 5-2; Figures 5-3 and 5-4). Compared to the NNP1 simulation, this represents a 40% reduction in the volume of groundwater lost to the Pacific Ocean through the UAS and provides a similar estimate of seawater flux into the LAS of the Oxnard Subbasin, given the uncertainty in the Coastal Plain Model predictions (FCGMA 2019).

Particle tracks indicate that the NNP3 pumping distribution results in a recession of the saline water impact front in the Oxnard aquifer along the coast of the Oxnard Subbasin (Figure 5-11). Similarly, south of Casper Road, particle tracks show no landward migration of the saline water impact front in the Mugu aquifer (Figure 5-12). In the northern portion of the saline water impact front in the Mugu aquifer, the NNP3 pumping distribution reduced saline water migration by approximately 50% (Figure 5-12).

In the LAS, the NNP3 pumping distribution does not fully mitigate the landward migration of the saline water impact front, except in the GCA. In the Hueneme aquifer, particle tracks show ongoing landward migration over the entire 47-year simulation period; however, the particle trajectories in the NNP3 scenario are approximately 40% shorter than the Future Baseline Scenario (Figures 5-13 and 5-7). In the upper and basal FCA, the 2020 saline water impact front migrated landward by approximately 0.1 miles (Figures 5-14 and 5-15). This is an approximately 80% reduction in the saline water impact front migration within the FCA, and within the model uncertainty.

The NNP3 pumping distribution resulted in approximately 700 AFY of underflows from the LAS of the Oxnard Subbasin to the WLPMA (Table 5-2). This represents a loss of approximately 1,200 AFY in underflow recharge to the LAS of the Oxnard Subbasin compared to the Future Baseline scenario. However, the reduction in underflows to the Oxnard Subbasin were lower than the NNP1 and NNP2 model runs (Table 5-2). In the UAS, the NNP3 pumping distribution results in a 6% reduction in underflow recharge from the Oxnard Subbasin compared to the Future Baseline Scenario (Table 5-2).

Over the sustaining period, groundwater elevations at the key wells were approximately 25 feet higher than the Future Baseline scenario. Groundwater elevations were higher than the minimum threshold at all four key wells and remained higher than the measurable objective at two key wells. These simulated groundwater elevations indicate that the NNP3 pumping rate avoids chronic lowering of groundwater levels and storage in the WLPMA.

These simulated groundwater elevations, particle tracks, and seawater flux results indicate that NNP3 pumping rates and distributions in the Oxnard Subbasin, PVB, and WLPMA are sustainable, within the uncertainty of the Coastal Plain Model.

5.2.2.1.4 Basin Optimization Model Scenario

To support effective management, the GSP established five separate management areas in the Oxnard Subbasin: the Forebay Management Area, the West Oxnard Plain Management Area, the Oxnard Pumping Depression Management Area, the Saline Intrusion Management Area, and the East Oxnard Plain Management Area (Figure 5-1). Results from an initial investigation of the pumping impacts within each management area on seawater flux indicate that the sustainable yield of the Oxnard Subbasin, PVB, and WLPMA could be increased by shifting pumping out of the Saline Intrusion and Oxnard Pumping Depression management areas into the West Oxnard Plain and Forebay management areas (FCGMA 2024). The Basin Optimization Scenario was developed to integrate these results into the future scenario modeling for the GSP, with the goal of increasing total groundwater production from the Oxnard Subbasin, PVB, and WLPMA, while maintaining similar estimates of seawater flux and landward migration of the saline water impact front as the NNP3 model run.

The pumping distribution evaluated as part of this Basin Optimization scenario neither represents a commitment by FCGMA to implement a reduction and/or shift in groundwater production. While the simulated pumping scenario provides the foundation on which additional basin optimization strategies can be developed and evaluated, implementing management actions consistent with this scenario would require the development of additional projects that equitably distribute impacts across operators in the Oxnard Subbasin. Additionally, and importantly, FCGMA and other agencies in the Oxnard Subbasin are implementing water supply and treatment projects aimed at increasing the sustainable yield of the Oxnard Subbasin. These projects should be considered in future evaluations of basin optimization strategies.

Basin Optimization Scenario Assumptions

As described above, the Basin Optimization Scenario included all the assumptions from the Future Baseline Scenario, except for the distribution of groundwater production. Using the results from the Future Baseline Scenario and NNP Scenario, along with the results from FCGMA's initial investigation of management area impacts, the Basin Optimization Scenario implemented:

- A 10% reduction in groundwater production from the UAS of the Oxnard Subbasin
- A 40% reduction in groundwater production from the LAS of the Oxnard Subbasin
- A 10% reduction in groundwater production from both aquifer systems of the PVB
- A 10% reduction in groundwater production from both aquifer systems of the WLPMA

Importantly, during the sustaining period, all pumping that would have occurred in the Saline Intrusion Management Area of the Oxnard Subbasin and 40% of the pumping that would have occurred in the Oxnard Pumping Depression Management Area of the Oxnard Subbasin, was moved to the West Oxnard Plain Management Area. Implementing this reduction and shift in groundwater production resulted in an average annual groundwater production rate of approximately 52,300 AFY in the Oxnard Subbasin, 13,800 AFY in the PVB, and 12,200 AFY in the WLPMA.

This scenario did not include any changes to existing land uses in the Oxnard Subbasin. Therefore, this modeling scenario assumes that implementing pumping shifts across the Oxnard Subbasin would occur concurrently with the development of infrastructure projects that would deliver water to operators directly impacted by pumping reductions.

Basin Optimization Scenario Results

In the Basin Optimization Scenario, approximately 400 AFY of groundwater discharged to the Pacific Ocean through the UAS and approximately 1,100 AFY of seawater entered the Oxnard Subbasin through the LAS (Table 5-2, Figures 5-3 and 5-4). These estimates are similar to the seawater flux values estimated in the NNP3 simulation and are within the quantitative uncertainty of the Coastal Plain Model.

Particle tracks show a similar recession of the saline water impact front in the Oxnard aquifer (Figure 5-17). In the Mugu aquifer, the Basin Optimization Scenario pumping distribution reduced the landward migration of the saline water impact front in the Oxnard Subbasin compared to the NNP3 simulation (Figure 5-18). In the Hueneme aquifer, FCA, and GCA, particle tracks show similar trajectories of the saline water impact fronts within each aquifer (Figures 5-19 through 5-22).

The Basin Optimization Scenario pumping distribution resulted in approximately 300 AFY of underflows from the LAS of the WLPMA to the Oxnard Subbasin, which is similar to those simulated in the Future Baseline scenario (Table 5-2). Underflows from the UAS of the Oxnard Subbasin to the WLPMA were approximately 10% (or 400 AFY) less than the Future Baseline Scenario.

Over the sustaining period, groundwater elevations at the key wells in the WLPMA were approximately 15 feet higher than the Future Baseline scenario. Groundwater elevations were higher than the minimum threshold at all four key wells and remained higher than the measurable objective at two key wells (Figures 5-2a and 5-2b). Like the NNP3 scenario, these simulated groundwater elevations indicate that the Basin Optimization pumping distribution avoids chronic lowering of groundwater levels and storage in the WLPMA.

The simulated groundwater elevations, particle tracks, and simulated seawater flux results indicate that an average annual production rate of approximately 52,300 AFY in the Oxnard Subbasin, 13,800 AFY in the PVB, and 12,200 AFY in the WLPMA could be sustainable if pumping is redistributed across the Oxnard Subbasin.

5.2.2.1.5 Projects Scenario

Modeling of future conditions in the Projects Scenario included all the assumptions incorporated in the Future Baseline Scenario, and in the WLPMA also included the Purchase of Imported Water from CMWD for Basin Replenishment project and ZMWC's infrastructure improvement project (Table 5-2). In the Oxnard Subbasin and PVB, projects include UWCD's Freeman Expansion project and FCGMA's Voluntary Temporary Fallowing Project (FCGMA 2024a). The City of Oxnard's AWPF Expansion project was not incorporated into the Projects Scenario because use(s) of AWPF water have not yet been defined. Additionally, UWCD's EBB Water Treatment project was not included in the Projects Scenario, but rather, was evaluated in a separate scenario to account for the impacts of this project on groundwater elevations and seawater flux along the coast (Section 5.2.2.1.6 Extraction Barrier and Brackish Water Treatment Scenario).

Incorporation of the potential future projects in the Projects Scenario does not represent a commitment by FCGMA to move forward with each project included in the future model scenario.

Projects Scenario Assumptions

In the WLPMA, the Purchase of Imported Water from CWMD for Basin Replenishment included the of 1,763 AFY for delivery to the eastern portion of the WLPMA in lieu of groundwater extraction. ZMWC's infrastructure improvements are anticipated to reduce groundwater demands by approximately 500 AFY. The combination of these projects results in a reduction in pumping of 2,263 AFY. Simulated pumping was reduced uniformly and proportionally at ZMWC and VCWWD-19 wells located in the WLPMA.

In the Oxnard Subbasin simulated future projects included UWCD's Freeman Diversion Expansion project, which, under the projected future hydrology, would increase Santa Clara River water diversions by approximately 6,800 AFY compared to Future Baseline conditions. UWCD anticipates delivering a portion of this water to users on their pipelines including in the PVB and recharging a portion of this water in the Forebay. The timing and volume of pipeline deliveries and recharge was determined by UWCD using their Surface Water Distribution Model.

Two voluntary temporary fallowing projects were modeled in the Projects Scenario. In the Oxnard Subbasin, a 504 AFY reduction of pumping was simulated. In the PVCWD service area, a voluntary temporary fallowing program was simulated using a 2,407 AFY reduction in agricultural water demands, which consists of both surface water, recycled water, and groundwater. To do this, agricultural water demands were reduced uniformly and proportionally in the PVCWD service area, and UWCD's Surface Water Distribution Model was used to estimate the resulting reduction in groundwater pumping. These projects are discussed in detail in FCGMA (2024a, 2024c).

After incorporating the potential future projects, the average groundwater production rate for the UAS in the Oxnard Subbasin was 39,500 AFY and the average groundwater production rate for the LAS in the Oxnard Subbasin was 26,600 AFY for the Projects Scenario. In the PVB, the average groundwater production rate was 4,100 AFY in the UAS and 8,900 AFY in the LAS. In the WLPMA, the average production rate in the LAS was 11,400 AFY (Table 5-2).

Projects Scenario Results

In the Projects Scenario, groundwater production from the Oxnard Subbasin at a rate of approximately 66,100 AFY resulted in seawater flux into both the UAS and LAS of the Subbasin (Table 5-2). In the UAS, the seawater flux averaged approximately 1,300 AFY over the sustaining period, and in the LAS, the seawater flux averaged approximately 2,100 AFY over the sustaining period. These results indicate that implementation of UWCD's Freeman Expansion Project, FCGMA's temporary voluntary fallowing project, and ZMWC's infrastructure improvement and in-lieu delivery project would result in a 20% decrease in total seawater flux, compared to the Future Baseline Scenario. The majority of these benefits would occur in the UAS (Table 5-2). This scenario is not considered sustainable.

Implementation of these three projects in the Oxnard Subbasin, PVB, and WLPMA, without any additional demand reduction actions, results in a decrease in net underflows from the Oxnard Subbasin to the WLPMA (Table 5-2).

Over the sustaining period, groundwater elevations at the key wells in the WLPMA were approximately 25 feet higher than the Future Baseline scenario, which reflects the benefits of re-initiating in-lieu deliveries in the WLPMA and additional recharge in the Oxnard Forebay. Groundwater elevations were higher than the minimum threshold at all four key wells and were higher than, or equal to, the measurable objective at three key wells (Figures 5-2a and 5-2b).

5.2.2.1.6 Extraction Barrier and Brackish Water Treatment Scenario

UWCD is designing and implementing an EBB Water Treatment Project to create a seawater intrusion barrier at Naval Base Ventura County Point Mugu in the Oxnard Subbasin. UWCD intends to operate the project by extracting brackish groundwater from the Oxnard and Mugu aquifers near the coast, creating a pumping trough that helps prevent landward migration of saline water throughout the Oxnard Subbasin. Because successful implementation and operation of this project will intentionally lower groundwater elevations along the coastline, thereby inducing seawater flux along the coast, a separate set of model simulations were conducted to evaluate this project.

Two model runs were conducted under this scenario:

- Future Baseline with EBB
- Projects with EBB

The assumptions used for each model run are described below. The pumping distributions evaluated in the EBB Water Treatment Scenario does not represent a commitment by FCGMA to move forward with pumping scenarios or projects.

EBB Water Treatment Scenario Assumptions

Simulation of UWCD's EBB Water Treatment project included the following:

- A total of ten (10) EBB extraction wells screened in the Oxnard aquifer, pumping at a combined rate of approximately 5,000 AFY over the 30-yr sustaining period.
- A total of ten (10) EBB extraction wells screened in the Mugu aquifer, pumping at a combined rate of approximately 5,000 AFY over the 30-year sustaining period.

Consistent with the current project understanding (Section 3.1.1, Management Actions), implementation of the EBB Water Treatment Project occurred in two phases:

- **Phase I (Water Year 2028 through Water Year 2030):** 2,500 AFY of production from 5 wells screened in the Oxnard aquifer, and 1,000 AFY of production from 2 wells screened in the Mugu aquifer.
- **Phase I (Water Year 2031 through Water Year 2069):** 5,000 AFY of production from 10 wells screened in the Oxnard aquifer, and 5,000 AFY of production from 10 wells screened in the Mugu aquifer.

Based on the current project understanding, it was assumed that 50% of the brackish water treated as part of the EBB project would be made available for delivery and use in the Oxnard Subbasin. Of this, UWCD anticipates delivering approximately 1,500 AFY to Naval Base Ventura County and delivering the remaining 3,500 AFY either to operators in the Subbasin or to the Forebay for additional recharge. For simplicity in both the Future Baseline with EBB and Projects with EBB scenario, it was assumed that the 3,500 AFY of treated EBB water was recharged in the Oxnard Forebay Management Area. The addition of a consistent source of recharge to the Forebay through this project resulted in an increase in the availability of Santa Clara River water for delivery to users on the PTP and PVP.

Future Baseline with EBB Model Simulation

The Future Baseline with EBB simulation included all the assumptions from the Future Baseline Scenario, and also included the full implementation of UWCD's EBB Water Treatment Project. Including UWCD's EBB Water Treatment Project resulted in a total groundwater production rate of 78,200 AFY in the Oxnard Subbasin, 13,800 AFY from the PVB, and 13,500 AFY from the WLPMA.

Projects with EBB Model Simulation

The Projects with EBB simulation included all the assumptions from the Projects Scenario, and also included the full implementation of UWCD's EBB Water Treatment Project. The net effects of UWCD's EBB Water Treatment Project, Freeman Diversion Expansion Project, Voluntary Temporary Fallowing Project, and In-Lieu and infrastructure improvement projects in WLPMA resulted in a total groundwater production rate of 75,800 AFY from the Subbasin, 13,000 AFY from the PVB, and 11,400 AFY from the WLPMA.

EBB Water Treatment Scenario Model Results

Because UWCD's EBB project will increase seawater flux into the Subbasin, while mitigating the landward migration of saline water in the Oxnard Subbasin, groundwater sustainability was evaluated by calculating the simulated flows across the current inland extent of saline water impact in the UAS and LAS of the Oxnard Subbasin. The average annual flows across these boundaries for the 30-year sustaining period were used to characterize the pumping rates, projects, and management actions that would result in no net landward movement of the current saline water extents.

Like some of the scenarios that do not include UWCD's EBB projects, the net flow estimates were analyzed concurrently with particle tracks to characterize the trajectory of the saline water impact front over the sustaining period.

Future Baseline with EBB

In the Future Baseline with EBB scenario, groundwater elevations at key wells in the WLPMA were equal to the groundwater elevations simulated in the Future Baseline scenario (Figures 5-23a and 5-23b)[23]. Approximately 3,200 AFY of groundwater flowed across the current inland extent of saline water impact in the UAS of the Oxnard Subbasin, toward the coast. This flow direction indicates that, under Future Baseline conditions, operation of UWCD's EBB project mitigated against the net landward migration of saline water over the 30-year sustaining period. Particle tracks show a recession in the saline water impact front in the UAS, and corresponding capture of groundwater that migrates toward the coast by UWCD's EBB extraction wells (Figures 5-24 and 5-25).

Over the sustaining period, approximately 500 AFY of groundwater flowed across the current inland extent of saline water impact in the LAS, toward the coast (Table 5-2). This suggests that, under the Future Baseline conditions, while UWCD's EBB project does not include any dedicated extraction wells in the LAS, operation of the UAS extraction wells limit the landward migration of saline water throughout the LAS. This interpretation is consistent with particle tracks that shows a recession of the saline water impact front, particularly near Point Mugu (Figures 5-26 through 5-29). However, particle tracks suggest some inland migration in the Hueneme aquifer near Port Hueneme (Figure 5-26). Presently, there are no wells in this vicinity to monitor the actual saline front. Although modeled particle tracks indicate inland migration of approximately 0.75 miles over the 30-year sustaining period, the closest wells screened across the Hueneme aquifer are still more than 1.5 miles from the modeled inland saline intrusion extent.

These results indicate that groundwater production at the average 2016 to 2022 rates in the Oxnard Subbasin, PVB, and WLPMA may be sustainable if UWCD's EBB project is implemented at a 10,000 AFY production scale.

Projects with EBB

In the Projects with EBB scenario, groundwater elevations at the key wells in the WLPMA were approximately equal to the groundwater elevations simulated in the Projects scenario (Figures 5-23a and 5-23b)[24]. Approximately 3,800 AFY of groundwater flowed across the current inland extent of saline water impact in the UAS, toward the coast in the Oxnard Subbasin. This is an increase in the coastward flow of approximately 20% compared to the Future Baseline with EBB simulation. Like the Future Baseline with EBB simulation, this indicates that operation of UWCD's

23 Due to the similarity in simulated groundwater conditions in the WLPMA, the Future Baseline with Extraction Barrier Brackish (EBB) groundwater elevations plot directly on top of the Future Baseline scenario groundwater elevations.

24 Due to the similarity in simulated groundwater conditions in the WLPMA, the Projects with EBB groundwater elevations plot directly on top of the Projects scenario groundwater elevations.

EBB project will limit the landward migration of saline water throughout the UAS over the 30-year sustaining period. This is consistent with particle tracks that show a recession in the saline water impact front in the UAS (Figures 5-30 and 5-31).

Over the sustaining period, approximately 600 AFY of groundwater flowed across the current inland extent of saline water impact in the LAS, toward the coast in the Oxnard Subbasin. Like the Future Baseline with EBB scenario, this suggests that, while UWCD's EBB project does not include any dedicated extraction wells in the LAS, operation of the UAS extraction wells results in the vertical migration of flow from the LAS to UAS, limiting the landward migration of saline water throughout the LAS. This interpretation is consistent with particle tracks that shows a recession of the saline water impact front, particularly near Point Mugu (Figures 5-32 through 5-35). The one exception to this is in the Hueneme aquifer near Port Hueneme, where the particle trajectories under the Projects with EBB scenario were similar to those in the Future Baseline with EBB scenario.

5.2.2.2 East Las Posas Management Area Modeling

A total of four (4) model simulations were completed for the ELPMA under the three scenarios that are applicable to the management area. Results from each model run were analyzed to characterize the effects of pumping, projects, and management actions on chronic lowering of groundwater levels and reduction of groundwater in storage over the 30-year sustaining period. The simulated groundwater elevations from each model run were compared to the minimum thresholds and measurable objectives established in the GSP to assess the potential impacts on beneficial uses and users of groundwater in the ELPMA (FCGMA 2019).

5.2.2.2.1 Future Baseline Scenario

SGMA requires that the GSP include an assessment of "future baseline" conditions. The Future Baseline scenario developed for this 5-year evaluation built on the GSP modeling and was designed to assess whether current groundwater extractions from the ELPMA are sustainable. In the ELPMA, the Future Baseline extraction rate was equal to 22,500 AFY; of this, 1,470 AFY was extracted from the Epworth Gravels management area.

Future Baseline Model Assumptions

The Future Baseline model simulation assumptions included the following:

- Average annual extractions from the ELPMA and Epworth Gravels Management Area equal to approximately 22,500 AFY.
- Starting groundwater levels equal to the September 30, 2022, groundwater levels from the Coastal Plain Model.
- Precipitation and streamflow for the 1933 to 1979 period, adjusted by DWR's 2070 central tendency climate change factors, with 1933 hydrology replaced by 1978 hydrology (Section 5.2.1.3, Updated Hydrology).
- Average annual discharges of SVWQCP discharges to Arroyo Simi-Las Posas equal to approximately 9,900 AFY (FCGMA 2019).
- 1,300 AFY of dewatering well discharges from the City of Simi Valley to Arroyo Simi-Las Posas.

In addition to these assumptions, all existing projects in the ELPMA were included in the Future Baseline model scenario (Table 5-1).

Future Baseline Model Results

During the sustaining period, groundwater elevations in the ELPMA were higher than the minimum thresholds at eight of the 14 key wells and did not reach the measurable objectives for any key well. Over this period, chronic lowering of groundwater levels occurred in the northern part of the ELPMA in six key wells, where the influence of flows in Arroyo Simi-Las Posas are less pronounced (Figures 5-36a through 5-36e). Groundwater in storage declined at an average rate of approximately 1,800 AFY (Table 5-3, Summary of ELPMA Modeling Results).

Chronic lowering of groundwater levels also occurred in the Epworth Gravels Management Area under the Future Baseline Scenario (Figure 5-37, Key Well Hydrographs for the Epworth Gravels Management Area). During the sustaining period, groundwater in storage in this management area declined at an average rate of approximately 180 AFY.

Table 5-3. Summary of ELPMA Modeling Results

Simulation		Average Annual Groundwater Production Rate (2040 – 2069; AFY)			Average Annual Change in Storage (2040 – 2069; AFY)[a]		
		Epworth Gravels	ELPMA	Total	Epworth Gravels	ELPMA	Total
Future Baseline		1,470	21,070	22,540	-180	-1,810	-1,980
No New Projects	NNP1	1,330	17,900	19,230	-30	-240	-270
	NNP2	1,330	17,900	19,230	-30	-400	-430
Projects		1,330	17,900	19,230	-30	-140	-170

Notes: AFY = acre-feet per year; NNP = No New Projects; ELPMA = East Las Posas Management Area; Epworth Gravels = Epworth Gravels Management Area.

[a] Negative (-) values denote a reduction in groundwater in storage.

5.2.2.2.2 No New Projects Scenario

The NNP Scenario was designed to provide a direct simulation of the groundwater pumping distributions in the ELPMA and Epworth Gravels Management Area that avoid chronic lowering of groundwater levels and storage. Two separate model runs were conducted under the NNP Scenario: NNP 1 and NNP2. Each model run incorporated all the assumptions included in the Future Baseline scenario but used different sets of assumptions for groundwater production and SVWQCP discharges to Arroyo Simi-Las Posas (Section 5.2.2.1.2, Future Baseline Scenario).

Additionally, as noted previously, FCGMA will be developing a Basin Optimization Plan that evaluates and prioritizes projects that increase the sustainable yield of the ELPMA and Epworth Gravels Management Area. Information developed as part of the Basin Optimization Plan will be integrated into future evaluations and, as appropriate, amendments to the LPVB GSP.

No New Projects Scenario Assumptions

Groundwater Production

Both the NNP1 and NNP2 model runs incorporate a 10% reduction in pumping in the Epworth Gravels Management Area and a 15% reduction in pumping in the ELPMA (Table 5-3). Groundwater production was reduced linearly from the start of the simulation period through 2040. During the sustaining period, total groundwater production in the ELPMA and Epworth Gravels was equal to approximately 19,200 AFY (Table 5-3).

SVWQCP Discharges to Arroyo Simi-Las Posas

The NNP1 and NNP2 model runs incorporated two different assumptions for the volume of SVWQCP discharges to Arroyo Simi-Las Posas over the entire 47-year simulation period. In the NNP1 scenario, SVWQCP discharges were held constant at the Future Baseline rates, which are approximately equal to the long-term historical average (Section 5.2.2.2.1 Future Baseline Scenario).

Discharges of SVWQCP discharges have declined over the past decade in response to increasing water conservation efforts within the City of Simi Valley. Over the 2016 to 2022 period, SVCWQP discharges averaged approximately 8,040 AFY, which is approximately 1,890 AFY less than the assumptions used in the Future Baseline scenario. To evaluate the effects of reduced SVWQCP discharges on groundwater conditions within the ELPMA, the NNP2 scenario simulated a SVWQCP discharge rate of 8,040 AFY.

No New Projects Scenario Model Results

No New Projects 1

During the sustaining period, groundwater elevations in the ELPMA were higher than, or equal to, the minimum thresholds at all key wells and were higher than the measurable objectives at 6 (or 40%) of the key wells (Figures 5-36a through 5-36e). Over this period, groundwater levels remained stable, including in the northern ELPMA (Figures 5-36a through 5-36e). Groundwater in storage declined at an average rate of approximately 300 AFY (Table 5-3), which is within the predictive uncertainty of the ELPMA model (FCGMA 2019).

Similar to the ELPMA, the simulated groundwater elevation in the Epworth Gravels Management Area remained higher than the minimum threshold throughout the 47-year simulation period. During the 30-year sustaining period, groundwater elevations at well 03N19W29F06S, the only key well in the Epworth Gravels Management Area, declined at an average rate of approximately 0.25 feet per year. This is an 85% reduction in the rate of groundwater elevation decline at this well compared to the Future Baseline scenario (Figure 5-37). During the sustaining period, groundwater in storage in this management area declined at an average rate of approximately 30 AFY.

No New Projects 2

Simulated groundwater elevations and change in storage in the NNP2 model run were similar to NNP1 (Table 5-3; Figures 5-36a through 5-37). The similarity in results indicates that, under the simulated pumping distribution, the sustained flows in Arroyo-Simi Las Posas help to fill the aquifers in the southern part of the ELPMA, such that, SVWQCP discharges in excess of approximately 8,040 AFY do not significantly increase the volume of recharge to the ELPMA. In the NNP1 scenario, the increased flows in Arroyo-Simi Las Posas primarily serve to increase outflows to the PVB. These results suggest that implementing new projects to increase available storage in the southern ELPMA may increase the benefit of projects that maintain flows in Arroyo Simi-Las Posas.

The simulated groundwater elevations in the Epworth Gravels Management Area are equal to the NNP1 simulation because groundwater conditions in this part of the LPVB are not impacted by flows in Arroyo Simi-Las Posas.

5.2.2.2.3 Projects Scenario

Modeling of future conditions in the Projects Scenario included all the assumptions in the NNP1 scenario and also included the proposed Arroyo Simi-Las Posas Arundo Removal project (Table 5-1). As noted above, additional projects in the ELPMA will be considered by FCGMA, in consultation with the LPVB committees, as part of the Basin Optimization Plan. FCGMA anticipates incorporating these projects into future evaluations and amendments of the GSP as additional information is developed for these projects.

The Nature Conservancy estimated that implementation of the Arroyo Simi-Las Posas Arundo Removal project will result in a reduction of evapotranspiration (ET) losses and an increase in Arroyo Simi-Las Posas flows by up to 2,680 AFY (FCGMA 2019). To simulate this project, all ET demands associated with Arundo within the Arroyo-Simi Las Posas corridor were removed from the model – this accounted for approximately 1,900 AFY of the 2,680 AFY in estimated ET demand reductions. The remaining 780 AFY of ET demand reductions are anticipated to occur upstream of the LPVB. Because of this, the surface water flows entering the ELPMA through Arroyo Simi-Las Posas were increased by 780 AFY.

No New Projects Scenario Model Results

Simulated groundwater elevations and change in storage in the Projects model run were similar to NNP1 (Table 5-3; Figures 5-36a through 5-37). Like the NNP2 model run, the similarity in results indicates that the sustained flows in Arroyo Simi-Las Posas over the 50-year projection horizon helps to fill the aquifers in the southern part of the ELPMA, such that, the Arroyo Simi-Las Posas Arundo Removal project provides little additional recharge to the ELPMA. Under these conditions, this project increases outflows to the PVB. Like the NNP results, these results suggest that implementing new projects to increase available storage in the southern ELPMA may increase the benefit of projects that maintain flows in Arroyo Simi-Las Posas.

The simulated groundwater elevations in the Epworth Gravels Management Area are equal to the NNP1 simulation because groundwater conditions in this part of the LPVB are not impacted by flows in Arroyo Simi-Las Posas.

5.2.3 Estimates of the Future Sustainable Yield

The sustainability goal for the LPVB is: "to maintain a sufficient volume of groundwater in storage in each management area so that there is no significant and unreasonable net decline in groundwater or storage over wet and dry climatic cycles" (FCGMA 2019). Additionally, "groundwater levels in the WLPMA should be maintained at elevations that are high enough to not inhibit the ability of the Oxnard Subbasin to prevent net landward migration of the saline water impact front" in the Oxnard Subbasin after 2040 (FCGMA 2019).

5.2.3.1 West Las Posas Management Area

Future projected groundwater elevations at all key wells in the WLPMA indicate that, except for the Future Baseline conditions, the management area is not expected to experience long-term decline in groundwater elevation or storage over wet and dry climatic cycles (Figures 5-2a and 5-2b). Because of this, the sustainable yield of the WLPMA was estimated by evaluating the seawater flux into the Oxnard Subbasin, south of Channel Islands Harbor, over the 30-year sustaining period. The sustaining period was assessed because SGMA recognizes that undesirable results may occur during the 20-year implementation period, as basins move toward sustainable groundwater management. In addition to the flux of seawater, particle tracks from model runs were analyzed to evaluate the potential migration of the current extent of saline water impact in the UAS and the LAS of the Oxnard Subbasin. As described in Section 5.2.2.1, Future Baseline Scenario, the particles were placed along the approximate inland extent of the zone of saline water impact in 2020. Scenarios that minimize the net flux of seawater into the Oxnard Subbasin and the landward migration of the saline water impact front over the 30-year sustaining period are sustainable for the Oxnard Subbasin, while those that allow for net seawater intrusion and landward migration of the saline water impact front are not.

Sustainable Yield without Future Projects

All three simulations performed under the NNP Scenario avoided chronic lowering of groundwater levels in the WLPMA and reduced seawater intrusion in the LAS of the Oxnard Subbasin during the 30-year sustaining period and resulted in net freshwater loss from the UAS of the Oxnard Subbasin to the Pacific Ocean. Therefore, the simulation with the highest overall production rate, that also minimized impacts from adjacent basins, was identified as the best estimate of the sustainable yield of the Oxnard Subbasin, PVB, and WLPMA, in the event that no new future projects are implemented in each basin. The simulation with the highest total groundwater production rate from this scenario was NNP3 – under this simulation, an average of approximately 11,400 AFY of groundwater was pumped from the WLPMA (Section 5.2.2.1.3 No New Projects Model Scenario). This estimate of the sustainable yield is approximately 1,100 AFY lower than the estimate presented in the GSP (FCGMA 2019). Applying the estimate of sustainable yield uncertainty calculated during the development of the GSP for the sustaining period suggests that the sustainable yield of the WLPMA may be as high as 12,600 AFY or as low as 10,200 AFY (FCGMA 2019).

The 2021 to 2022 average annual extractions from the WLPMA of 16,600 AFY is approximately 4,000 AFY higher than the estimated upper end of the sustainable yield of the WLPMA (Table 4-3).

Sustainable Yield with Future Projects

In the Projects Scenario, implementation of the UWCD's Freeman Expansion project and FCGMA's Voluntary Temporary Fallowing project helped to increase groundwater levels and the sustainable yield of the WLPMA. The primary benefits to the sustainable yield of the WLPMA associated with these projects are increased underflow recharge from the Oxnard Subbasin to the WLPMA that result from additional recharge in the Forebay Management Area of the Oxnard Subbasin. While the Purchase of Imported Water from CWMD for Basin Replenishment helps to increase groundwater levels in the WLPMA, the project does not increase the sustainable yield of the management area.

Over the 1985 to 2015 period, the relationship between modeled underflows between the Oxnard Subbasin and WLPMA suggest that approximately 7% of the water recharged in the Oxnard Forebay recharges the WLPMA as underflows from the UAS of the Oxnard Subbasin to the WLPMA. In the Projects scenario, recharge in the Oxnard Forebay was approximately 4,900 AFY higher than the Future Baseline scenario. Using the relationship between historical Forebay recharge and underflows, it is estimated that the implementation of projects in the Oxnard Subbasin and PVB would increase the sustainable yield of the WLPMA by approximately 340 AFY.

Therefore, if projects are implemented to increase diversions from the Santa Clara River and incentivize Voluntary Temporary Fallowing in the Oxnard Subbasin and PVB, the sustainable yield of the WLPMA may be as high as approximately 13,040 AFY or as low as 10,640 AFY.

Sustainable Yield with UWCD's EBB Water Treatment Project

Both simulations conducted under the EBB Water Treatment Scenario avoided chronic lowering of groundwater levels in the WLPMA and limited the landward migration of saline water in the Oxnard aquifer, Mugu aquifer, FCA, and GCA along the coastline of the Oxnard Subbasin. Because of this, the simulation with the highest overall production rate was used as the estimate of sustainable yield of the Oxnard Subbasin if UWCD's EBB Water

Treatment project is successfully implemented as described in Section 5.2.2.1.6, Extraction Barrier and Brackish Water Treatment Scenario. The simulation with the highest total groundwater production rate from this scenario was the Future Baseline with EBB simulation – under this simulation, an average of approximately 13,500 AFY of groundwater was extracted from the WLPMA (Section 5.2.2.1.6 Extraction Barrier and Brackish Water Treatment Scenario). This would represent an increase in the sustainable yield of WLPMA of approximately 2,100 AFY compared to the scenario in which no new projects are implemented in the Oxnard Subbasin, PVB, and WLPMA.

Therefore, if UWCD's EBB project is implemented at a 10,000 AFY production scale, the sustainable yield of the WLPMA may be as high as approximately 14,700 AFY or as low as 12,300 AFY.

5.2.3.2 East Las Posas Management Area

Sustainable Yield without Future Projects

Both simulations performed in the NNP Scenario avoided chronic lowering of groundwater elevations and storage in the ELPMA. Because of this, the estimated sustainable yield of the ELPMA, in the absence of new projects that increase water supplies in the management area, is approximately equal to 19,200 AFY (Table 5-3)[25]. This estimate of sustainable yield is approximately 1,400 AFY higher than the estimate of sustainable yield presented in the GSP (FCGMA 2019). The increase in sustainable yield compared to the GSP reflects the benefits of sustained flows in the Arroyo Simi-Las Posas.

Applying the estimate of sustainable yield uncertainty calculated during the development of the GSP for the sustaining period suggests that the sustainable yield of the ELPMA may be as high as 21,500 AFY or as low as 16,900 AFY (FCGMA 2019).

The 2021 to 2022 average annual extractions from the ELPMA of 23,800 AFY is approximately 2,300 AFY higher than the estimated upper end of the sustainable yield of the ELPMA (Table 4-4).

Sustainable Yield with Future Projects

The Projects scenario suggests that, under the simulated pumping conditions, if future SVWQCP discharges are greater than 8,040 AFY, the Arroyo-Simi Arundo Removal Project will not increase the sustainable yield of the ELPMA. As noted in Section 5.2.2.2.3, Projects Scenario, under these conditions, this project will likely result in increased surface water flows to the PVB. However, the benefits of maintaining, or increasing, flows in Arroyo Simi-Las Posas may increase if new projects are implemented in the ELPMA that increase available storage in the aquifers that underlie the Arroyo. FCGMA anticipates evaluating these types of projects in the Basin Optimization Plan and Basin Optimization Yield Study.

5.2.3.3 Epworth Gravels Management Area

Both simulations performed in the NNP Scenario mitigated against chronic lowering of groundwater elevations and storage in the Epworth Gravels Management Area. Because of this, the estimated sustainable yield of the Epworth Gravels Management Area, in the absence of new projects that increase water supplies in the management area, is approximately equal to 1,330 AFY (Table 5-3). This estimate of sustainable yield is approximately equal to the sustainable yield presented in the GSP (FCGMA 2019). Applying the estimate of sustainable yield uncertainty

25 Consistent with the GSP, this includes the sustainable yield of the Epworth Gravels Management Area.

calculated during the development of the GSP for the sustaining period suggests that the sustainable yield of the Epworth Gravels Management Area may be as high as 1,350 AFY or as low as 1,310 AFY (FCGMA 2019).

The 2021 to 2022 average annual extractions from the Epworth Gravels Management Area of approximately 900 AFY is approximately 450 AFY lower than the estimated upper end of the sustainable yield (Table 4-4).

6 Monitoring Network

This section summarizes changes to the monitoring network for the LPVB, including revisions to the key well network. Groundwater wells that are included in the LPVB monitoring network are shown in Figures 6-1, Monitoring and Non-Monitoring Wells Screened in the Shallow Alluvial Aquifer, Epworth Gravels Aquifer, and Grimes Canyon Aquifer in the Las Posas Valley Basin, through Figure 6-3, Monitoring Wells Screened in the Fox Canyon Aquifer in the Las Posas Valley Basin.

6.1 Summary of Changes to the Monitoring Network

Groundwater elevation and water quality data for the LPVB are collected from a network of more than 80 wells. The wells in the monitoring network are monitored by UWCD, Ventura County Watershed Protection District (VCWPD), and CMWD, and VCWWD. FCGMA relies on these agencies to collect manual groundwater elevation measurements, automated transducer measurements, and groundwater quality samples at all wells, including key wells, in the LPVB.

Changes to UWCD's Monitoring Activities

At the time of GSP adoption, UWCD monitored five wells in the LPVB. Well 02N21W16J03S, a key well in WLPMA, has been removed from the monitoring network due to access issues that have limited measurement since 2019. The remaining four wells from the GSP that were monitored by UWCD in the LPVB are on the same monitoring schedule and no wells have been added to their network.

Changes to VCWPD's Monitoring Activities

At the time of GSP adoption, VCWPD monitored 50 wells in the LPVB. Since then, well 02N20W04F02S, a key well in the ELPMA, has been destroyed. In addition to the revisions to their monitoring network, VCWPD updated the monitoring schedule for seven of the 50 wells in the GSP monitoring network (Table 6-1).

Table 6-1. Change in VCWPD Monitoring Schedule

State Well Number	Management Area	Notes	Main Use	Screened Aquifer	Screened Aquifer System	Change in Water Levels Monitoring Schedule	Water Quality Samples Collected by VCWPD[a]
02N20W10J01S	ELPMA	Change in WQ monitoring schedule	Monitoring	Fox	LAS	No Change, Manual	No
03N19W19J01S	ELPMA		Agricultural	Fox	LAS	No Change, Manual	No
03N20W35R02S	ELPMA		Monitoring	Fox	LAS	No Change, Manual	No
03N20W35R03S	ELPMA		Monitoring	Fox	LAS	No Change, Manual	No
02N21W11J03S	WLPMA		Monitoring	Fox	LAS	No Change, Manual	No
02N21W12H01S	WLPMA		Agricultural	Fox	LAS	Manual and Transducer	No
02N20W01B02S	ELPMA	Now monitored by CMWD	Municipal	Multiple	LAS	No change, not monitored	No

Changes to CMWD's Monitoring Activities

At the time of GSP adoption, CMWD monitored 31 wells in the LPVB. Four of the wells have been removed from the monitoring network because they were either destroyed or CMWD had recurring access issues. In addition to removing these wells, CMWD took over monitoring one well from VCWPD (Table 6-2, Revisions to CMWD Monitoring Network). None of these wells are key wells in the LPVB. In addition to the revisions to their monitoring network, CMWD updated the monitoring schedule for 13 of the 31 wells in the GSP monitoring network (Table 6-3, Change in CMWD Monitoring Schedule).

Table 6-2. Revisions to CMWD Monitoring Network

State Well Number	Management Area	Status	Main Use	Screened Aquifer	Screened Aquifer System	Water Levels Monitored by CMWD	Water Quality Samples Collected by CMWD
03N20W32H02S	WLPMA	Removed	Monitoring	Fox	Unassigned	—	—
02N20W02D02S	ELPMA	Removed	Monitoring	Fox	LAS	—	—
03N20W36P01S	ELPMA	Removed	Monitoring	Fox	Unassigned	—	—
03N20W35J01S	ELPMA	Removed	Agricultural	Fox	LAS	—	—
02N20W01B02S	ELPMA	Added	Municipal	Multiple	LAS	Transducer	No

Table 6-3. Change in CMWD Monitoring Schedule

State Well Number	Management Area	Notes	Main Use	Screened Aquifer	Screened Aquifer System	Changes to Water Levels Monitoring Schedule	Water Quality Samples Collected by CMWD
02N19W06F01S	ELPMA	CMWD does not collect water quality samples	Monitoring	USP	Unassigned	Transducer only	No longer monitored
02N19W07G01S	ELPMA		Monitoring	Alluvium	Unassigned	Transducer only	No longer monitored
02N19W07K02S	ELPMA		Monitoring	Fox	Unassigned	Transducer only	No longer monitored
02N19W07K03S	ELPMA		Monitoring	USP	Unassigned	Transducer only	No longer monitored
02N20W03H01S	ELPMA		Agricultural	Fox	LAS	Transducer only	No longer monitored
02N20W09Q08S	ELPMA		Municipal	Alluvium	LAS	Transducer only	No longer monitored
02N20W03J01S	ELPMA	Wells are now monitored by VCWWD	Municipal	Fox	LAS	Monitored by VCWWD	—
02N20W06R01S	ELPMA		Municipal	Fox	LAS	Monitored by VCWWD	—
03N19W31H01S	ELPMA		Municipal	Fox	LAS	Monitored by VCWWD	—
03N19W31B01S	ELPMA		Municipal	Fox	LAS	Monitored by VCWWD	Monitored by VCWWD
03N19W31H01S	ELPMA		Municipal	Fox	LAS	Monitored by VCWWD	—
03N20W36A02S	ELPMA		Municipal	Fox	Unassigned	Monitored by VCWWD	—
03N20W36G01S	ELPMA		Municipal	Fox	Unassigned	Monitored by VCWWD	—

6.2 Data Gaps

6.2.1 Data Gaps That Have Been Partially Addressed

Spatial Data Gaps

FCGMA has undertaken several steps toward filling data gaps identified in the GSP. At the request of FCGMA, DWR installed a nested monitoring well cluster in 2019 near the boundary between the PVB and ELPMA, an area identified in the GSP as a critical location where groundwater elevation measurements were lacking. Another nested monitoring well cluster is being constructed in the Oxnard Subbasin near the border with WLPMA. Construction of these well clusters help characterize the interaction between the LPVB and adjacent basins.

6.2.2 Remaining Data Gaps

As described in the GSP, the existing monitoring network in the LPVB is sufficient to document groundwater and can be used to document progress toward the sustainability goals for the LPVB. Potential monitoring network improvements that address data gaps that remain from the GSP are summarized below.

6.2.2.1 Water Level Measurements: Spatial Data Gaps

The GSP identified data gaps in the spatial and vertical distribution of groundwater elevation measurements in the LPVB and recommended construction of:

- A monitoring well or wells near the boundary between the WLPMA and the Oxnard Subbasin to the west.
- A monitoring well or wells adjacent to Arroyo Simi–Las Posas, within the boundaries of the potential GDE.
- A monitoring well or wells screened in the GCA.

As described in Section 6.2.1, Data Gaps that Have Been Partially Addressed, the newly constructed monitoring well in the Oxnard Subbasin, near the boundary with the WLPMA, helps to partially address the first data gap listed above. In 2022, FCGMA applied for grant funding through DWR's Sustainable Groundwater Management Grant program to construct dedicated monitoring wells in the ELPMA and WLPMA to address the remaining spatial data gaps identified in the GSP. FCGMA was not awarded funds through this program but anticipates evaluating projects that address these data gaps as part of the Basin Optimization Plan.

Importantly, since adoption of the GSP, several groundwater level monitoring wells have been removed from the monitoring network, including two key wells (Figure 6-3):

- 02N20W04F02S, which was destroyed; and
- 02N21W16J03S, which has not been measured since 2019.

CGMA reviewed groundwater wells in the vicinity of these key wells but was unable to identify suitable replacements that have similar geographic location, construction, and historical record of measurement. Because of this, the removal of these wells from the key well network introduces new spatial groundwater elevation data gaps:

- The destruction of well 02N20W04F02S limits characterization of groundwater conditions in the southeastern part of the ELPMA, near portions of the FCA that may transition from confined to unconfined if groundwater elevations drop to the minimum thresholds.
- The removal of 02N21W16J03S limits characterization of groundwater conditions in the easter part of WLPMA, where groundwater elevations are influenced by operations in the Oxnard Subbasin.

As noted above, FCGMA anticipates evaluating projects that help to fill these critical data gaps as part of the Basin Optimization Plan

6.2.2.2 Water Level Measurements: Temporal Data Gap

The DWR Monitoring Protocols Best Management Practices (DWR 2016a) states the following:

> Groundwater elevation data … should approximate conditions at a discrete period in time. Therefore, all groundwater levels in a basin should be collected within as short a time as possible, preferably within a 1-to-2-week period.

The DWR Monitoring Networks Best Management Practices (DWR 2016b) states the following:

> Groundwater levels will be collected during the middle of October and March for comparative reporting purposes.

Currently, groundwater elevation measurements are not scheduled according to these criteria because FCGMA relies on monitoring by several other agencies. To minimize the effects of this type of temporal data gap in the future, it would be necessary to coordinate the collection of groundwater elevation data, so it occurs within a 2-week window during the key reporting periods of mid-March and mid-October. The recommended collection windows are October 9–22 in the fall and March 9–22 in the spring.

Additionally, as funding becomes available, pressure transducers should be added to wells in the groundwater monitoring network. Pressure transducer records provide the high-temporal-resolution data that allows for a better understanding of water level dynamics in the wells related to groundwater production, groundwater management activities, and climatic influence.

6.2.2.3 Groundwater Quality Monitoring

Groundwater quality monitoring is conducted on at least an annual basis by UWCD, VCWPD, and CMWD. The GSP monitoring well network included 49 wells that were to be regularly monitored for groundwater quality. Since adoption of the GSP, 13 wells that were to be monitored for groundwater quality are no longer monitored for groundwater quality. The majority these wells, 11 of the 13 wells, are representative monitoring wells located in the ELPMA. Despite the removal of the 11 wells, there remain 18 wells in the ELPMA that are monitored for groundwater quality. The spatial distribution of these 11 wells is considered sufficient to determine trends in groundwater quality; however, FCGMA continues to evaluate opportunities to include additional monitoring wells.

6.3 Functionality of the Water Level Monitoring Network

While data gaps remain in the LPVB, the spatial and temporal coverage of the existing groundwater monitoring network is sufficient to provide an understanding of representative water level conditions for the FCA, Epworth Gravels, and LAS of the WLPMA. FCGMA anticipates evaluating opportunities to fill these data gaps over the next 5 years as part of implementing the GSP and Judgment.

6.4 Functionality of Additional Monitoring Network

FCGMA will monitor subsidence in the LPVB using DWR's TRE ALTAMIRA InSAR data. Updates are provided annually with point data and raster interpolations of total vertical displacement since June 13, 2015, and annual vertical displacement rates. This data will be used in conjunction with groundwater elevation data to monitor land subsidence with relation to groundwater extraction.

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7 Fox Canyon Groundwater Management Agency Authorities and Enforcement Actions

The Periodic Evaluation should describe any new authorities the basin's GSAs have gained, established, or exercised since the last GSP submittal and summarize what has been implemented to advance groundwater sustainability. Authorities could pertain to relevant actions related to regulations and ordinances applicable to the Plan. In addition, GSAs should provide information describing any enforcement or legal actions taken in the basin to further the sustainability goal. This could include any new significant information such as funding and fee actions, installing volumetric measuring devices on wells (i.e., flow meters), or collecting other data related to allocation programs and pumping reductions. Demonstrating how these components of GSP implementation will help GSAs reach sustainability is important.

7.1 Actions Taken by the Agency

This section describes relevant actions taken by FCGMA and includes a summary of regulations or ordinances related to the GSP, per GSP Emergency Regulations Section 356.4(g). As a groundwater management agency established by the California Legislature in 1982 with the Fox Canyon Groundwater Management Agency Act, FCGMA adopted many ordinances and regulations related to managing the Basin prior to adoption of the GSP in December 2019 and submittal in January 2020.

This section describes the ordinances and resolutions adopted since adoption of the GSP, which are summarized in Table 7-1, Summary of Actions Taken by the Agency. These ordinances and resolutions can be grouped into the following general actions to advance groundwater sustainability and implement the GSP.

Table 7-1. Summary of Actions Taken by the Agency

Date Adopted	Regulatory Action	Description
10/28/2020	Resolution No. 2020-05 Imposing a Fee on Groundwater Extractions to Establish a Reserve Fund to be Used to Pay the Cost and Expenses of Actions and Proceedings Related to FCGMA's Groundwater Sustainability Program	Imposed a new $20 per AF fee on all but de minimis pumpers for legal expenses related to actions and proceedings related to FCGMA's GSP implementation.
10/2/2020	Resolution No. 2020-07 Increasing Tiered Groundwater Extraction Surcharge Rates.	Increased the surcharge rate to $1,549 for extractions that exceed a pumper's extraction allocation.
12/14/2020	An Ordinance to Establish an Extraction Allocation System for the Las Posas Valley Groundwater Basin	Established a new extraction allocation system needed to sustainably manage the Basin.
2/24/2021	An Ordinance to Amend the Ordinance to Establish an Allocation System for the Las Posas Valley Basin	Amended ordinance to correct a typo.

Table 7-1. Summary of Actions Taken by the Agency

Date Adopted	Regulatory Action	Description
2/24/2021	An Ordinance to Adjust extraction Allocations in the Las Posas Valley Basin to Facilitate the Transition from Calendar Year to Water Year Reporting of Groundwater Extractions	Established the process to transition from Agency's traditional calendar year extraction reporting to reporting by water year.
3/24/2021	An Ordinance to Exempt Domestic Operators from the Requirement that Flowmeters be Equipped with Advanced Metering Infrastructure (AMI) Telemetry	Exempts domestic pumpers that extract 2 AF or less per year with specified maximum pump discharge and horsepower from Agency's AMI requirements.
5/25/2022	Ordinance 8.10 to Amend the Fox Canyon Groundwater Management Agency Ordinance Code Relating to Reporting Extractions	Requires monthly extraction reporting by M&I and domestic pumpers, in addition to agricultural pumpers, for wells required to be equipped with AMI.
7/10/2023	Judgment in Las Posas Valley Water Rights Coalition, et al., v. Fox Canyon Groundwater Management Agency, Santa Barbara Supreme Court Case No. VENC100509700	The Judgment adjudicates all groundwater rights in the Las Posas Valley Groundwater Basin and provides for the Basin's sustainable management pursuant to SGMA. The LPV Judgment appoints Fox Canyon Groundwater Management Agency (FCGMA) as the Watermaster to implement and administer the LPV Judgment. FCGMA remains responsible for implementing and complying with SGMA and the Fox Canyon Groundwater Management Agency Act.
9/28/2022	Resolution No. 2022-05 Increasing Fee on Groundwater Extractions to Fund the Costs of a Groundwater Sustainability Program.	Increased the groundwater sustainability fee to $29 per AF (except de minimis pumpers) to fund the costs of the groundwater sustainability program.
10/26/2022	Resolution No. 2022-06 Increasing the Tiered Groundwater Extraction Surcharge Rates.	Increased the surcharge rate to $1,841 for extractions that exceed a pumper's allocation.
12/15/2023	Resolution No. 2023-03 Levying a Basin Assessment on Water Right Holders in the Las Posas Valley Groundwater Basin for Fiscal Year 2023-24.	Levies a Basin Assessment of $64 per AF of Annual Allocation on Water Rights Holders to fund the Watermaster's management of the Basin.
4/24/2024	Resolution No. 2024-03 Increasing Tiered Groundwater Extraction Surcharge Rates	Increased the surcharge rate to $1,929 for extractions that exceed a pumper's allocation.

7.1.1 Extraction Reporting

FCGMA implemented several ordinances to improve extraction reporting. These include transition from FCGMA's traditional calendar year reporting to reporting by water year; modified reporting requirements for mutual water companies, special districts, and municipalities for groundwater or in lieu deliveries for agricultural use outside of the Basin; exempting de minimis domestic pumpers from FCGMA's advanced metering infrastructure (AMI) requirements; and requiring monthly extraction reporting by all pumpers required to equip wells with AMI.

7.1.2 Extraction Allocations

Regulating extraction allocations is the primary management action available to FCGMA for managing groundwater demand in the Basin. FCGMA's previous allocation system needed to be replaced to sustainably manage the Basin and a new allocation system was developed over several years concurrent with development of the GSP. The new allocation ordinance was adopted in December 2020 and became effective on October 1, 2021. FCGMA amended the ordinance to facilitate transition to the new ordinance. Additionally, FCGMA adopted resolutions increasing tiered groundwater surcharge rates for extractions that exceed allocation. The surcharge provides an economic disincentive to extract groundwater exceeding allocation.

7.1.3 Funding

FCGMA adopted a "groundwater sustainability" regulatory fee on extractions to fund development of the GSP. Subsequent to adoption of the GSP, the fee was increased from $14 per acre-foot to $29 per acre-foot to fund the cost of FCGMA's groundwater sustainability program. FCGMA also adopted a $20 per acre-foot "reserve fee" to fund the cost and expense of legal actions and proceedings brought against FCGMA related to implementation of FCGMA's groundwater sustainability program. Surcharges collected for extractions exceeding allocation are accounted separate from the operating account and are to be used for acquisition of supplemental water or actions to increase the yield of the Basin. Subsequent to the adjudication judgment, FCGMA adopted an ordinance levying a Basin assessment on water rights holders to fund management of the Basin.

As described in Section 3.1, Evaluation of Projects and Management Actions, the Judgment adjudicated water rights in the basin and established an allocation system based on those water rights. The Judgment allocations supersede the allocations developed and adopted by FCGMA in 2019.

7.2 Enforcement and Legal Actions Agency

FCGMA has a robust ordinance code and set of resolutions that establish programs for basin management and reporting. These include ordinances and resolutions adopted under both the authority of the FCGMA Act and SGMA. The FCGMA Board has adopted policies and procedures for ordinance code violations, including sending notices of violation and assessing civil penalties, for failure to:

- Register an extraction facility.
- Report a change in owner or operator of an extraction facility within 30 days.
- Submit a semi-annual groundwater extraction statement.
- Install and maintain advanced metering infrastructure (AMI) on an extraction facility, unless exempt.
- Submit monthly reports of extractions from AMI, unless exempt.
- Install a flowmeter prior to pumping groundwater from an extraction facility.
- Report flowmeter failure and repair or replace the flowmeter within the required timeframe.
- Test and calibrate a flowmeter at the required frequency.
- Remit payment of groundwater extraction fees or civil penalties

The FCGMA Board additionally established a tiered surcharge for extractions in excess of extraction allocation.

7.3 Plan Amendments

The work completed as part of this periodic GSP evaluation will be integrated into an amendment of the LPVB GSP. This amendment will include updates to the:

- A description of the Judgment and its associated requirements as part of the sustainable groundwater management program for the LPVB.
- List of projects and management actions that support GSP implementation.
- Future scenario modeling.
- Estimates of the sustainable yield for the WLPMA, ELPMA, and Epworth Gravels.
- Representative Monitoring Well (Key Well) Network.
- General GSP monitoring network.

FCGMA anticipates adopting the LPVB GSP amendment and submitting it to DWR in the first quarter of 2025.

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8 Outreach, Engagement, and Coordination

8.1 Outreach and Engagement

A public outreach and engagement plan was developed for the LPVB GSP (FCGMA 2019). The outreach and engagement plan:

- Discusses FCGMA's decision-making process and how public input and responses will be used.
- Identifies opportunities for public engagement.
- Describes how FCGMA encourages the active involvement of diverse social, cultural, and economic elements of the population in the LPVB; and
- Describes the method FCGMA shall follow to inform the public about progress implementing the plan, including the status of projects and management actions.

Since adopting the GSP for the LPVB in 2019, the FCGMA Board of Directors has continued to prioritize outreach and engagement with interested parties and has followed the elements of the outreach and engagement plan developed for the GSP. Review of the outreach and engagement plan for this First Periodic Evaluation indicates that the methods described for outreach and engagement activities are relevant to GSP implementation and are being used to successfully support interested party involvement in the GSP implementation process.

During the GSP development and adoption process, interested parties expressed an interest in developing additional projects to increase the sustainable yield of the LPVB. FCGMA engaged with interested parties to solicit project descriptions, which were included in the 2022 GSP annual report (FCGMA 2022). In order to assist the FCGMA Board with evaluating the projects, FCGMA collaborated with interested parties to develop a project evaluation criteria checklist and held multiple operations committee meetings at which the project evaluation process was discussed, and project descriptions were refined. This process will allow FCGMA and project proponents to pursue project funding opportunities and has helped the implementation of project and management actions.

FCGMA has provided updates on GSP implementation activities and public participation opportunities to interested parties through direct electronic communications and posts to the FCGMA website. Additional, updates and opportunities for public comment were provided at FCGMA Regular Board meetings, FCGMA Special Board meetings, and FCGMA Board Committee meetings. Meeting agendas and minutes, as well as video recordings of all FCGMA Board meetings and workshops, were made available on the FCGMA website. The Draft Periodic Evaluation of the GSP, was made available for review on the GSP website for 45 days. FCGMA encouraged active participation from interested parties through public workshops (August 30, 2023; April 25, 2024; and September 9, 2024).

Additionally, the LPV Judgment established both a Policy Advisory Committee and a Technical Advisory Committee to solicit feedback from interested parties and advise the LPVB Watermaster on decisions that would impact interested parties and beneficial uses and users of groundwater in the LPVB. The Technical Advisory Committee provides additional review of documents developed to support GSP implementation and updates to the sustainable yield of the LPVB. Under the LPV Judgment, the Watermaster and the Technical Advisory Committee have a formal comment and response protocol that will assist the FCGMA Board of Directors, in its role as the Watermaster, to ensure that the beneficial uses and users of groundwater are considered in technical and policy decisions impacting groundwater use in the LPVB.

8.2 Groundwater Sustainability Agency Board

The FCGMA Board of Directors holds monthly meetings during which the Board is apprised of ongoing projects and upcoming initiatives that impact groundwater conditions in the basins under its jurisdiction, including the LPVB. Interested parties are informed in advance of each Board meeting via email and the Board meeting schedule is posted on the FCGMA website. Technical updates, consideration of impacts to beneficial uses and users of groundwater, and feedback from interested parties serve as the underpinnings for policy decisions made by the Board.

Since adopting the GSP in 2019, the Board has held 52 regular meetings and 25 special meetings. The topics discussed at these meetings included:

- GSP Implementation
- Grant Opportunities for Projects and Management Actions
- GSP Annual Reports
- GSP Periodic Updates
- Groundwater Allocation Ordinances
- Groundwater Adjudication Proceedings

The Board is composed of members representing the County of Ventura, the United Water Conservation District, the seven small water districts within the FCGMA jurisdiction, the five incorporated cities within the FCGMA jurisdiction, and the farmers. Members of the current Board have served for multiple years and are well informed on the requirements for sustainable management of the LPVB under SGMA.

8.3 Summary of Coordination Between Agencies

FCGMA has a long-standing history of coordination with other agencies in the LPVB, including the Camrosa Water District – Las Posas Basin GSA, the Las Posas Basin Outlying Areas GSA (County of Ventura), Calleguas Municipal Water District, and United Water Conservation District. There are no federally recognized tribal communities, federal lands, or state lands within the LPVB. Coordination between relevant agencies in the LPVB has continued throughout the implementation of the GSP, with FCGMA holding regular meetings with to coordinate on projects, grant funding opportunities, land use planning, well permitting, and water management strategies within the LPVB. This coordination is not anticipated to be impacted by the LPVB Judgment, in which FCGMA is designated as the Watermaster for the LPVB. Because of the history of coordination between agencies that began before SGMA was enacted and is anticipated to continue as FCGMA becomes the Watermaster for the LPVB, no new inter-agency agreements have been required to manage the LPVB since the GSP was adopted. Similarly, no changes were made to the GSP in response to new local requirements by these agencies.

The LPVB shares a basin boundary with both the Oxnard Subbasin to the west, and the PVB to the southwest. FCGMA is the primary GSA, along with Camrosa Water District and the County of Ventura, for these adjacent basins. The GSPs for the PVB, Oxnard Subbasin, and LPVB were all prepared by FCGMA using consistent data, methods, and tools, and the sustainable management criteria for each basin were developed with the consideration of impacts on the adjacent basins. The internal coordination that has been in place since the formation of the FCGMA in 1982 has continued through the first 5 years of GSP implementation. The FCGMA Board considers the impacts of implementation activities and policy decisions on the interested parties in all of the basins within the FCGMA jurisdiction.

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9 Other Information

9.1 Consideration of Adjacent Basins

The LPVB is hydrogeologically connected with the Oxnard Subbasin and PVB. FCGMA is the GSA for both the PVB and Oxnard Subbasin. FCGMA, as the lead GSA for the LPVB, PVB, and Oxnard Subbasin, used a regional approach to determine the combined sustainable yield of all three basins during development of the GSP. The individual sustainable yields and sustainable management criteria for each basin were then established to ensure that each basin is managed with mutually beneficial sustainability goals. DWR found that FCGMA's approach demonstrated an adequate consideration of adjacent basins and subbasins (DWR 2021). FCGMA has not altered this approach as a result of the first periodic evaluation process because implementation of the GSP has not affected the ability of the Oxnard Subbasin or PVB to achieve their respective sustainability goals. FCGMA will continue to manage the LPVB with consideration of impacts to the adjacent basins and, as part of GSP implementation, will continue to evaluate the relationship between groundwater production in the LPVB and groundwater conditions in adjacent basins.

9.2 Challenges Not Previously Discussed

The most significant challenge for successful implementation of the GSP is acquiring funding to fill data gaps, address DWR recommended corrective actions, and construct projects. FCGMA has investigated funding mechanisms to support these efforts and has implemented a replenishment fee to respond to legal challenges. However, development and implementation of replenishment fees sufficient to fund full GSP implementation remains a challenge for the agency.

9.3 Legal Challenges

FCGMA did not take legal action or enforcement in the LPVB in furtherance of the LPVB's sustainability goal. (23 C.C.R. § 356.4(h).) The following discussion describes the lawsuits pending against FCGMA and their effect on FCGMA's implementation of the LPVB GSP and sustainable management of the LPVB.

Las Posas Valley Water rights Coalition, et al. v. Fox Canyon Groundwater Management Agency, Santa Barbara Sup. Ct. Case No. VENC100509700

On July 10, 2023, the Santa Barbara Superior Court entered a statement of decision adopting a judgment in Las Posas Valley Water Rights Coalition, et al. v. Fox Canyon Groundwater Management Agency, Santa Barbara Sup. Ct. Case No. VENC100509700 (Judgment). The Judgment adjudicates all groundwater rights in the LPVB, appoints FCGMA as the Watermaster for the LPVB, and adopts a physical solution that requires FCGMA to prepare new studies and reports designed to maintain an annual operating yield for the LPVB at 40,000 AFY. Although the Judgment has been appealed, the trial court chose not to stay implementation of the Judgment; over the past year, FCGMA has worked to implement the Judgment's several new administrative, fiscal, reporting, and stakeholder processes. Because the Judgment is still being implemented and subject to appellate court review, the effect of the Judgment on FCGMA's implementation of the LPV GSP and sustainable management of the LPV Basin is uncertain at this time.

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10 Summary of Proposed or Completed Revisions to Plan Elements

The work completed as part of this periodic GSP evaluation has resulted in:

- An expanded suite of projects considered as part of GSP implementation.
- Improvements to the hydrogeologic conceptual model of the Subbasin based on newly available data.
- Improvements to the estimate of the sustainable yield of Subbasin that accounts for a range of projects and management actions implemented in the Subbasin.
- Revisions to the monitoring network, including the key well network, used to evaluate groundwater conditions and groundwater sustainability in the Subbasin.

These revisions warrant an amendment to the GSP. A summary of planned revisions to the GSP elements are summarized in Table 10-1, Summary of Proposed Plan Element Revisions.

Table 10-1. Summary of Proposed Plan Element Revisions

Section	Proposed Change	Reference to information in this report that warrants Plan Element Revisions
Administrative Information		
The administrative information will include a discussion of the adjudication of the LPVB, FCGMA's role of the Watermaster for the LPVB, and the requirements of the Judgment.		
Basin Setting		
Hydrogeologic Conceptual Model	There are no proposed changes to the Groundwater Conditions presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Groundwater Conditions	There are no proposed changes to the Groundwater Conditions presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Water Budget	Description of Projected Future Water Budget	Section 5.2
	Description of Future Sustainable Yield	Section 5.2.3
Management Areas	There are no proposed changes to the Management Areas presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Sustainable Management Criteria		
Sustainability Goal	There are no proposed changes to the Sustainability Goal presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Undesirable Results	There are no proposed changes to the Undesirable Results presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Minimum Thresholds Measurable Objectives	There are no proposed changes to the minimum thresholds and measurable objectives based on the information reviewed and evaluates as part of this periodic GSP evaluation. However, two key wells will be removed from the key well network.	
Monitoring Network		
Monitoring Network Objectives	There are no proposed changes to the monitoring network objectives presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation.	
Description of Monitoring Network	Incorporate updates to UWCD's, CMWD's, VCWWD's, and VCWPD's current monitoring schedule.	Section 6.1
Monitoring Network Implementation	There are no proposed changes to the monitoring network implementation presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation	
Protocols for Data Collection and Monitoring	There are no proposed changes to the protocols for data collection and monitoring presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation	

Table 10-1. Summary of Proposed Plan Element Revisions

Section	Proposed Change	Reference to information in this report that warrants Plan Element Revisions
Potential Monitoring Network Improvements	Update the potential new well (PNW) locations based on revisions to the existing monitoring network. Include new potential well locations based on changes to the key well network.	Section 6.1 and 6.2
Projects and Management Action		
Projects	Provide updated descriptions of projects included in the GSP	Section 3.1
	Include an expanded suite of projects based on information submitted to FCGMA by other agencies in the LPVB and identified in the Judgment.	Section 3.2
Management Actions	There are no proposed changes to the management actions presented in the GSP based on the information reviewed and evaluated as part of this periodic GSP evaluation	

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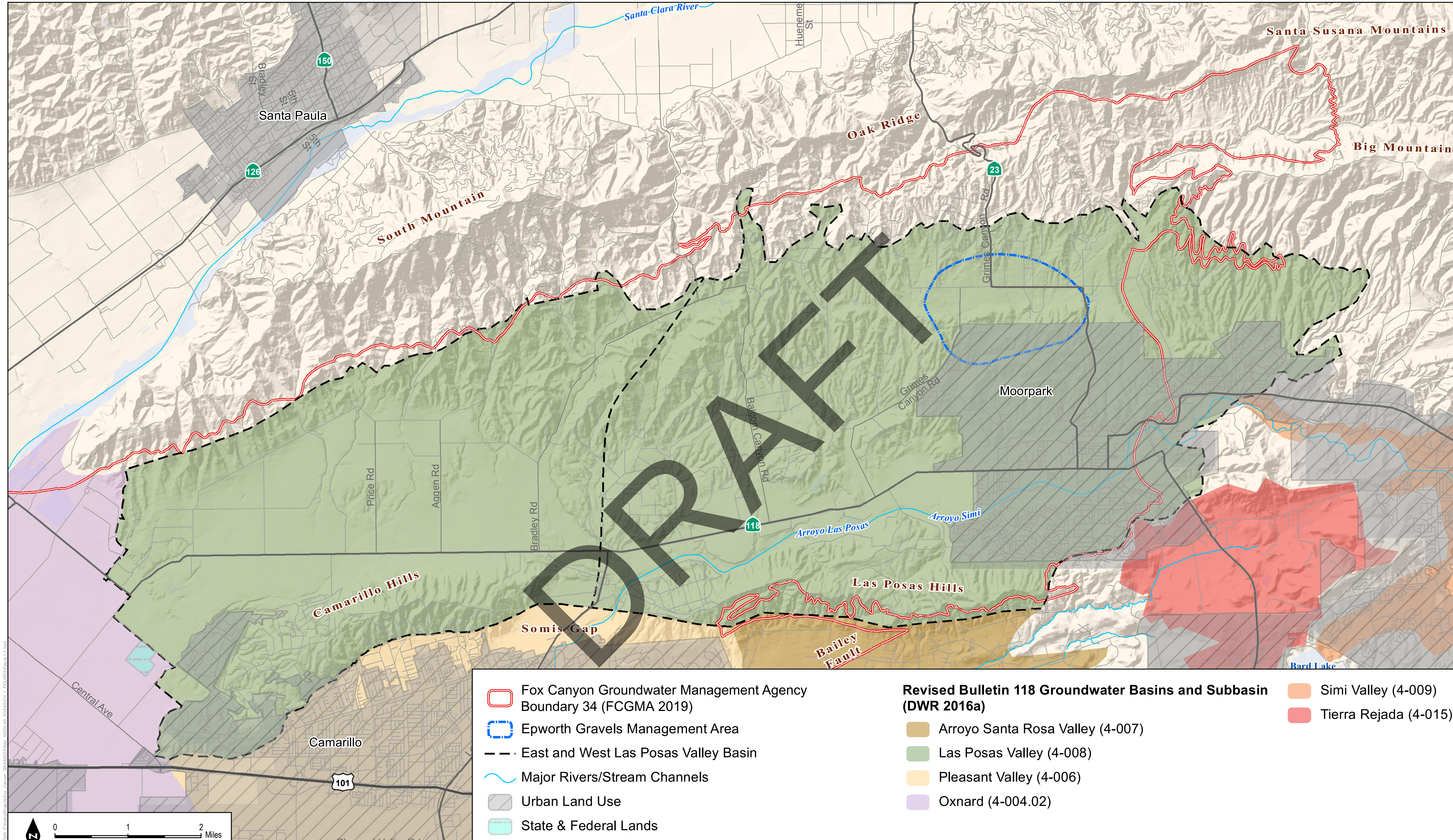

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SOURCE: DWR; County of Ventura

FIGURE 2-1

Vicinity Map for the Las Posas Valley Basin

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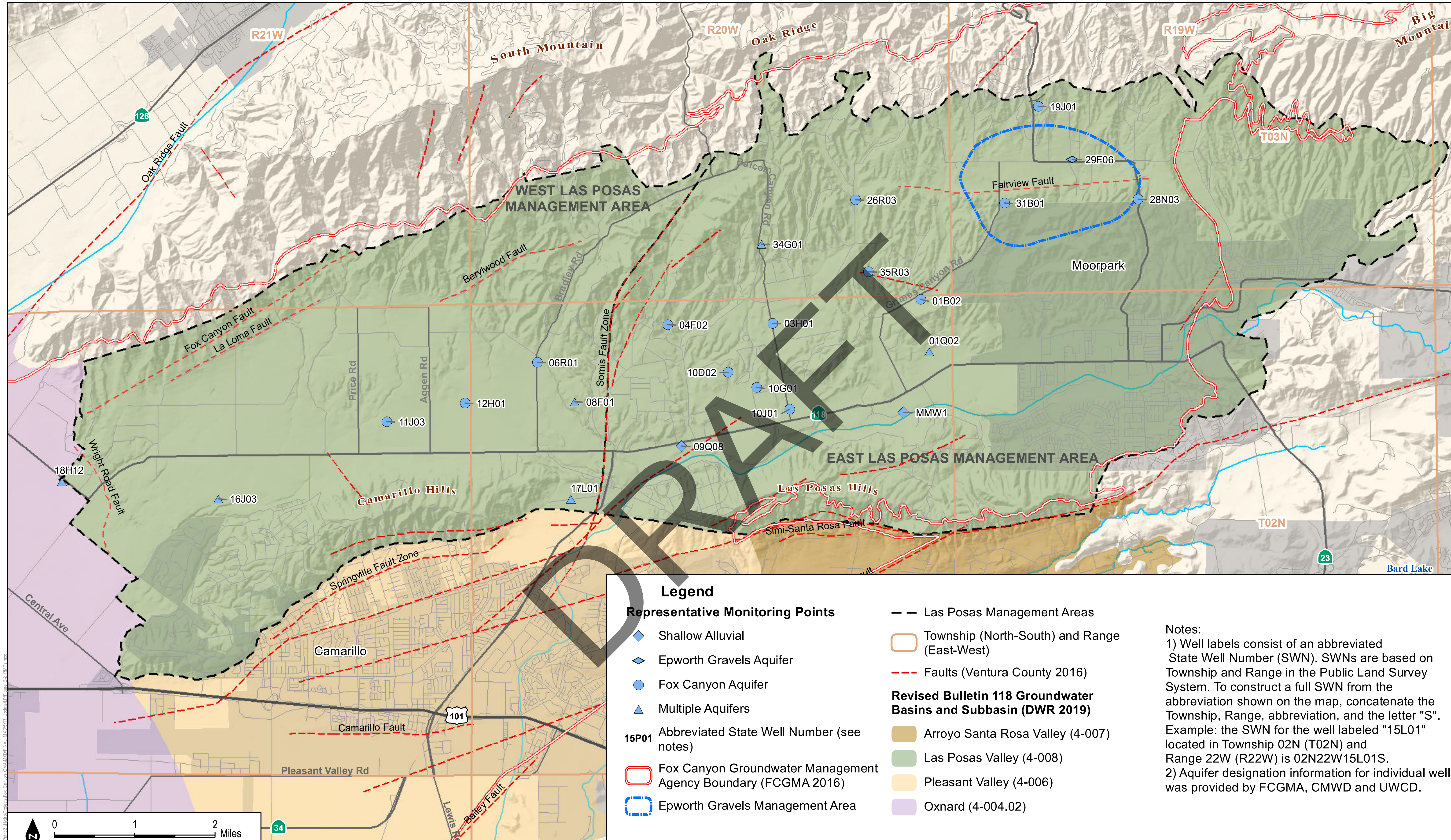

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SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-2
Representative Monitoring Points in the Las Posas Valley Basin

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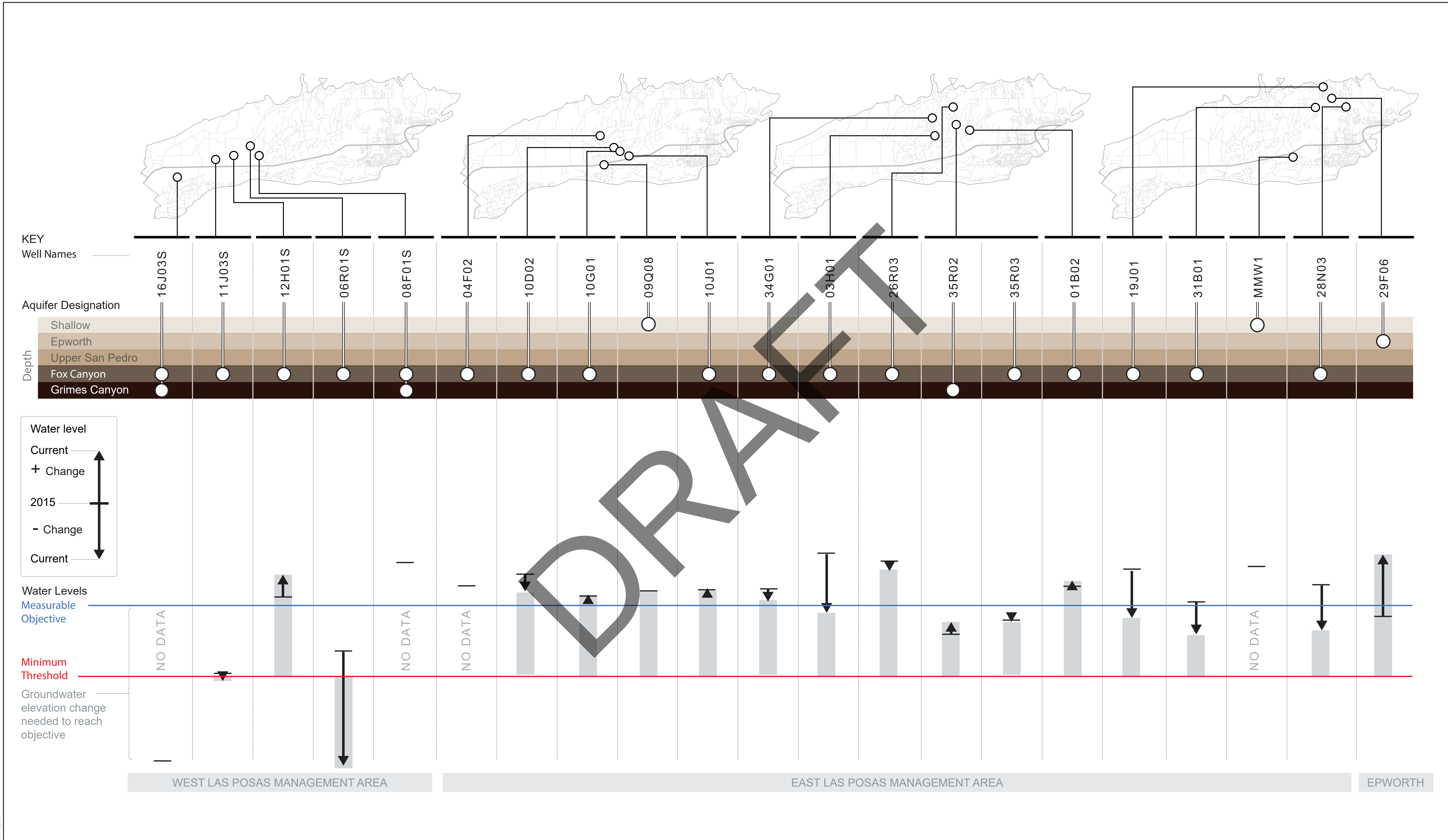

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FIGURE 2-3

Fall 2023 Groundwater Levels Relative to the Minimum Thresholds and Measurable Objectives

First Periodic Evaluation: Groundwater Sustainability Plan for the Las Posas Valley Basin

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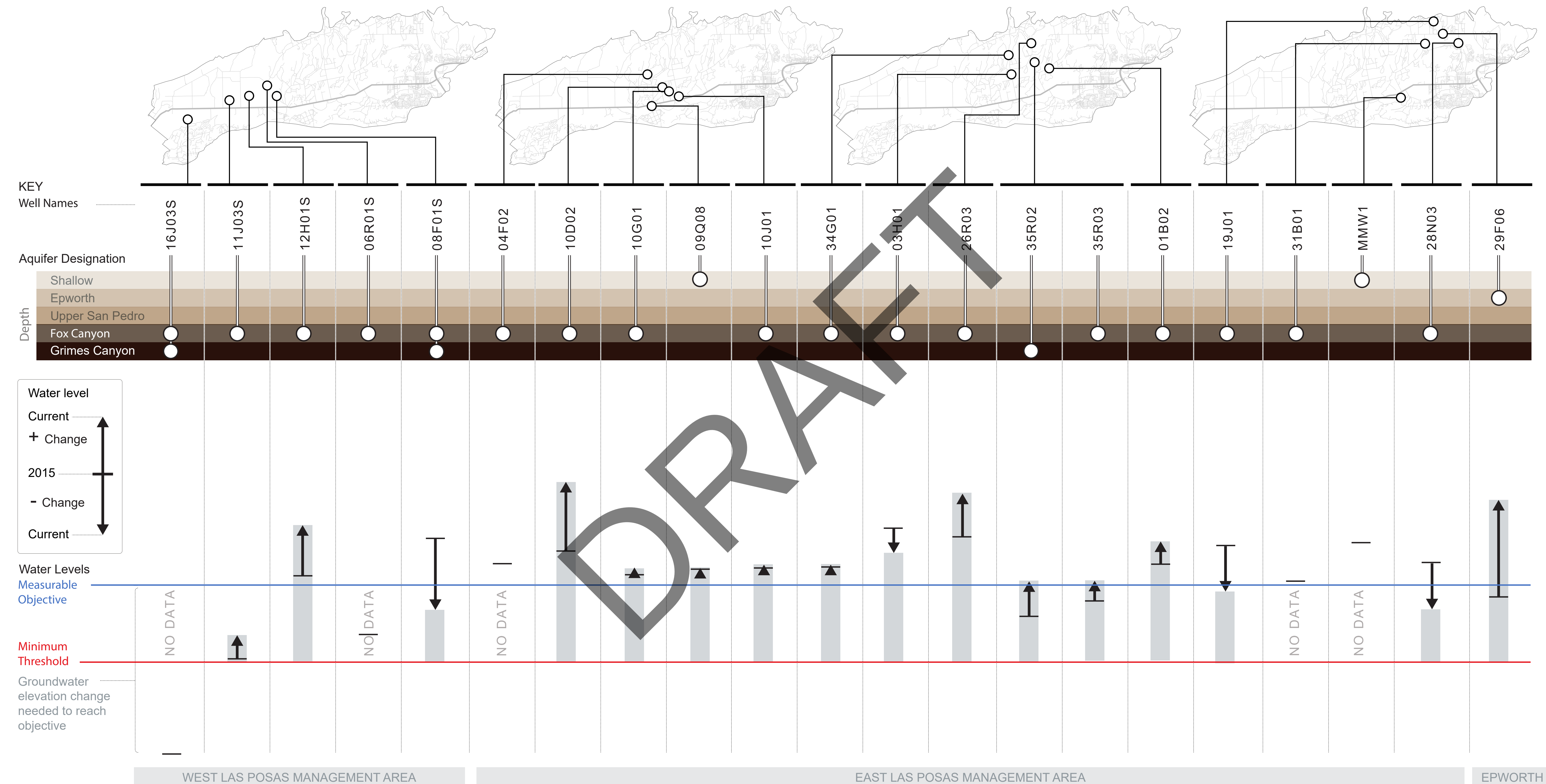

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FIGURE 2-4

Spring 2024 Groundwater Levels Relative to the Minimum Thresholds and Measurable Objectives

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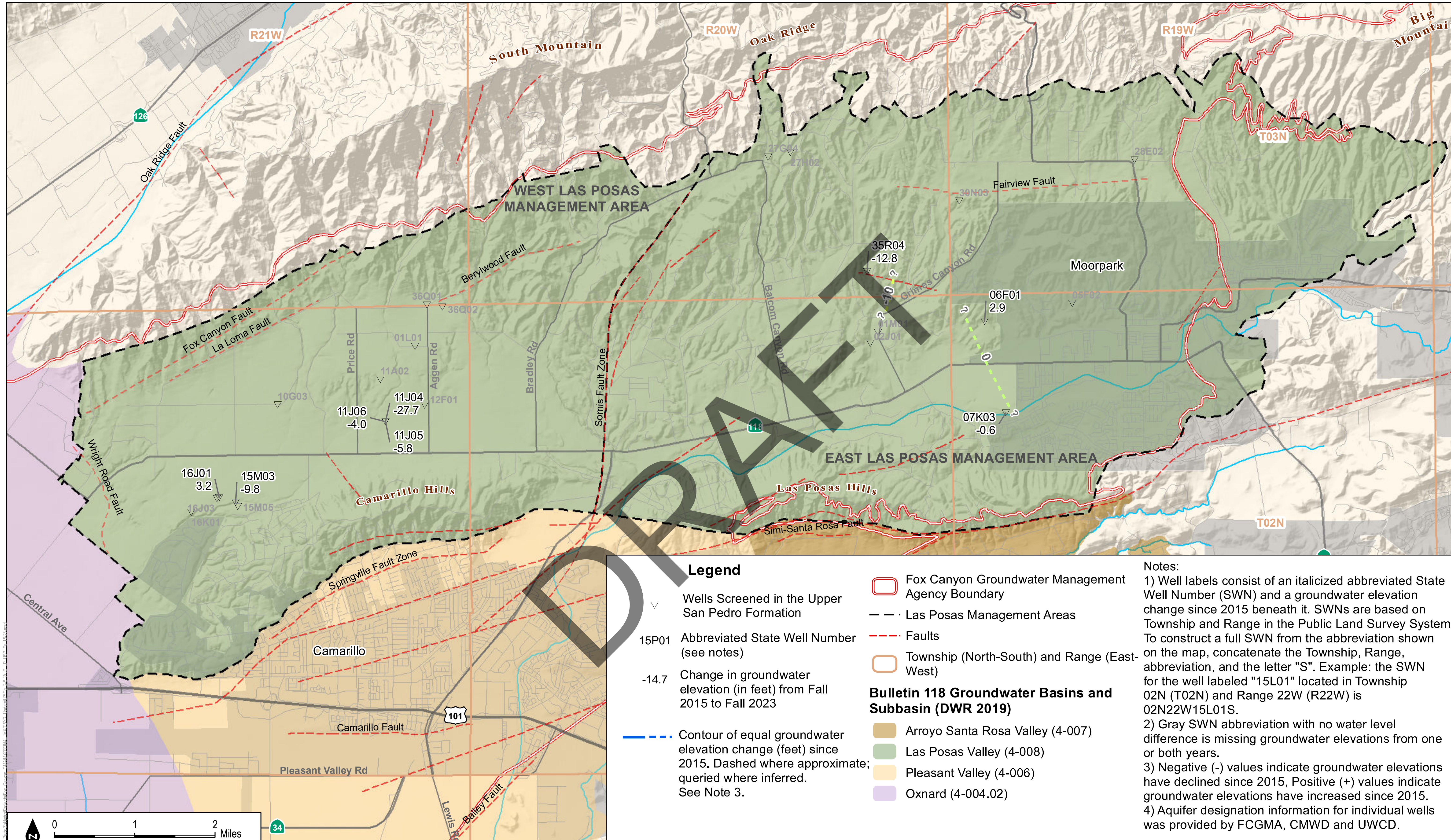

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation change since 2015 beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S.
2) Gray SWN abbreviation with no water level difference is missing groundwater elevations from one or both years.
3) Negative (-) values indicate groundwater elevations have declined since 2015, Positive (+) values indicate groundwater elevations have increased since 2015.
4) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-5

Upper San Pedro Formation - Groundwater Elevation Changes from Fall 2015 to 2023

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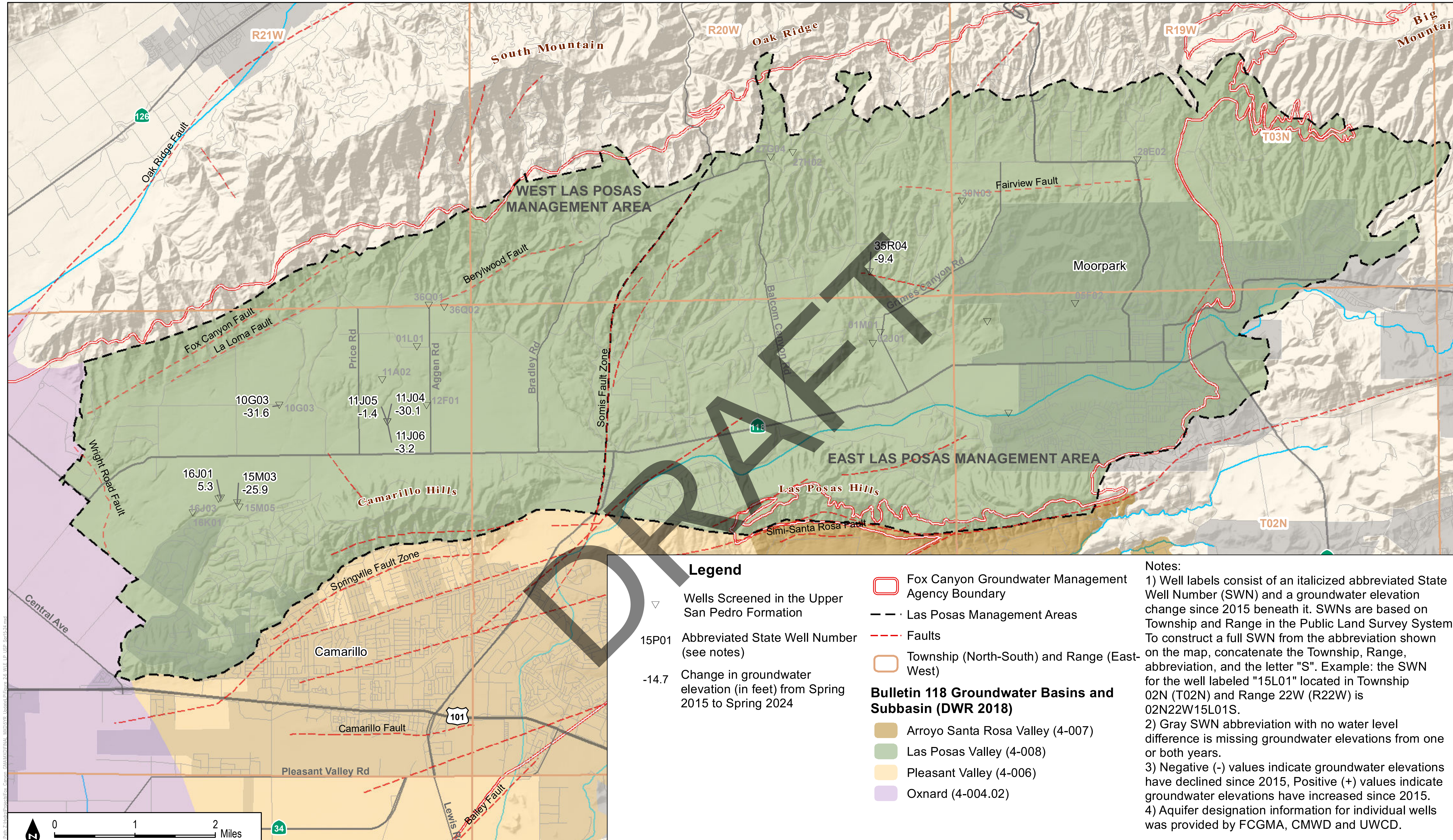

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation change since 2015 beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S.
2) Gray SWN abbreviation with no water level difference is missing groundwater elevations from one or both years.
3) Negative (-) values indicate groundwater elevations have declined since 2015, Positive (+) values indicate groundwater elevations have increased since 2015.
4) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-6

Upper San Pedro Formation - Groundwater Elevation Changes from Spring 2015 to 2024

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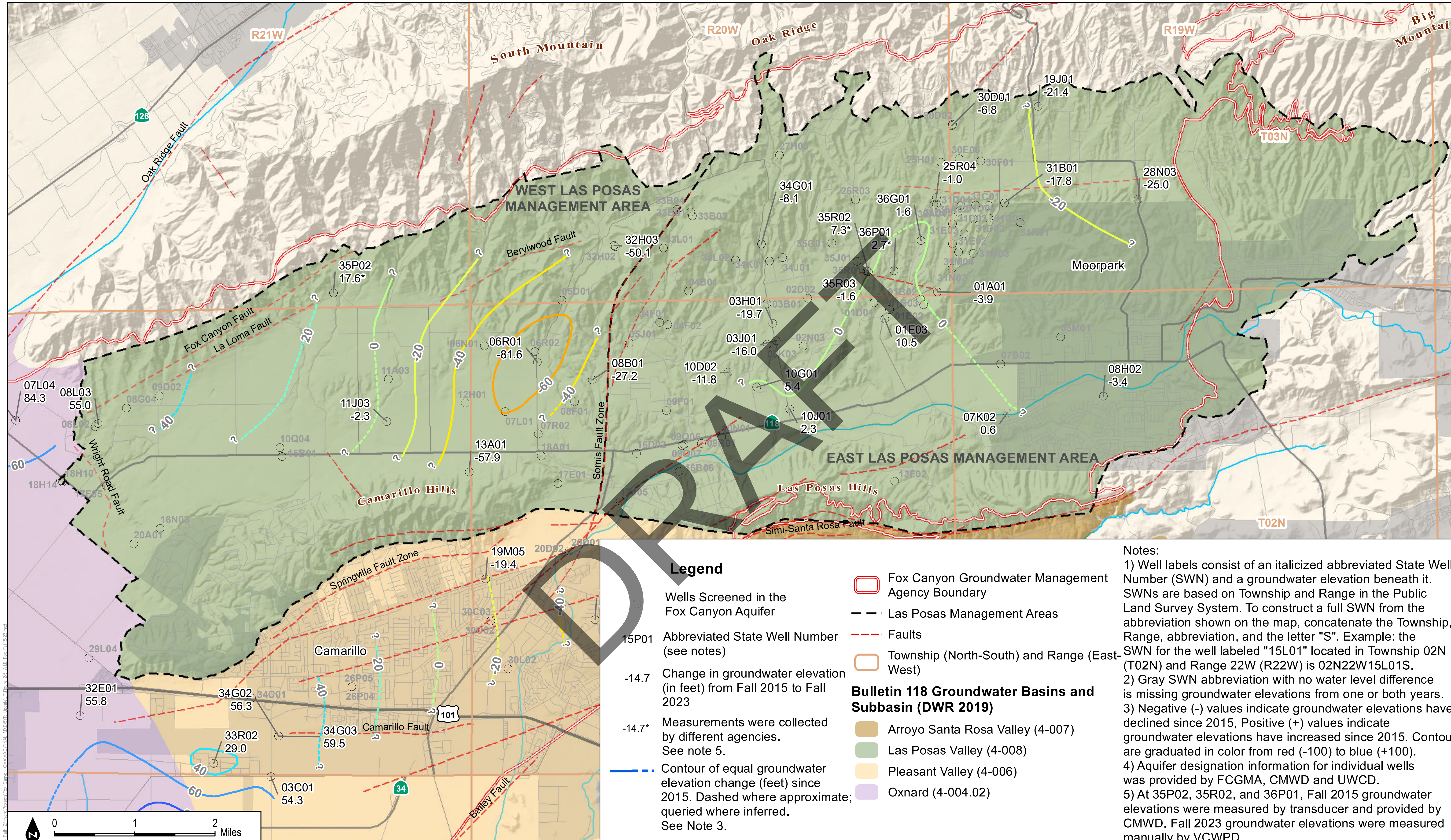

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-7

Fox Canyon Aquifer - Groundwater Elevation Changes from Fall 2015 to 2023

DUDEK

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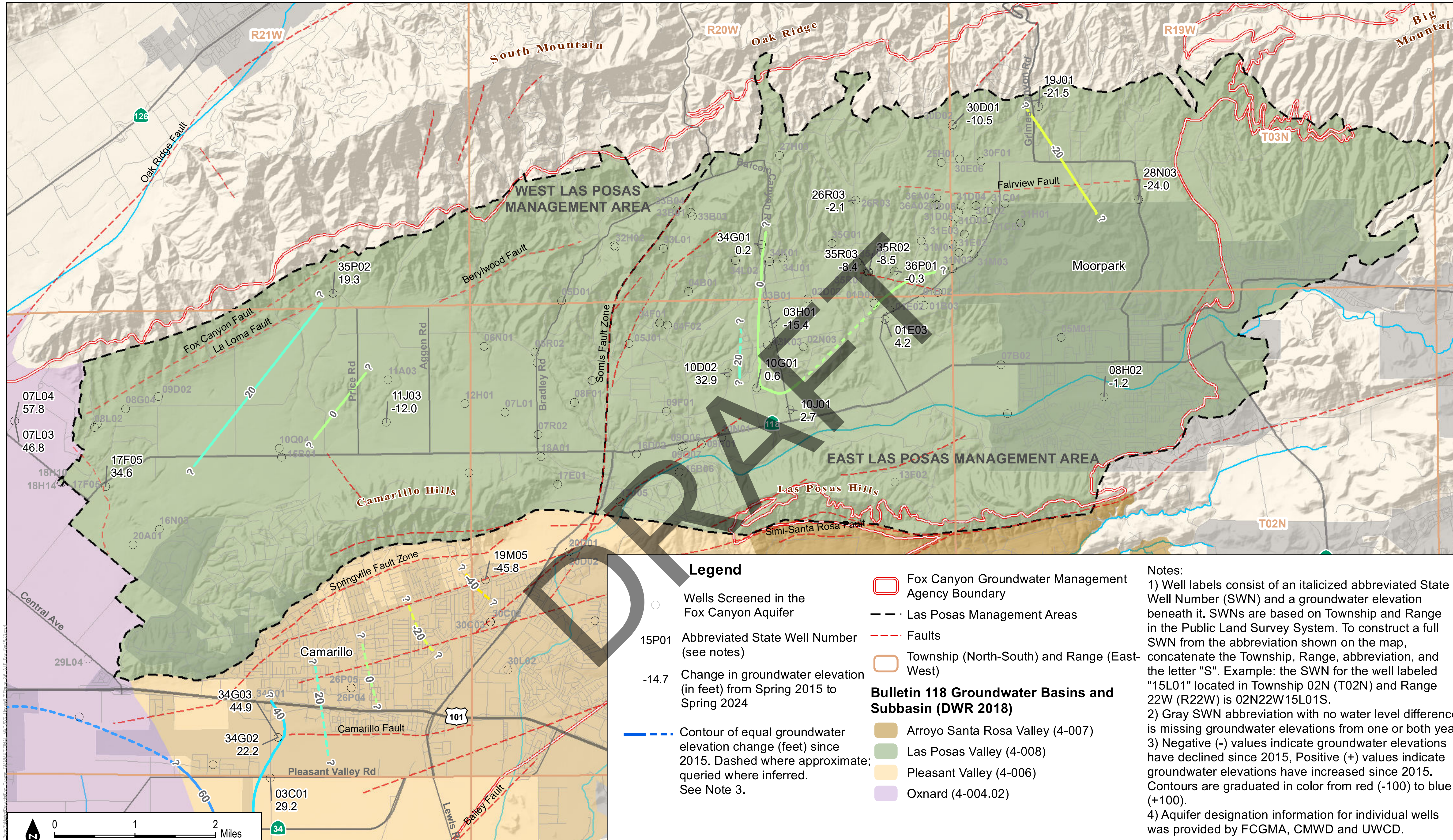

SOURCE: DWR; Ventura County; UWCD; CMWD

DUDEK

FIGURE 2-8

Fox Canyon Aquifer - Groundwater Elevation Changes from Spring 2015 to 2024

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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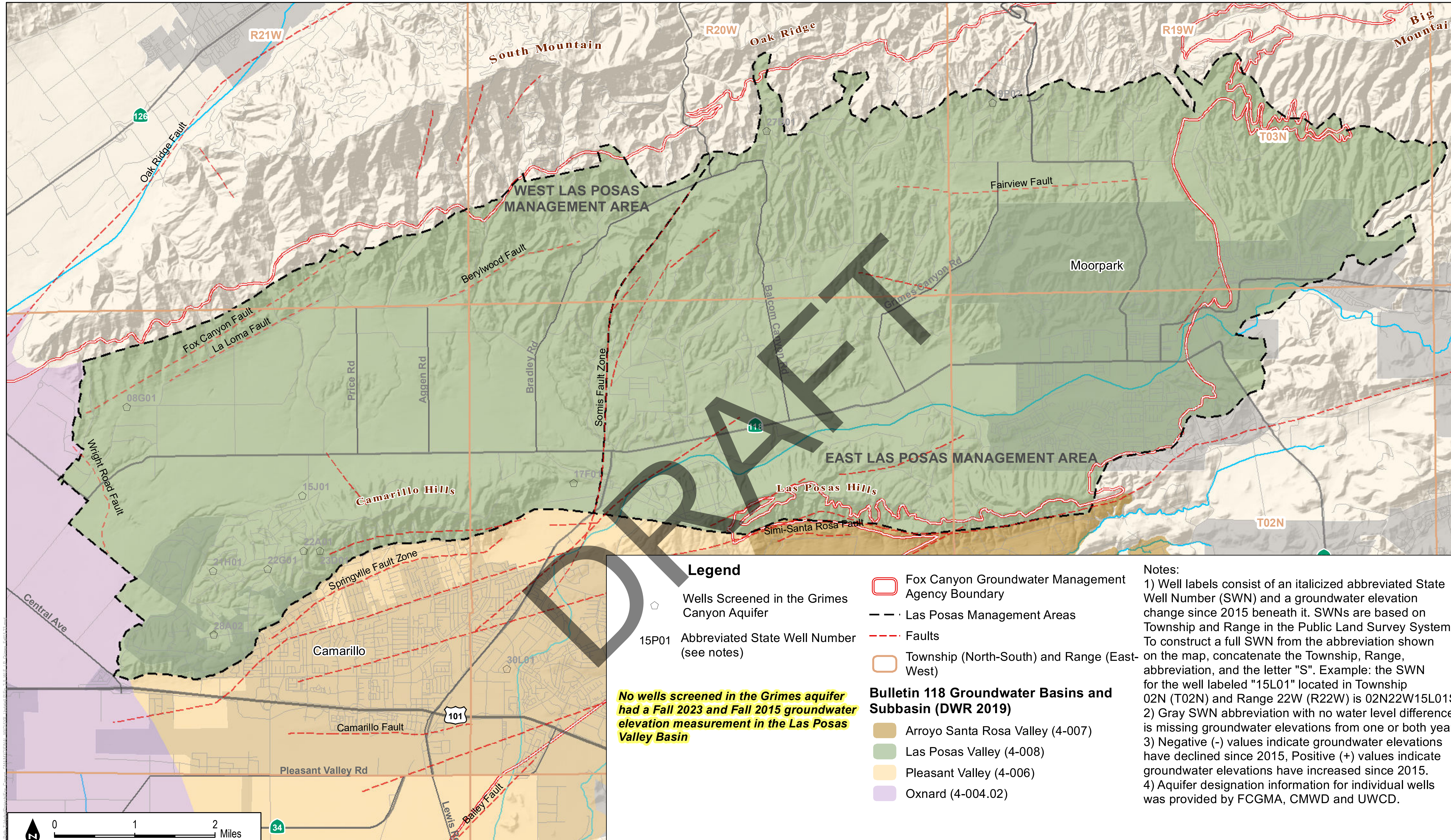

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-9

Grimes Canyon Aquifer - Groundwater Elevation Changes from Fall 2015 to 2023

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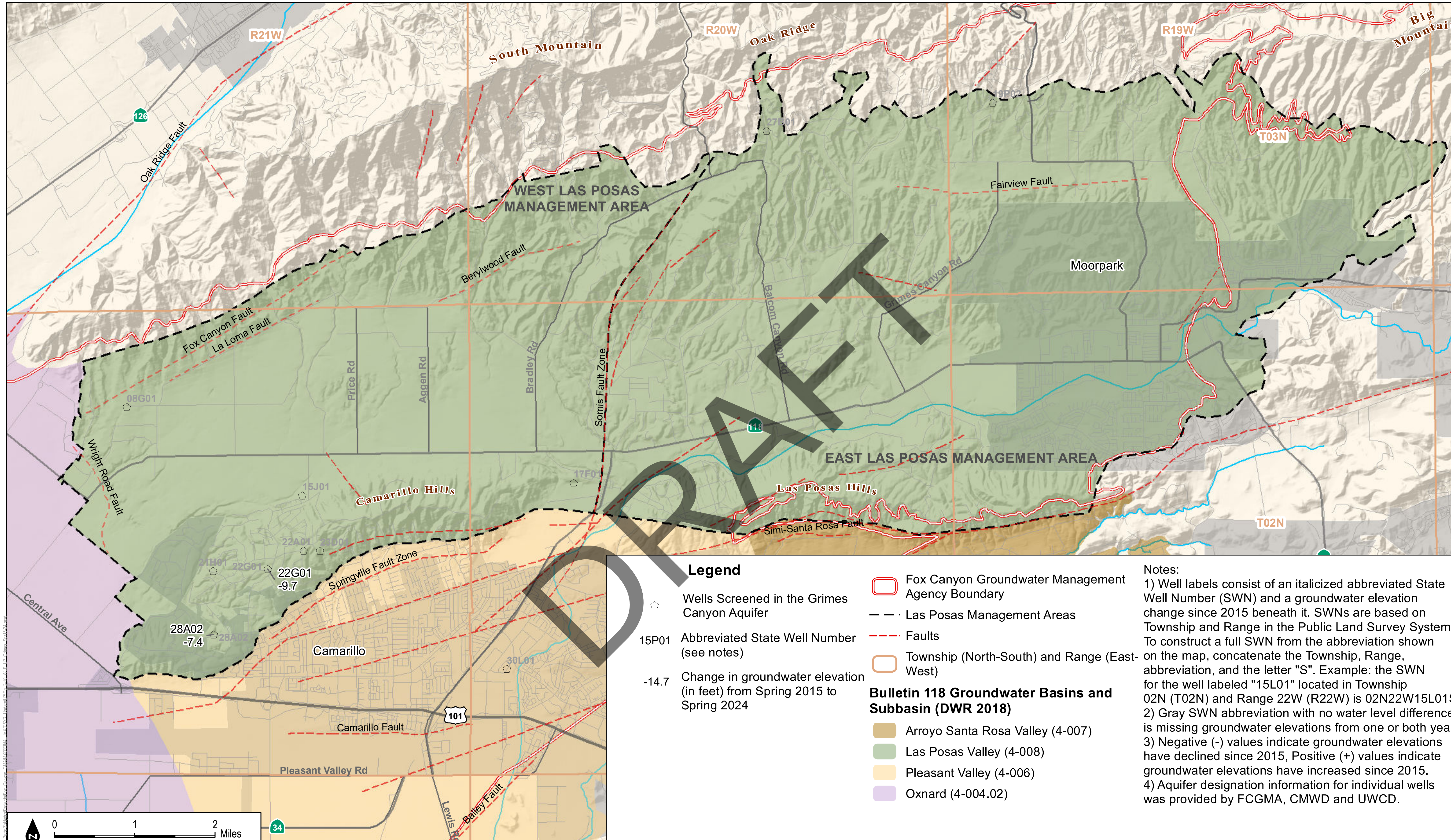

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-10

Grimes Canyon Aquifer - Groundwater Elevation Changes from Spring 2015 to 2024

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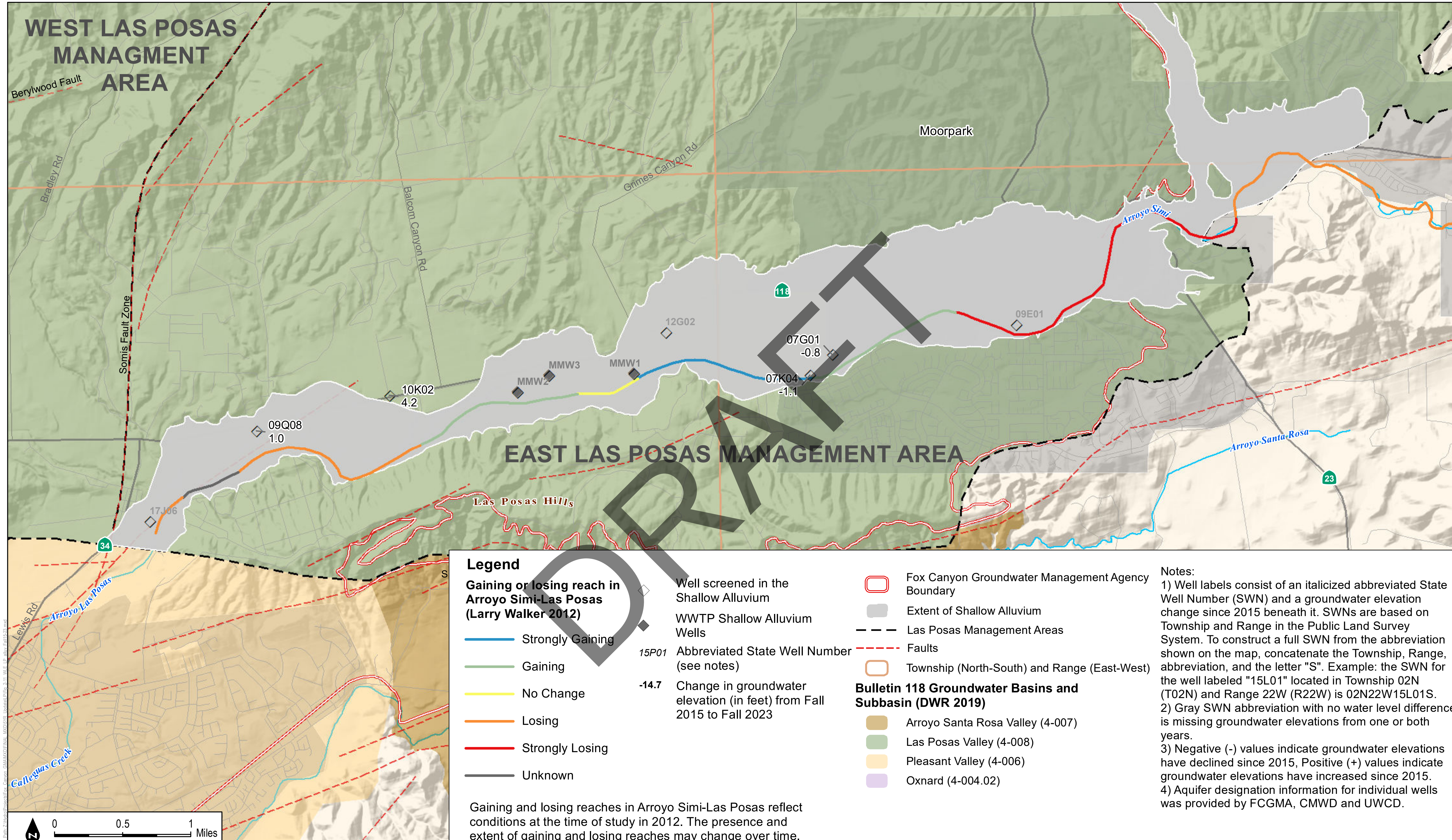

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-11

Shallow Alluvium - Groundwater Elevation Changes from Fall 2015 to 2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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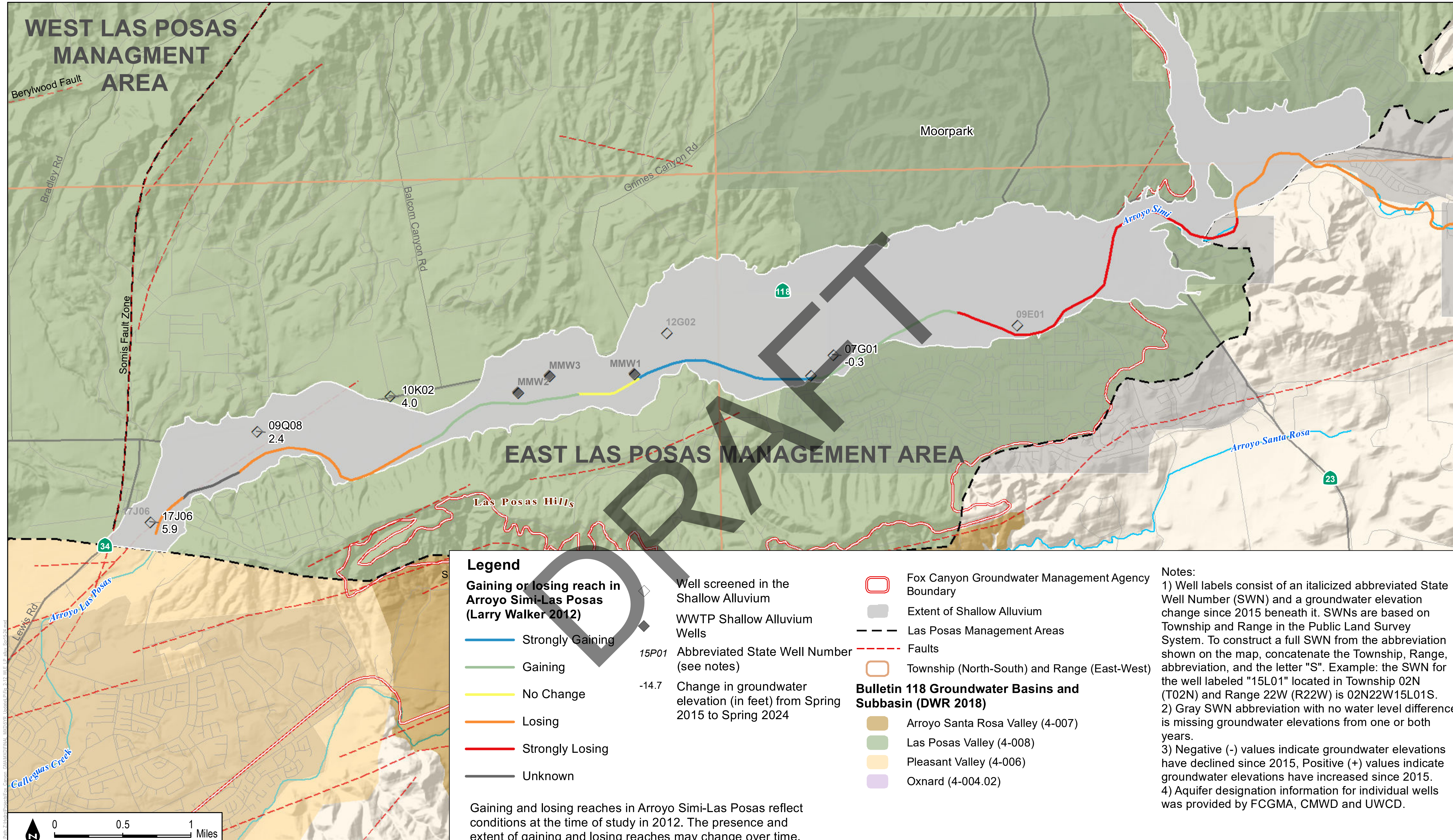

Legend

Gaining or losing reach in Arroyo Simi-Las Posas (Larry Walker 2012)

- Strongly Gaining
- Gaining
- No Change
- Losing
- Strongly Losing
- Unknown

- Well screened in the Shallow Alluvium
- WWTP Shallow Alluvium Wells
- *15P01* Abbreviated State Well Number (see notes)
- -14.7 Change in groundwater elevation (in feet) from Spring 2015 to Spring 2024

- Fox Canyon Groundwater Management Agency Boundary
- Extent of Shallow Alluvium
- Las Posas Management Areas
- Faults
- Township (North-South) and Range (East-West)

Bulletin 118 Groundwater Basins and Subbasin (DWR 2018)

- Arroyo Santa Rosa Valley (4-007)
- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

Gaining and losing reaches in Arroyo Simi-Las Posas reflect conditions at the time of study in 2012. The presence and extent of gaining and losing reaches may change over time.

Notes:
1) Well labels consist of an italicized abbreviated State Well Number (SWN) and a groundwater elevation change since 2015 beneath it. SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S.
2) Gray SWN abbreviation with no water level difference is missing groundwater elevations from one or both years.
3) Negative (-) values indicate groundwater elevations have declined since 2015, Positive (+) values indicate groundwater elevations have increased since 2015.
4) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-12

Shallow Alluvium - Groundwater Elevation Changes from Spring 2015 to 2024

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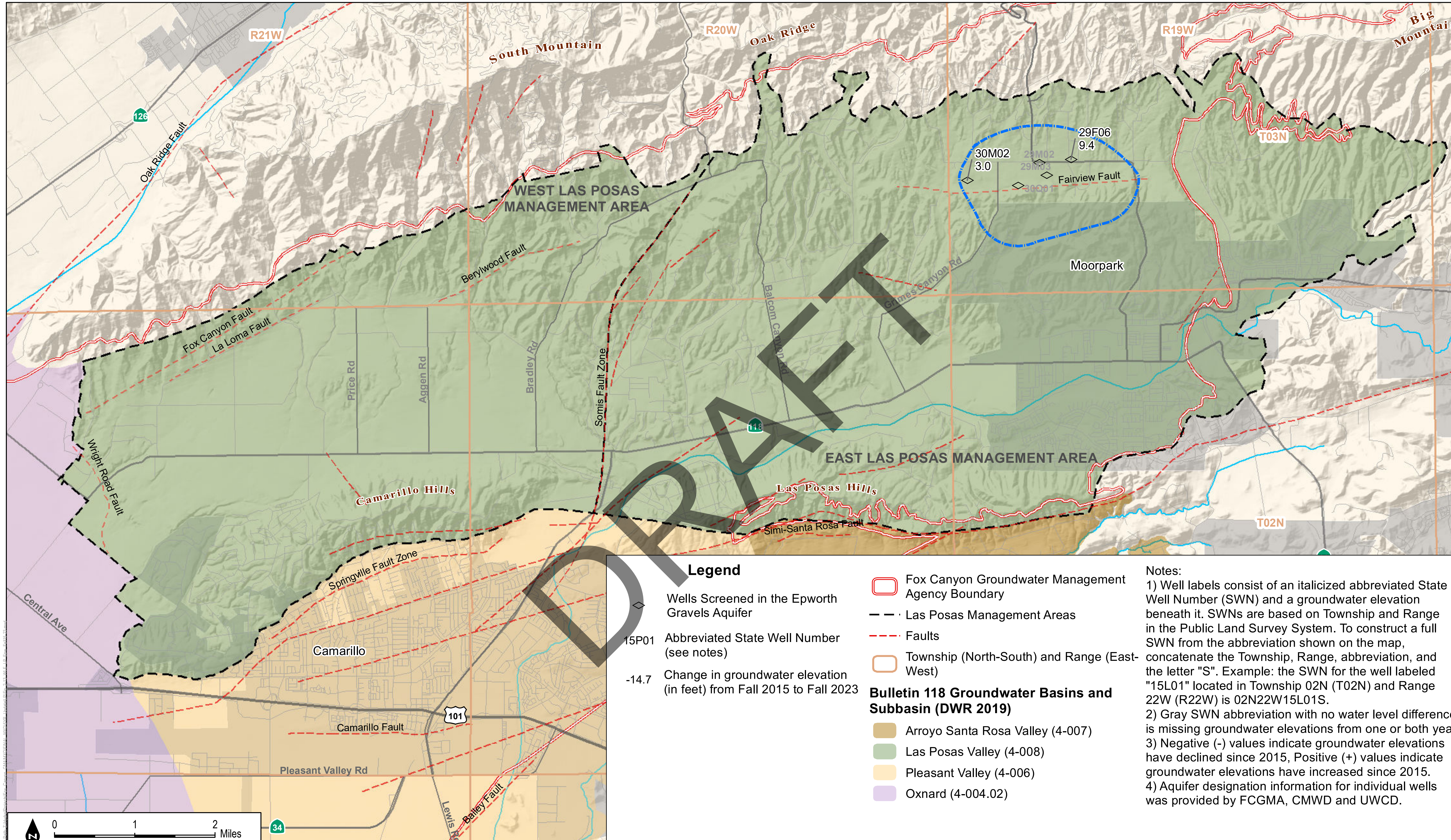

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-13

Epworth Gravels Aquifer - Groundwater Elevation Changes from Fall 2015 to 2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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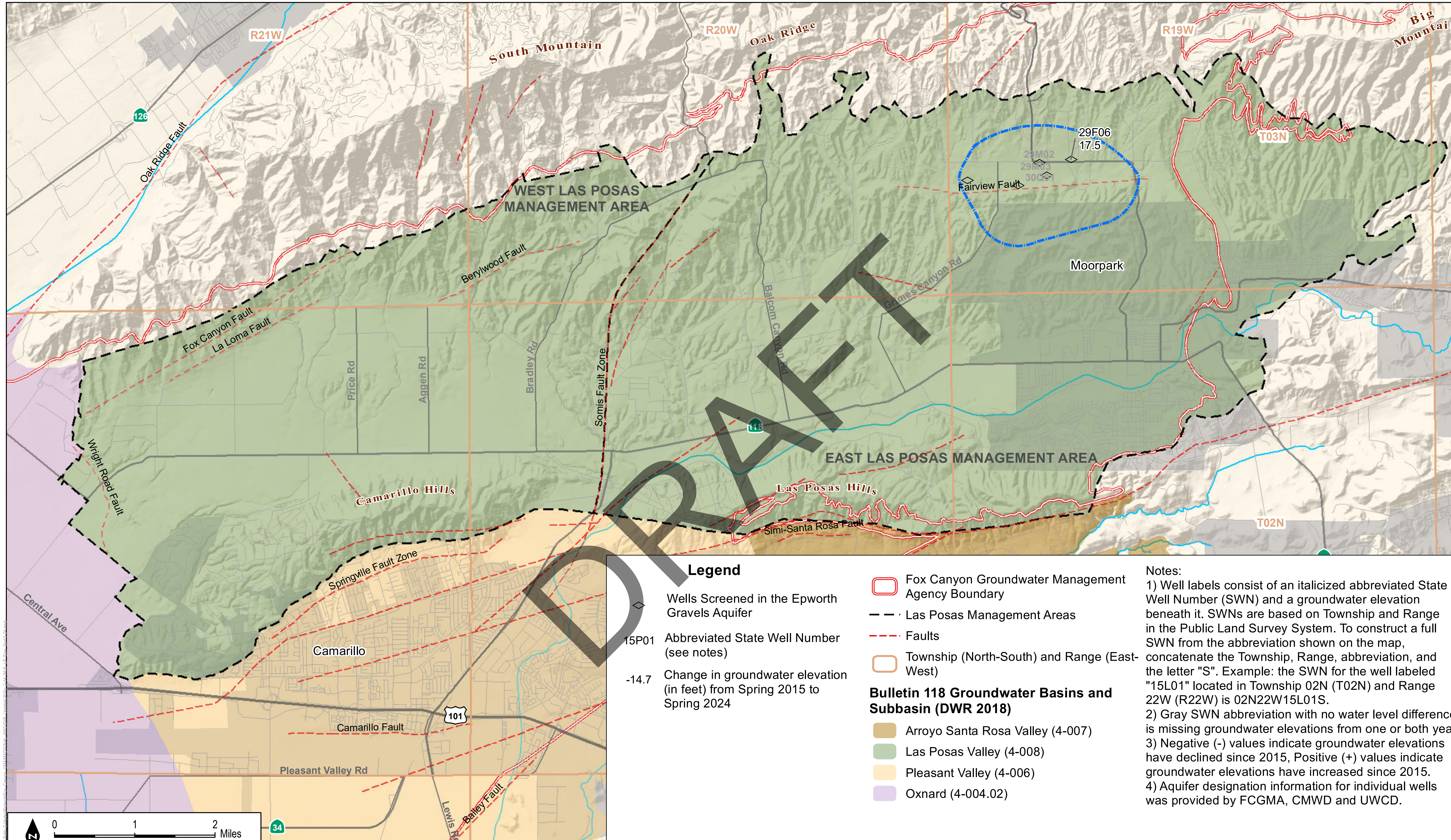

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-14

Epworth Gravels Aquifer - Groundwater Elevation Changes from Spring 2015 to 2024

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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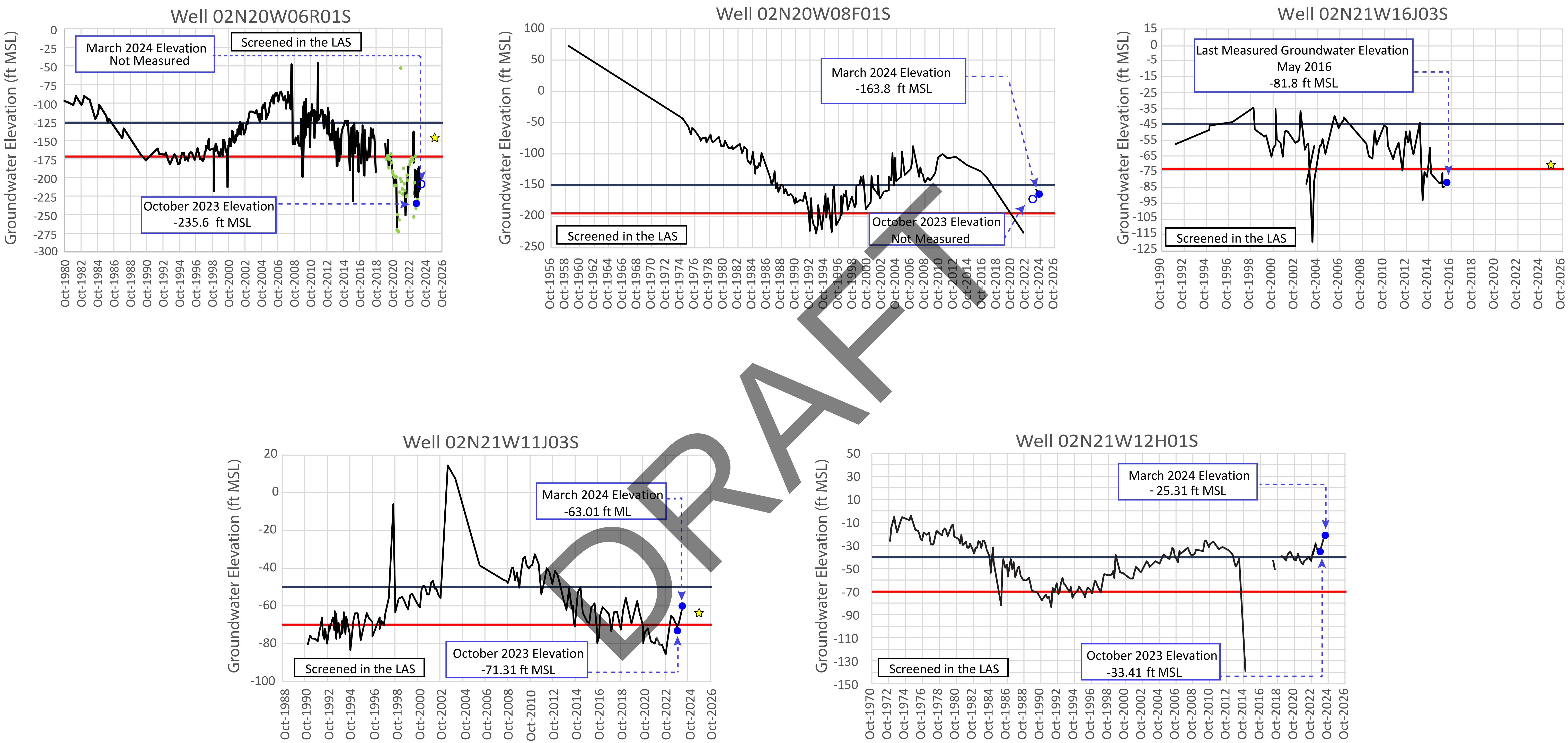

Groundwater Elevation — Minimum Threshold — Measurable Objective — 2025 Interim Milestone for Average Climate Conditions

Measurement not collected between October 2 and October 29, 2023 or March 2 and March 29, 2024

VCWWD Manual WLE Measurements

Note: 2025 Interim milestone groundwater elevations are not established for wells where 2015 groundwater elevations were higher than the established minimum thresholds

SOURCE: UWCD, VCWPD

FIGURE 2-15

Groundwater Elevation Hydrographs for Representative Monitoring Points in the West Las Posas Management Area

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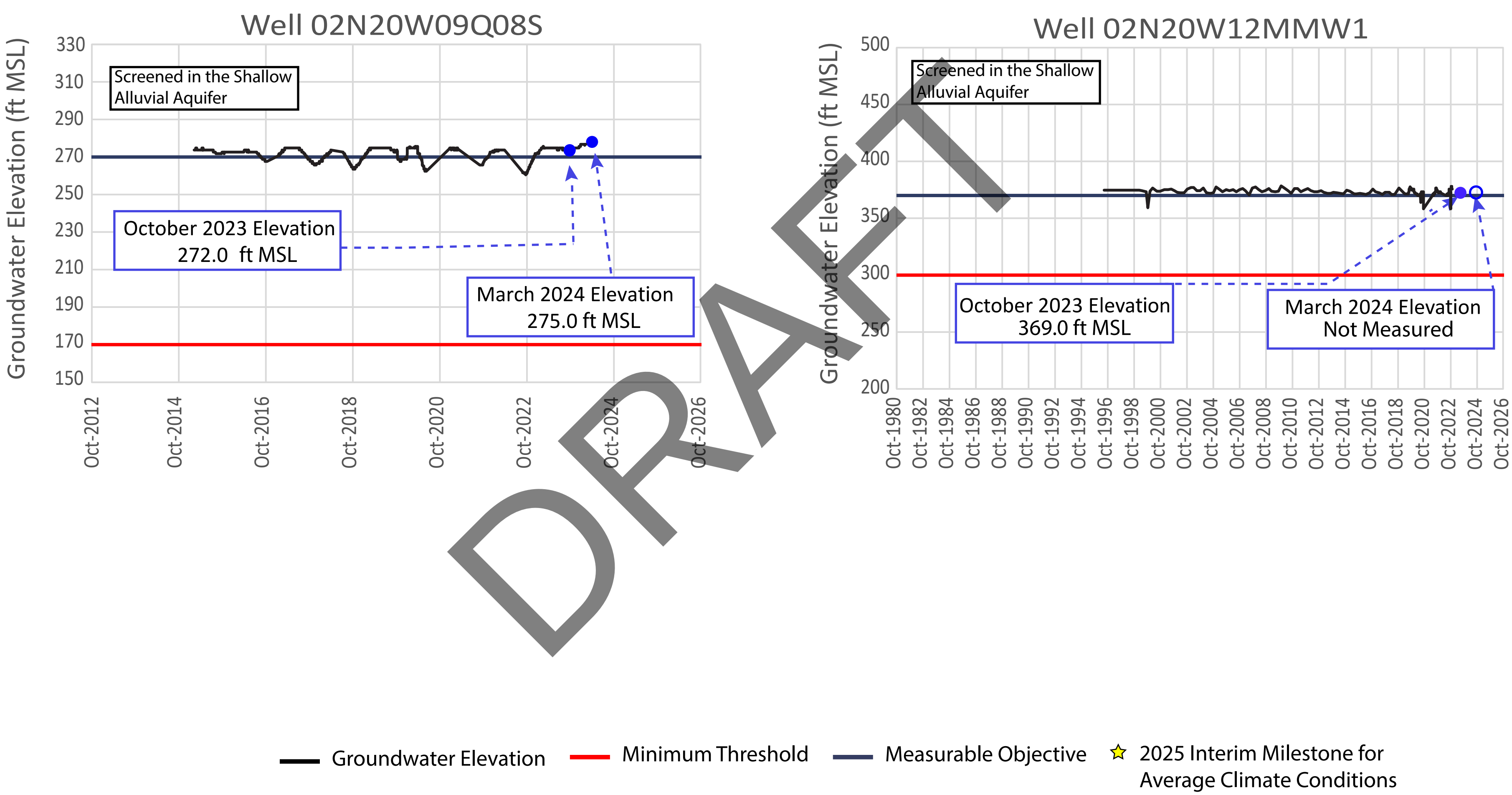

Note: 2025 Interim milestone groundwater elevations are not established for wells where 2015 groundwater elevations were higher than the established minimum thresholds

SOURCE: UWCD, VCWPD

FIGURE 2-16

Groundwater Elevation Hydrographs for ELPMA Representative Monitoring Points Screened in the Shallow Alluvial Aquifer

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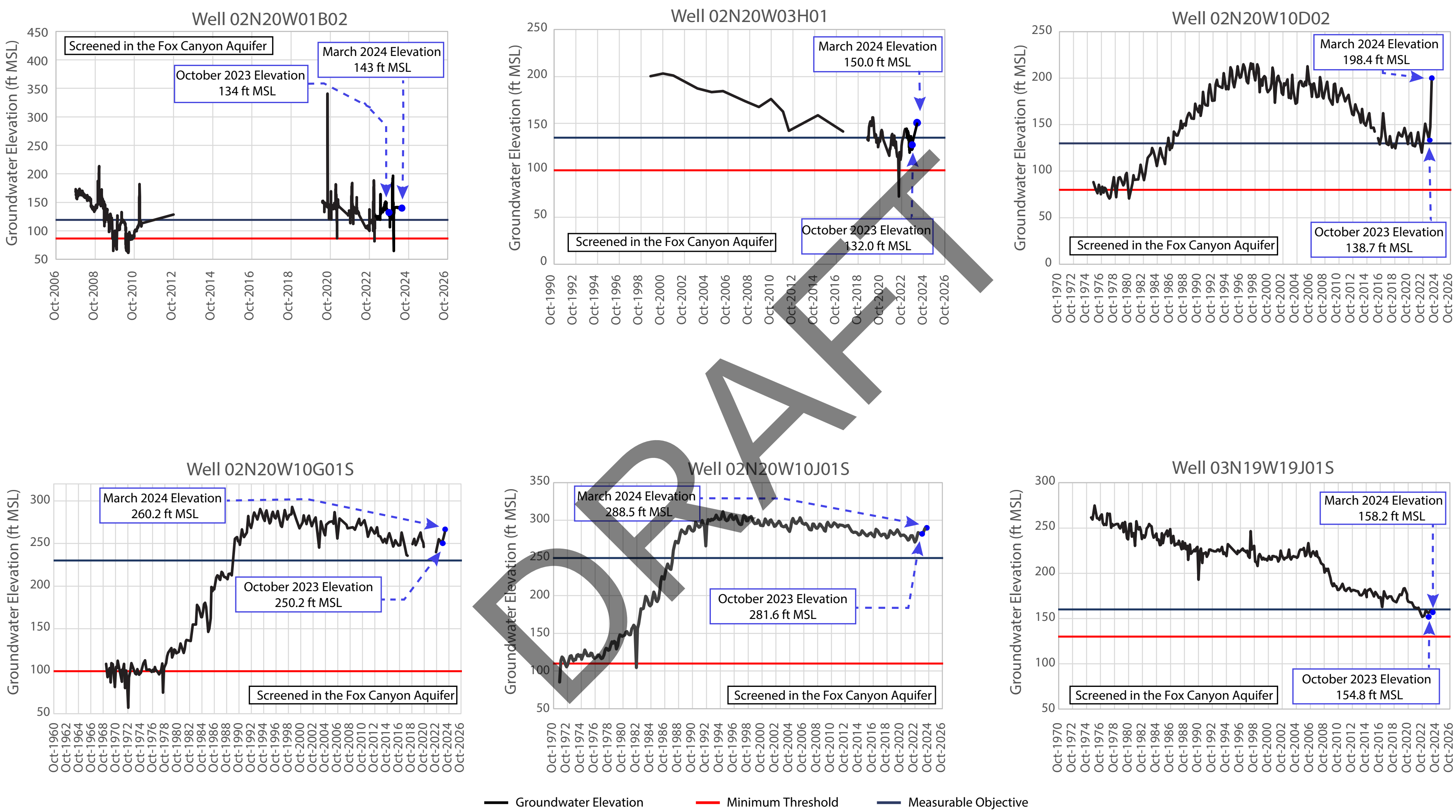

Note: 2025 Interim milestone groundwater elevations are not established for wells where 2015 groundwater elevations were higher than the established minimum thresholds

SOURCE: UWCD, VCWPD

DUDEK

FIGURE 2-17a

Groundwater Elevation Hydrographs for ELPMA Representative Monitoring Points Screened in the FCA

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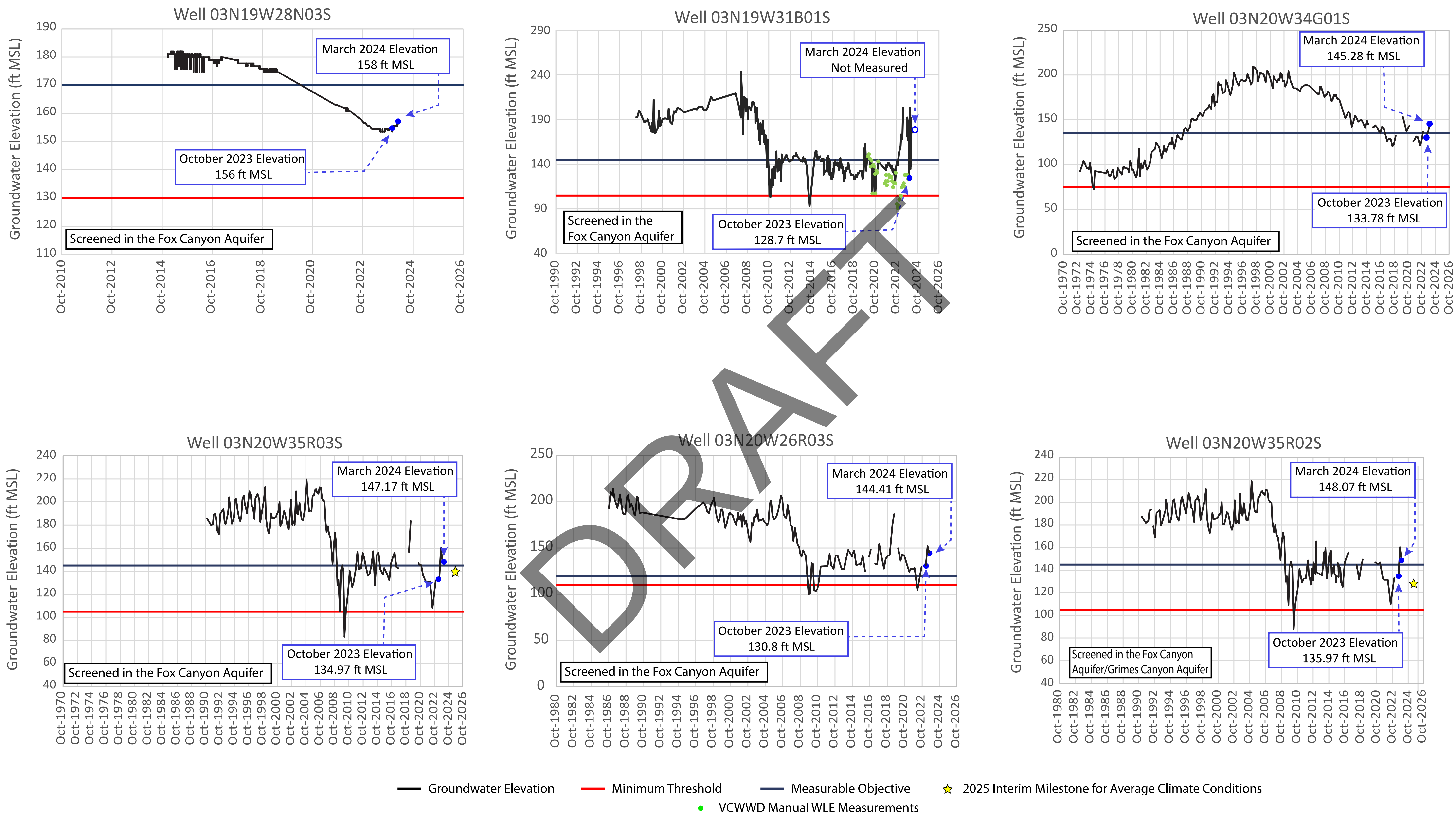

Note: 2025 Interim milestone groundwater elevations are not established for wells where 2015 groundwater elevations were higher than the established minimum thresholds

SOURCE: UWCD, VCWPD

FIGURE 2-17b

Groundwater Elevation Hydrographs for Representative Monitoring Points Screened in the East Las Posas Management Area

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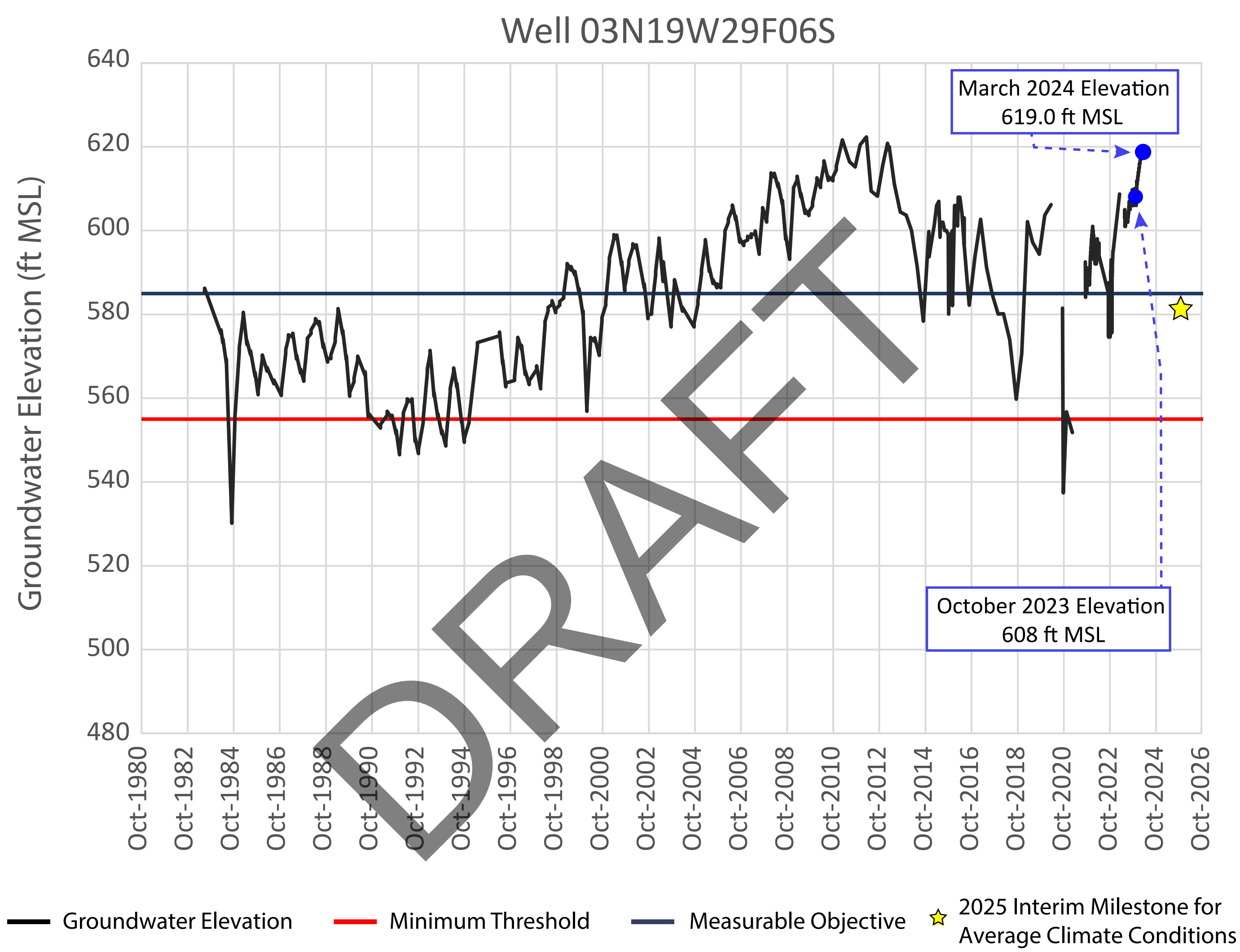

SOURCE: UWCD, VCWPD

FIGURE 2-18

Groundwater Elevation Hydrograph for the Representative Monitoring Points Screened in the Epworth Gravels Aquifer

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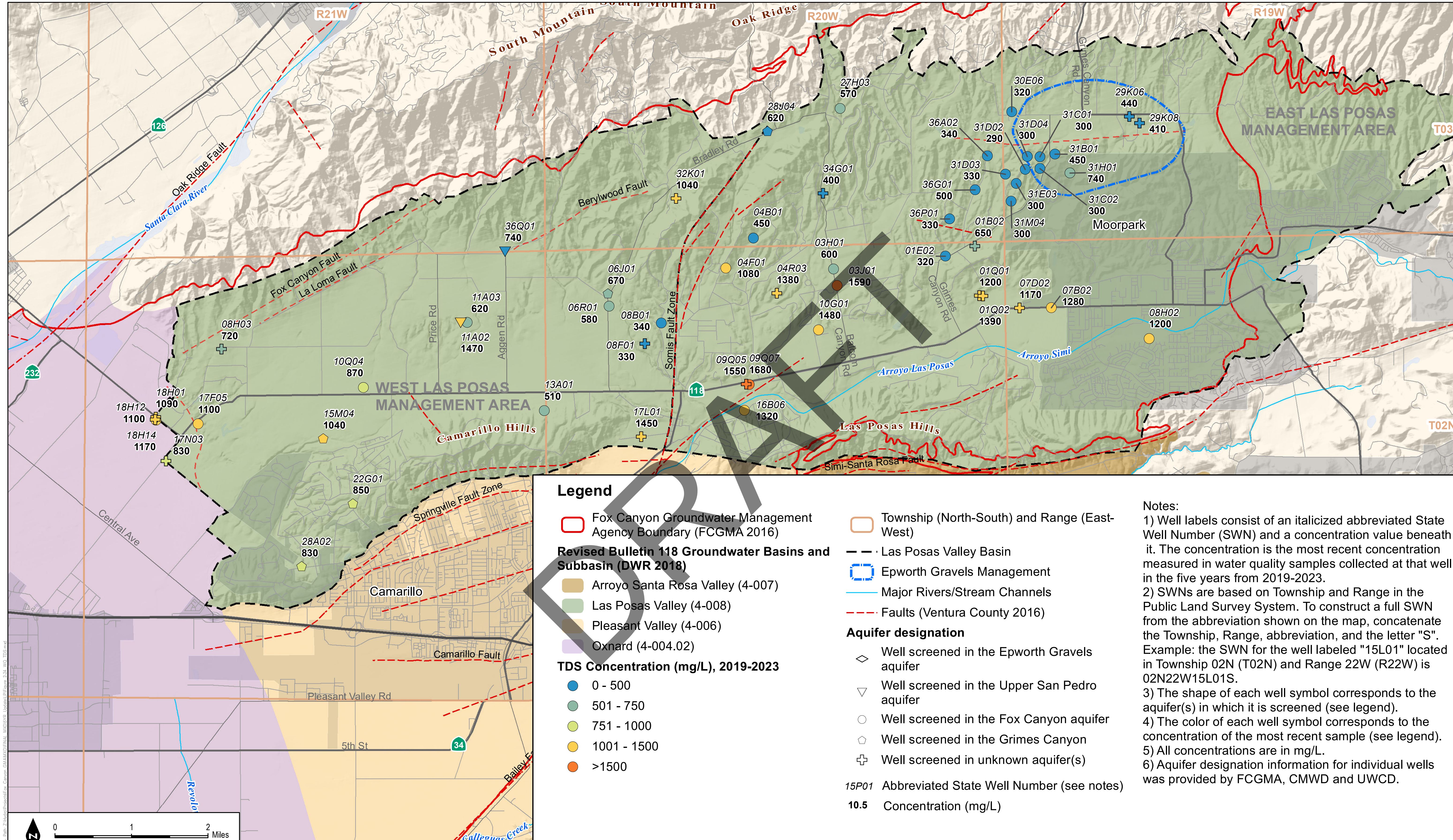

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-19

Most Recent TDS (mg/L) Measured 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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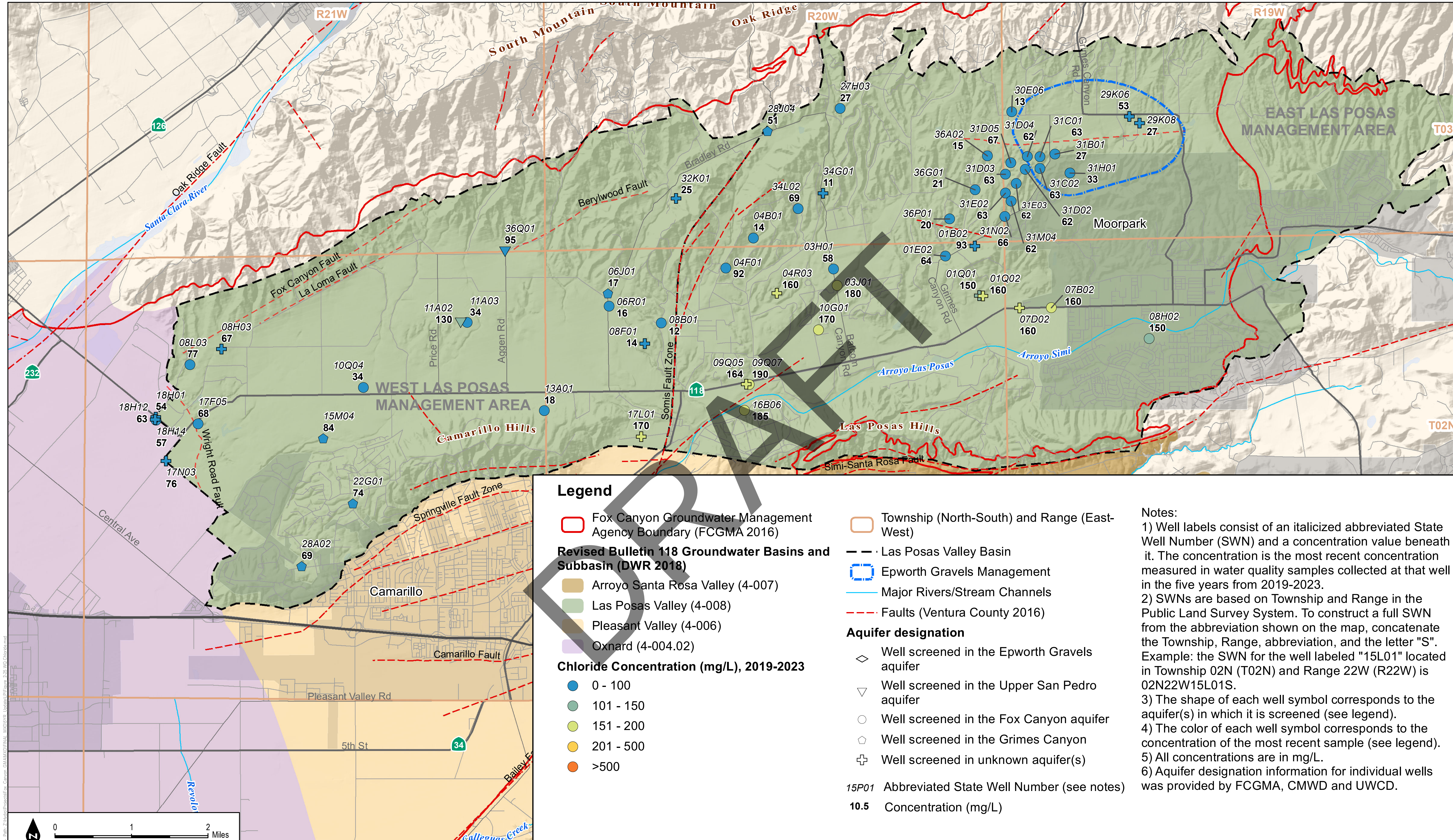

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-20

Most Recent Chloride (mg/L) Measured 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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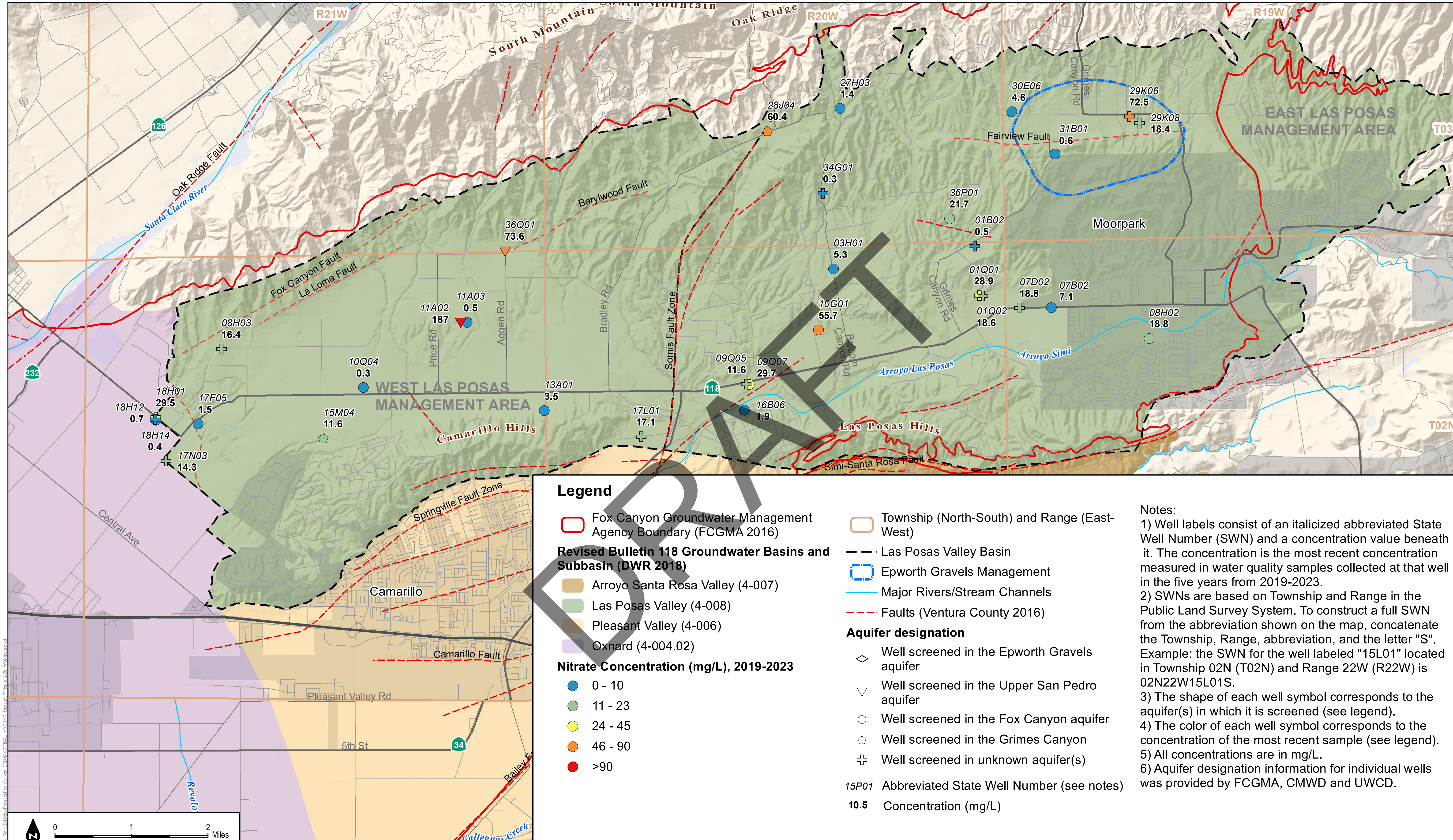

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-21
Most Recent Nitrate (mg/L) Measured 2019-2023

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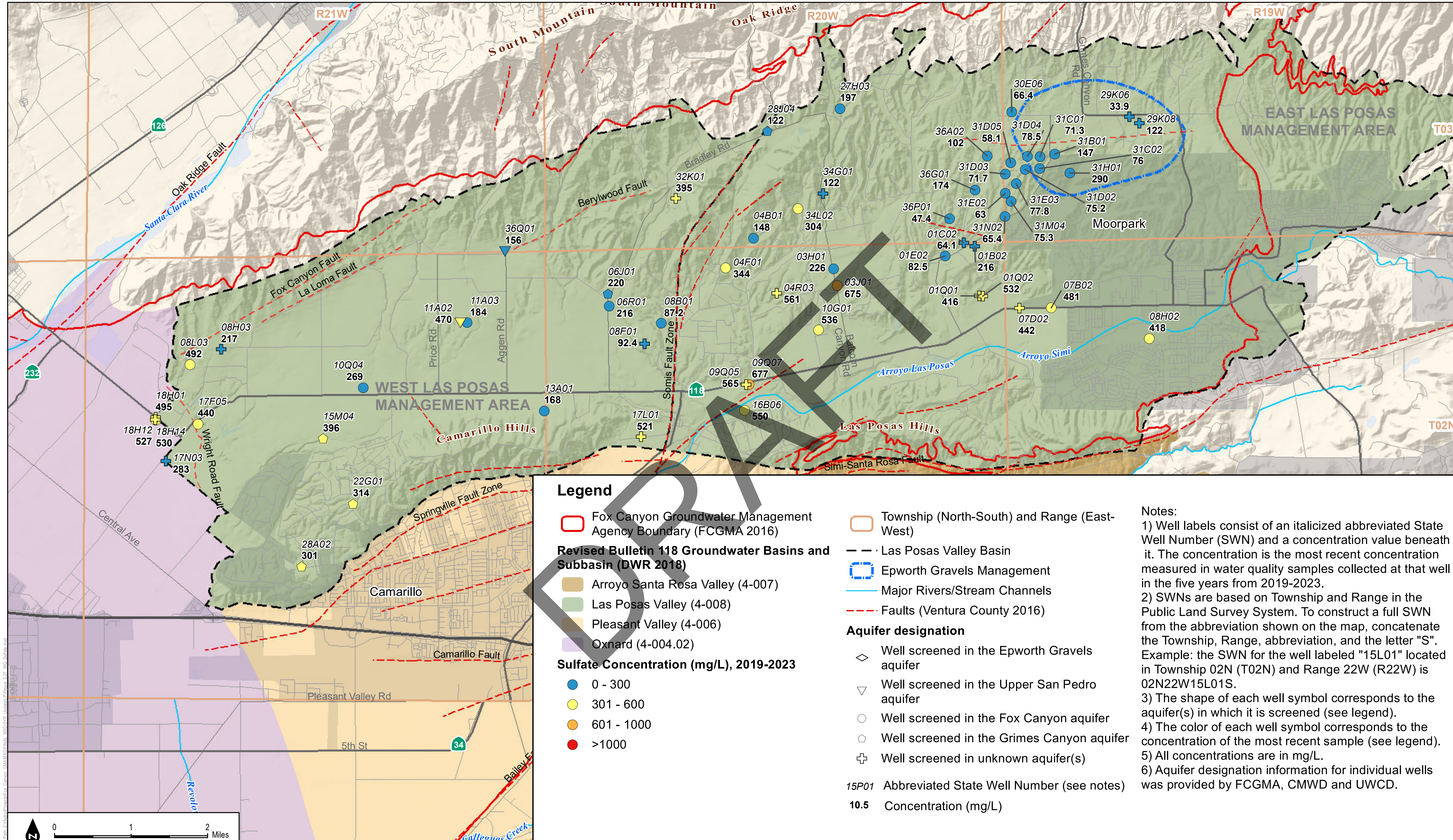

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-22

Most Recent Sulfate (mg/L) Measured 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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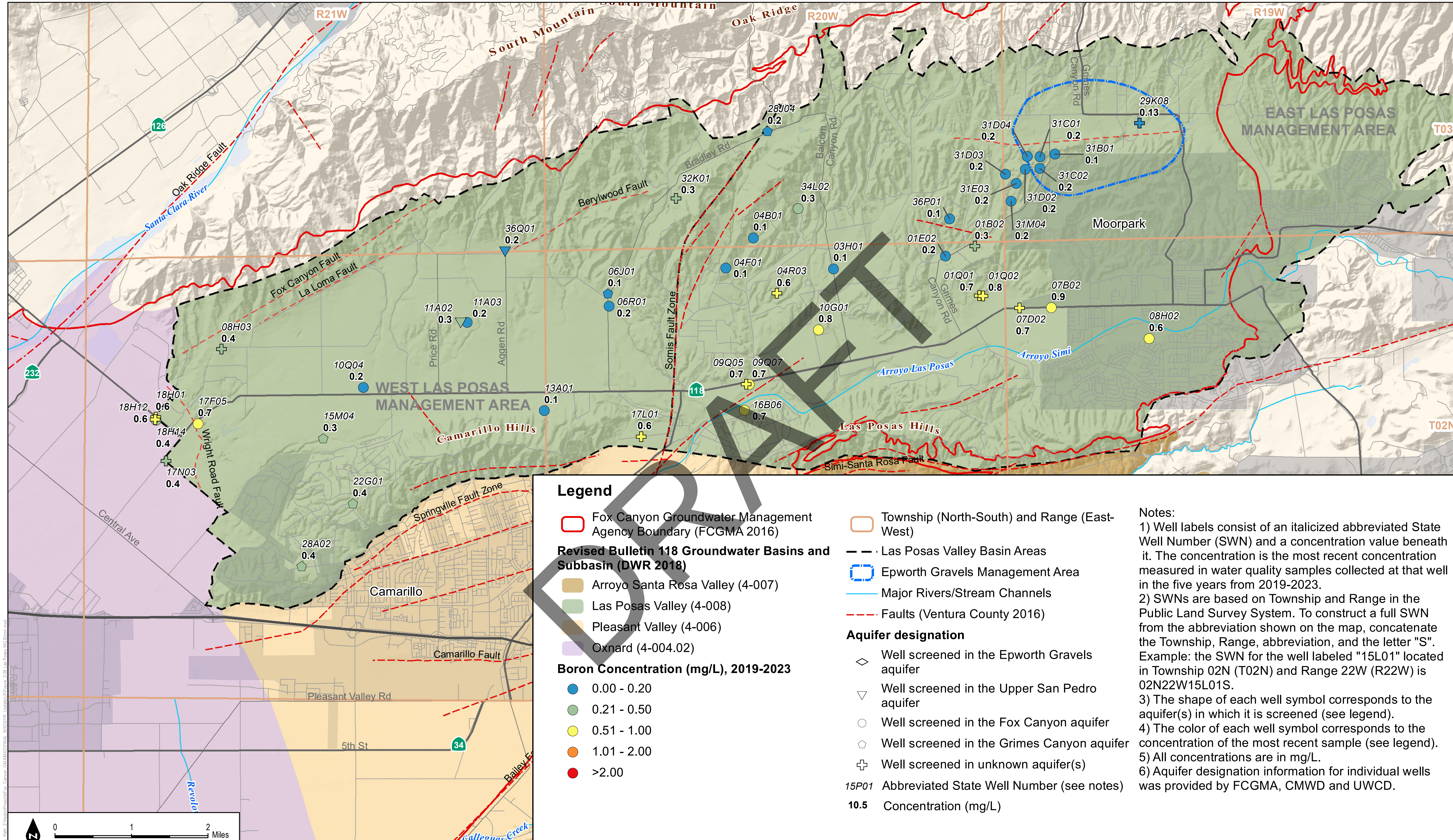

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-23

Most Recent Boron (mg/L) Measured 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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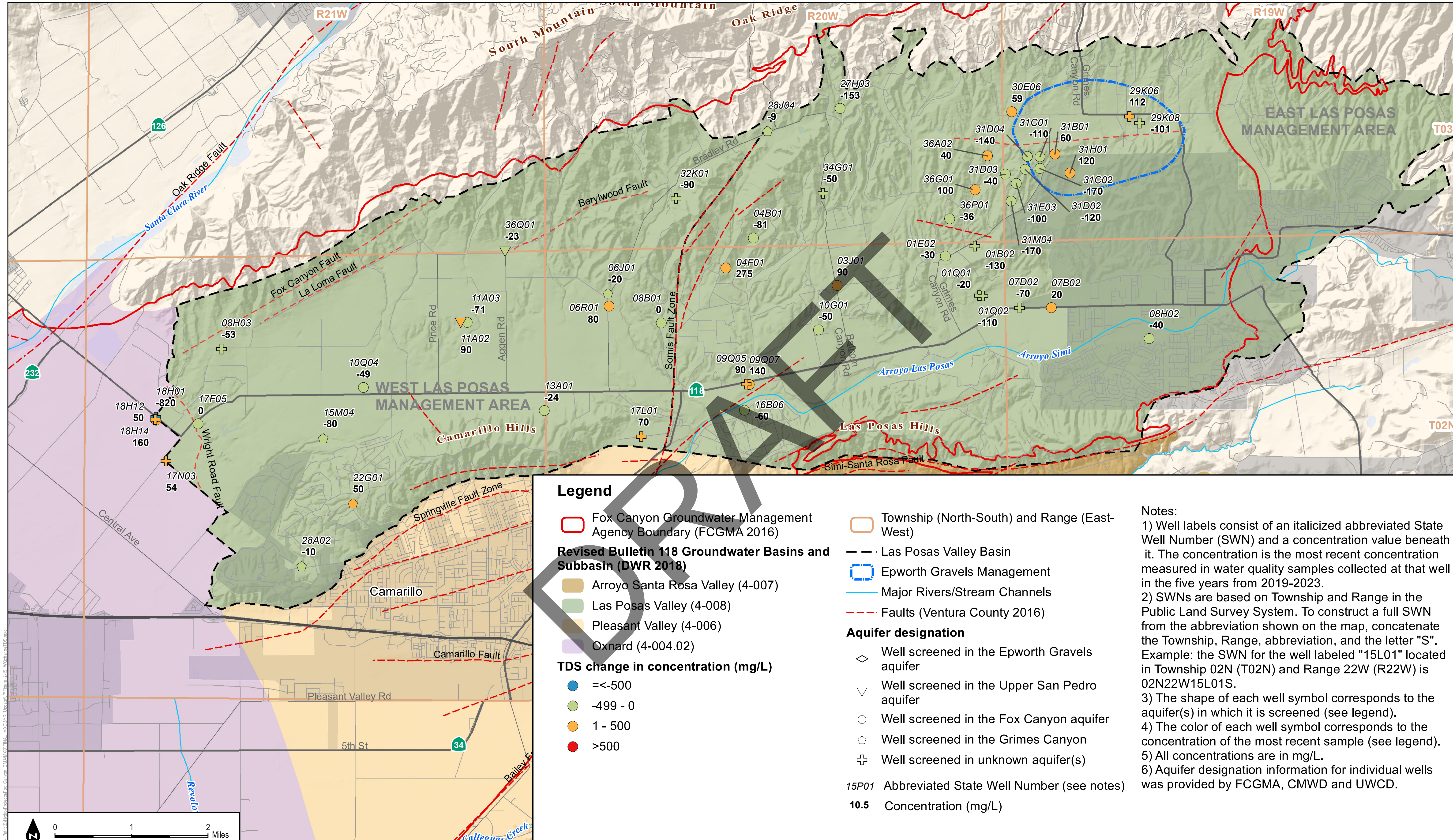

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-24

Change in TDS Concentration (mg/L) between the period from 2011-2015 and 2019-2023

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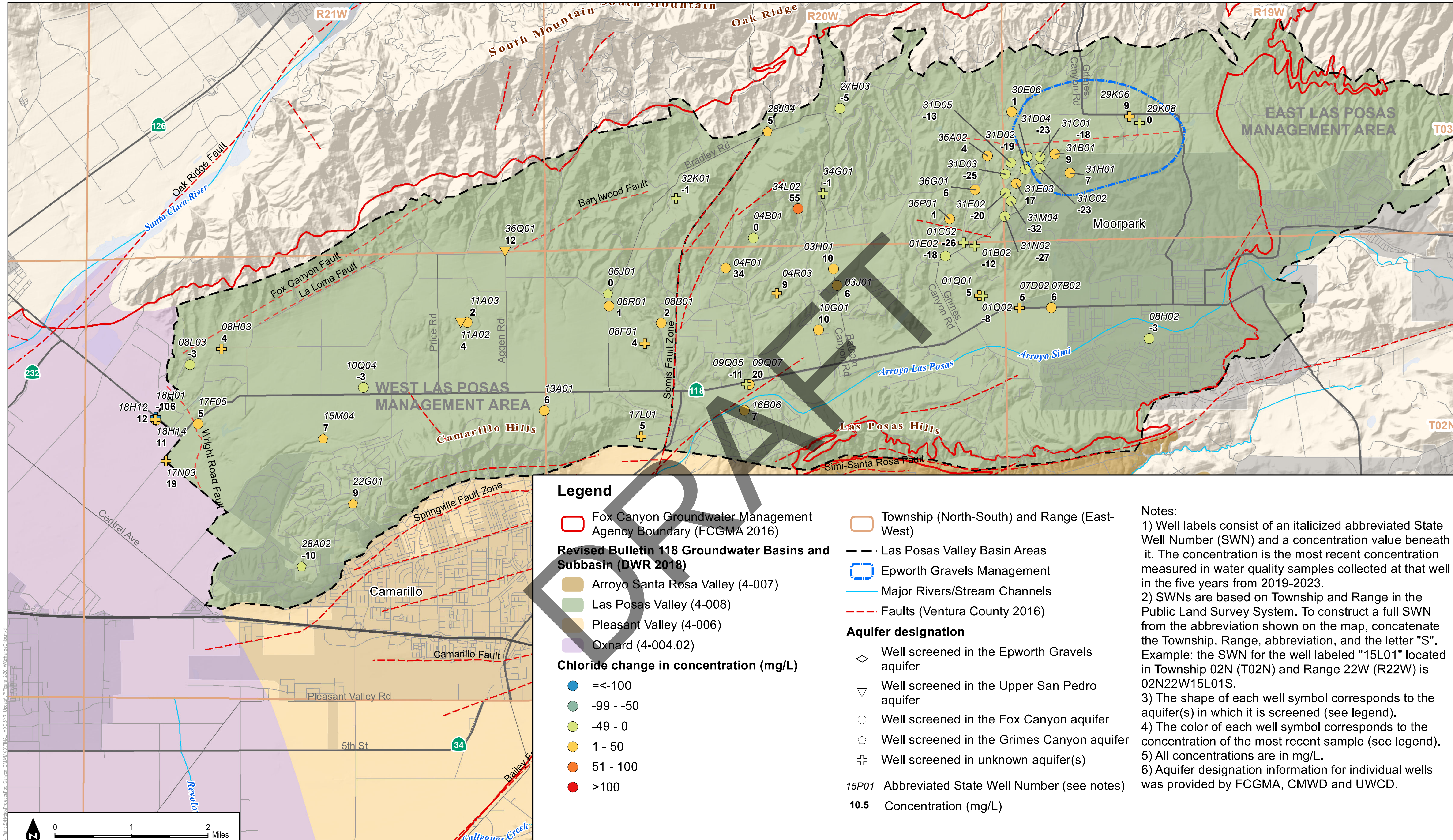

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-25

Change in Chloride Concentration (mg/L) between the period from 2011-2015 and 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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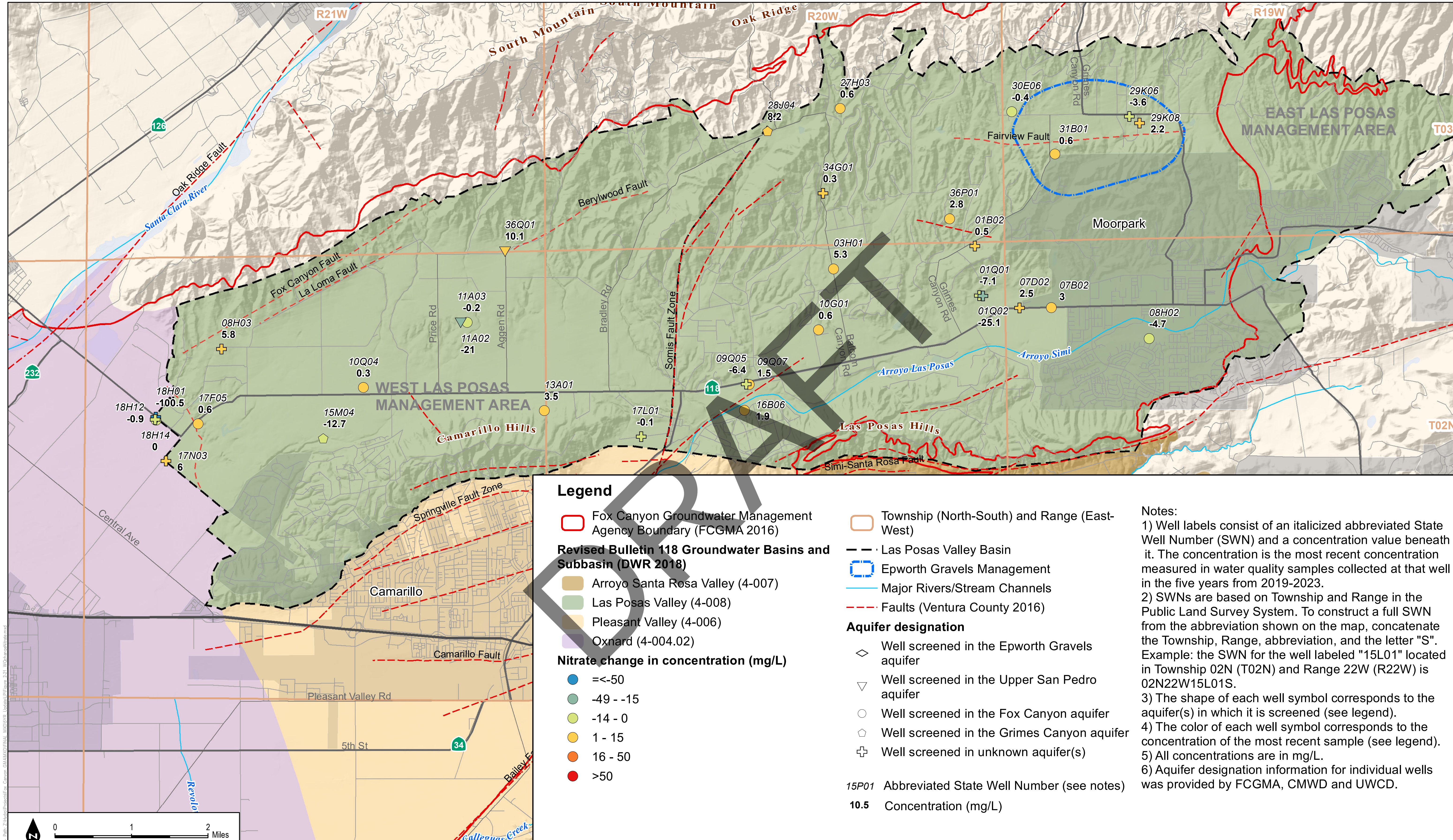

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-26

Change in Nitrate Concentration (mg/L) between the period from 2011-2015 and 2019-2023

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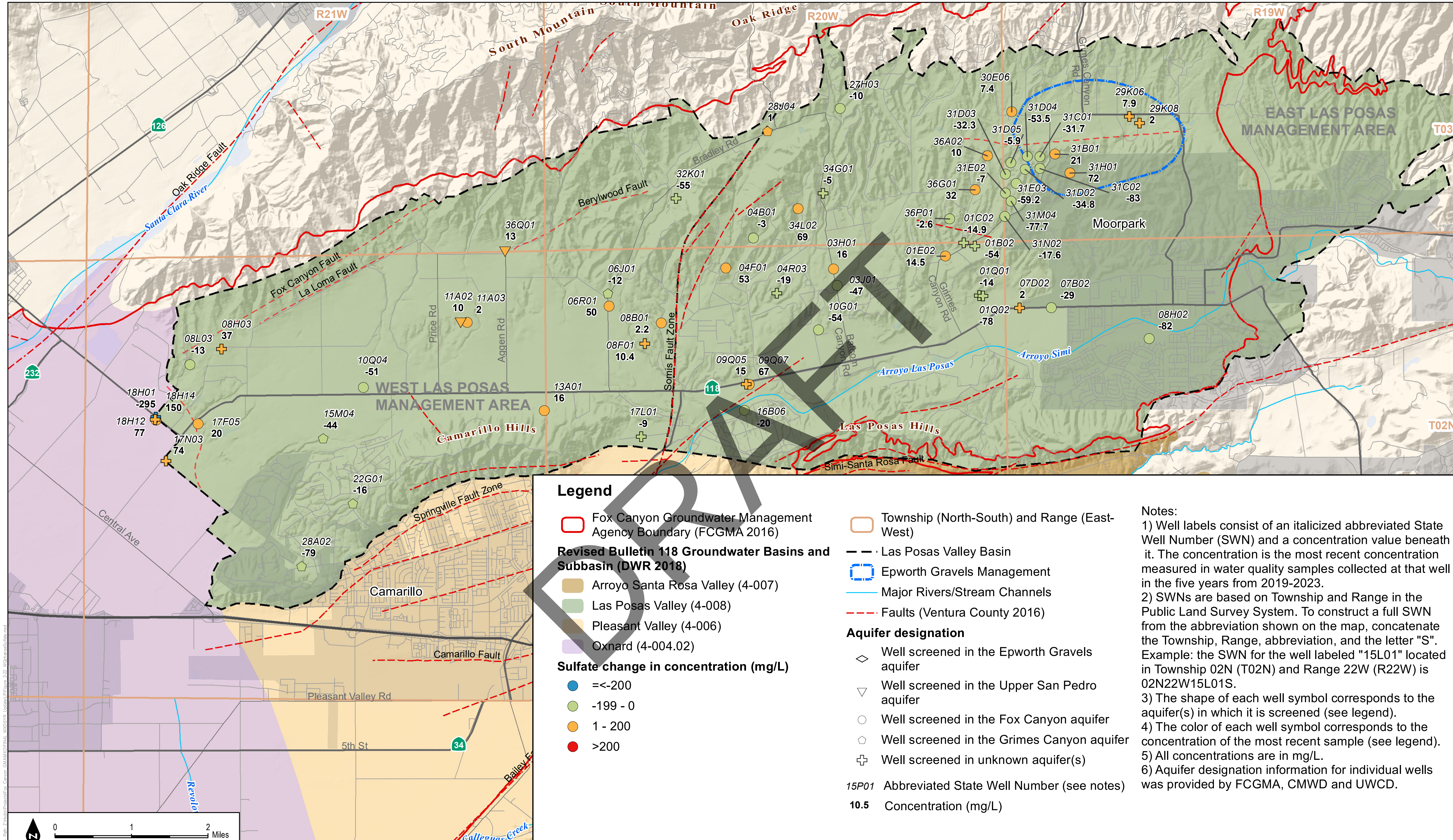

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-27

Change in Sulfate Concentration (mg/L) between the period from 2011-2015 and 2019-2023

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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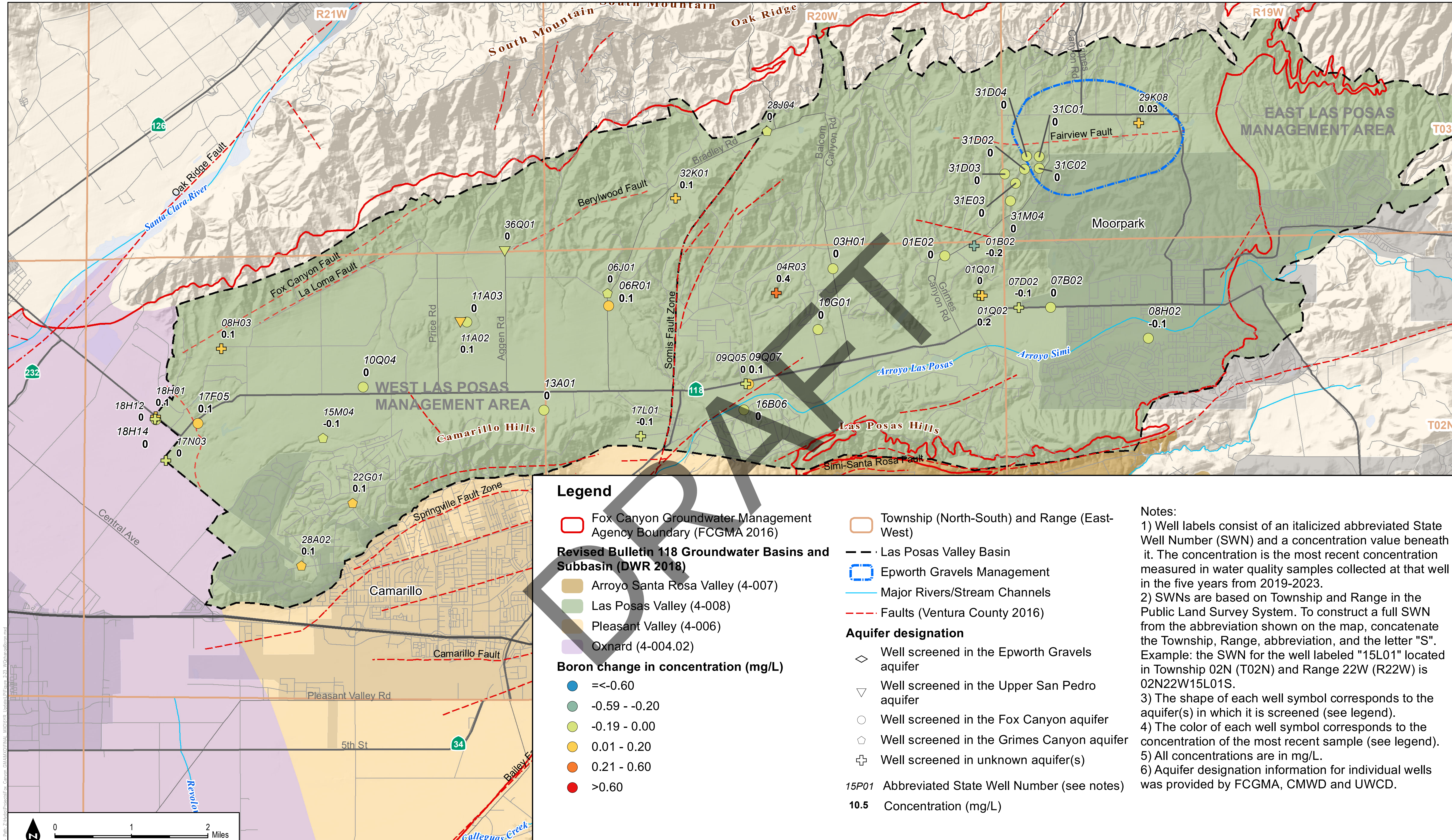

DUDEK

SOURCE: DWR, FCGMA, VCWPD, CMWD, UWCD

FIGURE 2-28

Change in Boron Concentration (mg/L) between the period from 2011-2015 and 2019-2023

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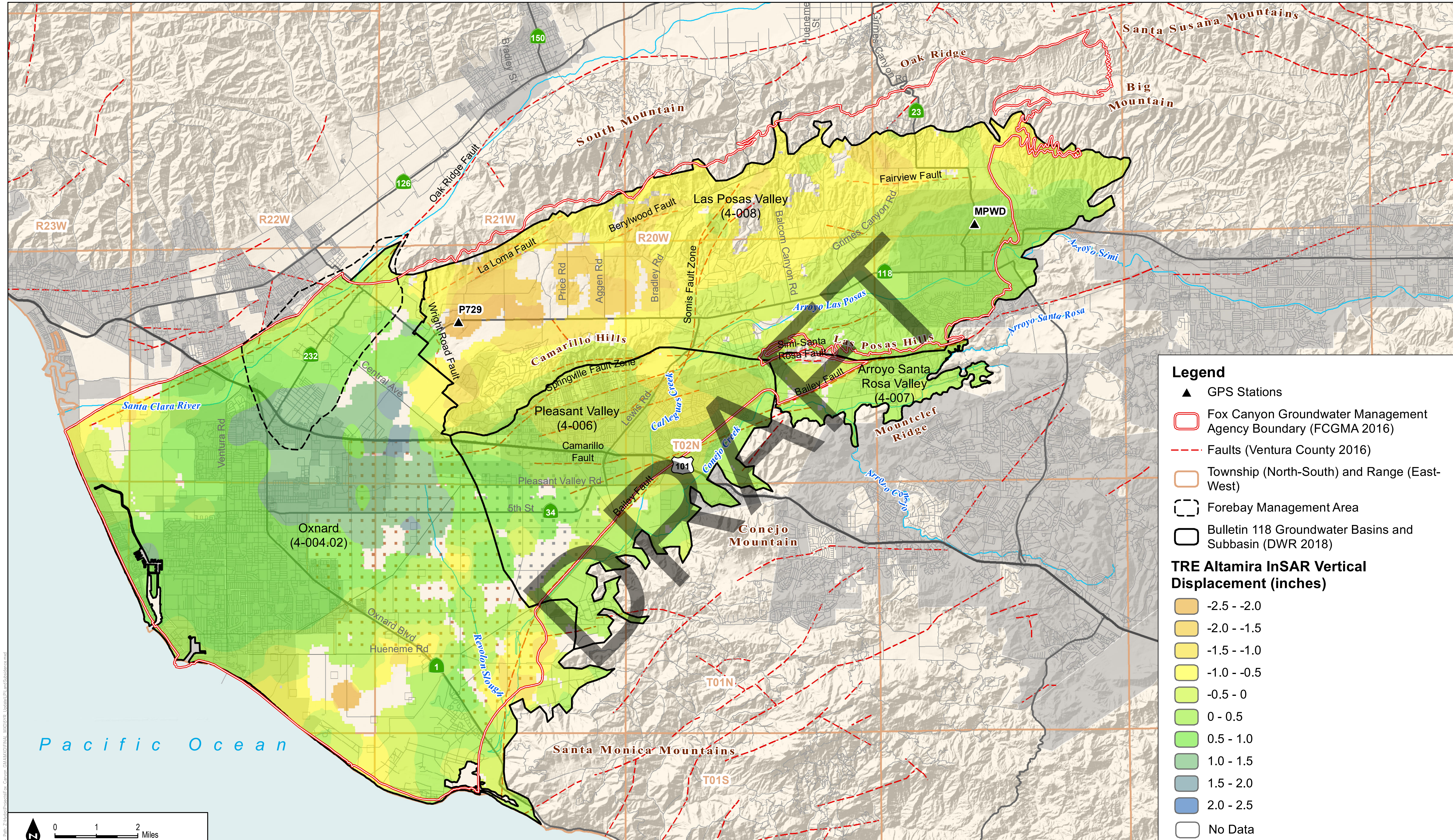

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 2-29

Land Subsidence June 2015 to January 2024

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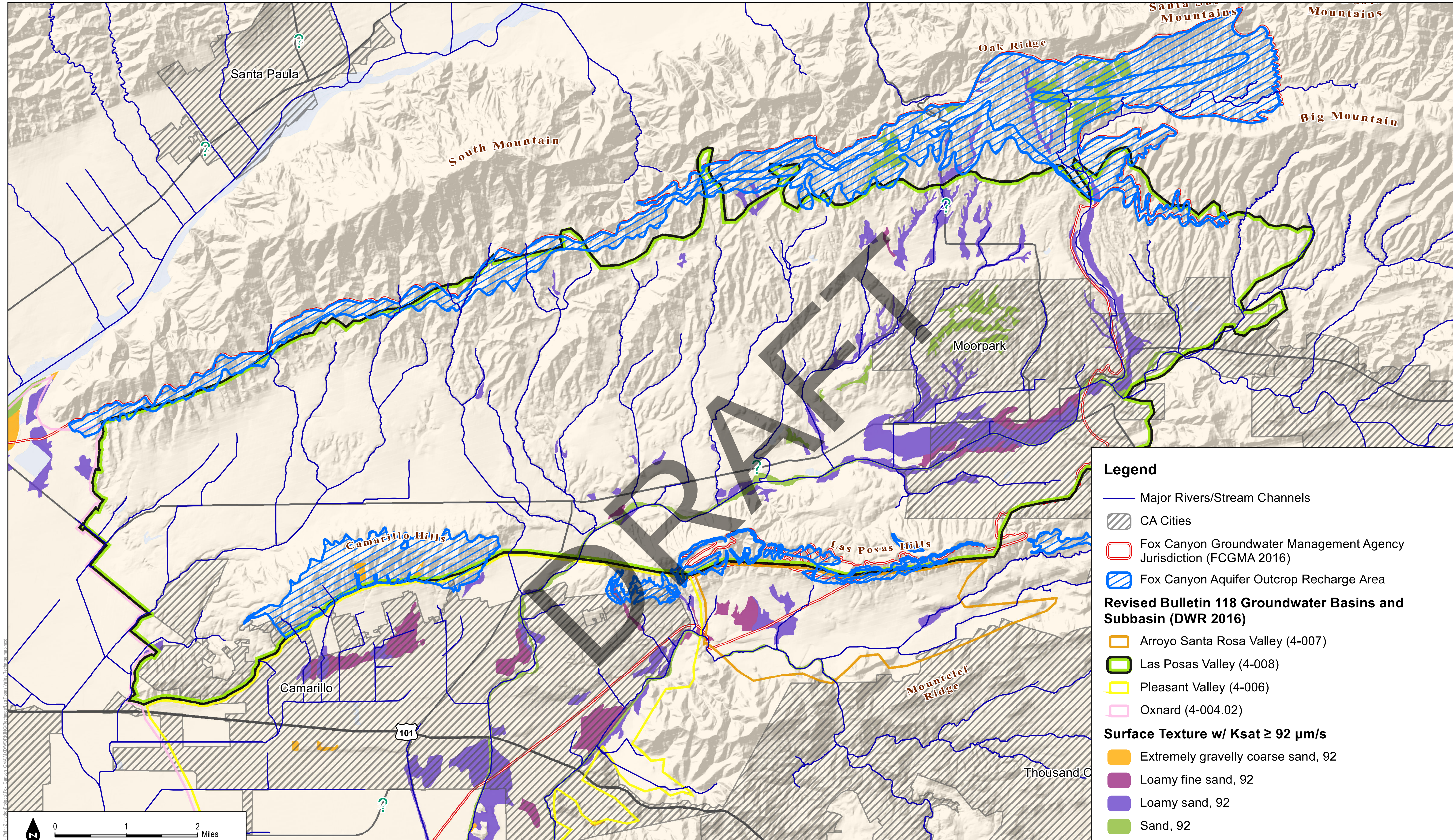

DUDEK

SOURCE: DWR, USGS, NRCS

Figure 4-1
Las Posas Valley Potential Recharge Areas

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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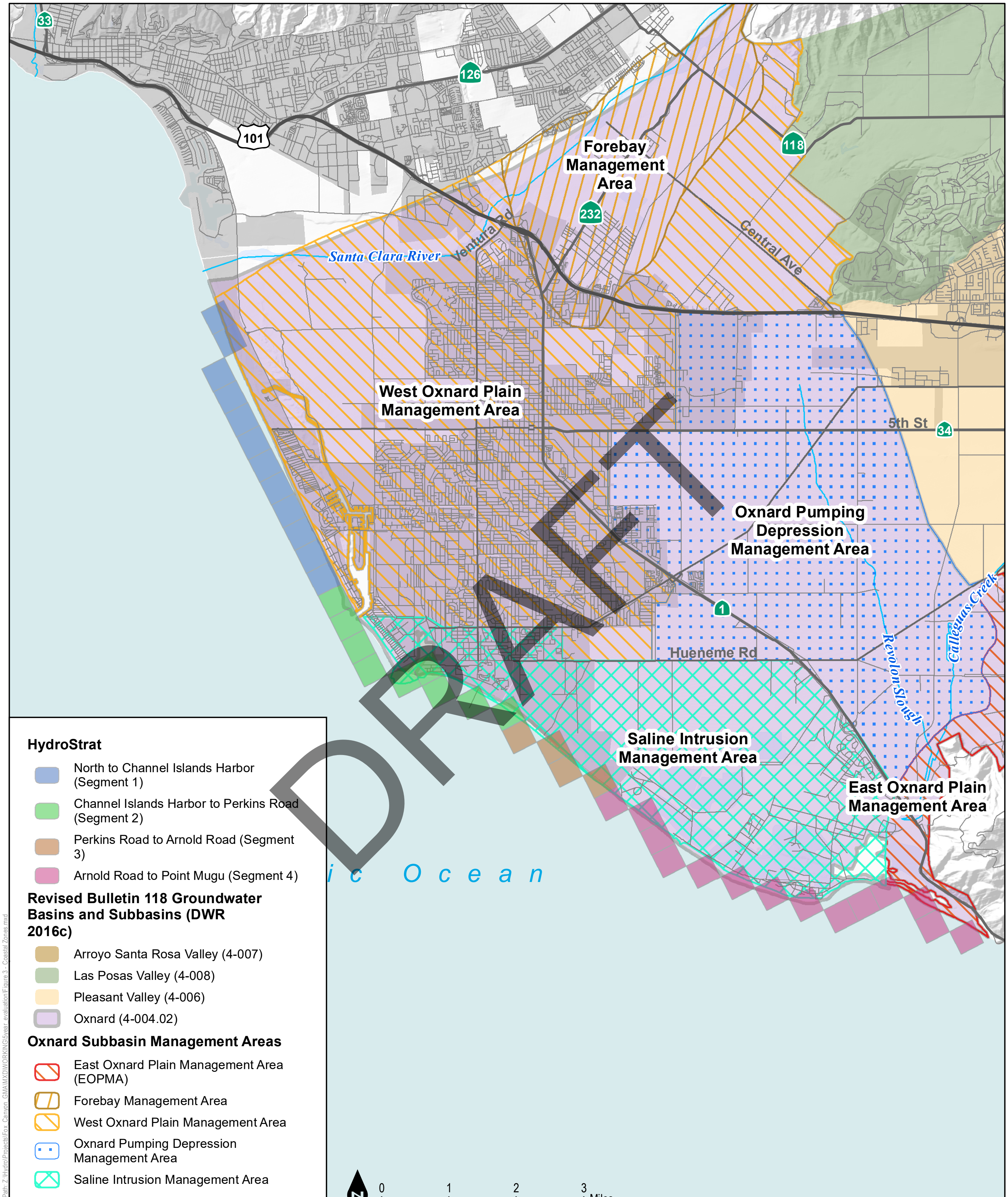

DUDEK

SOURCE: DWR; County of Ventura; FCGMA

FIGURE 5-1

Modeled Seawater Flux Coastal Segments

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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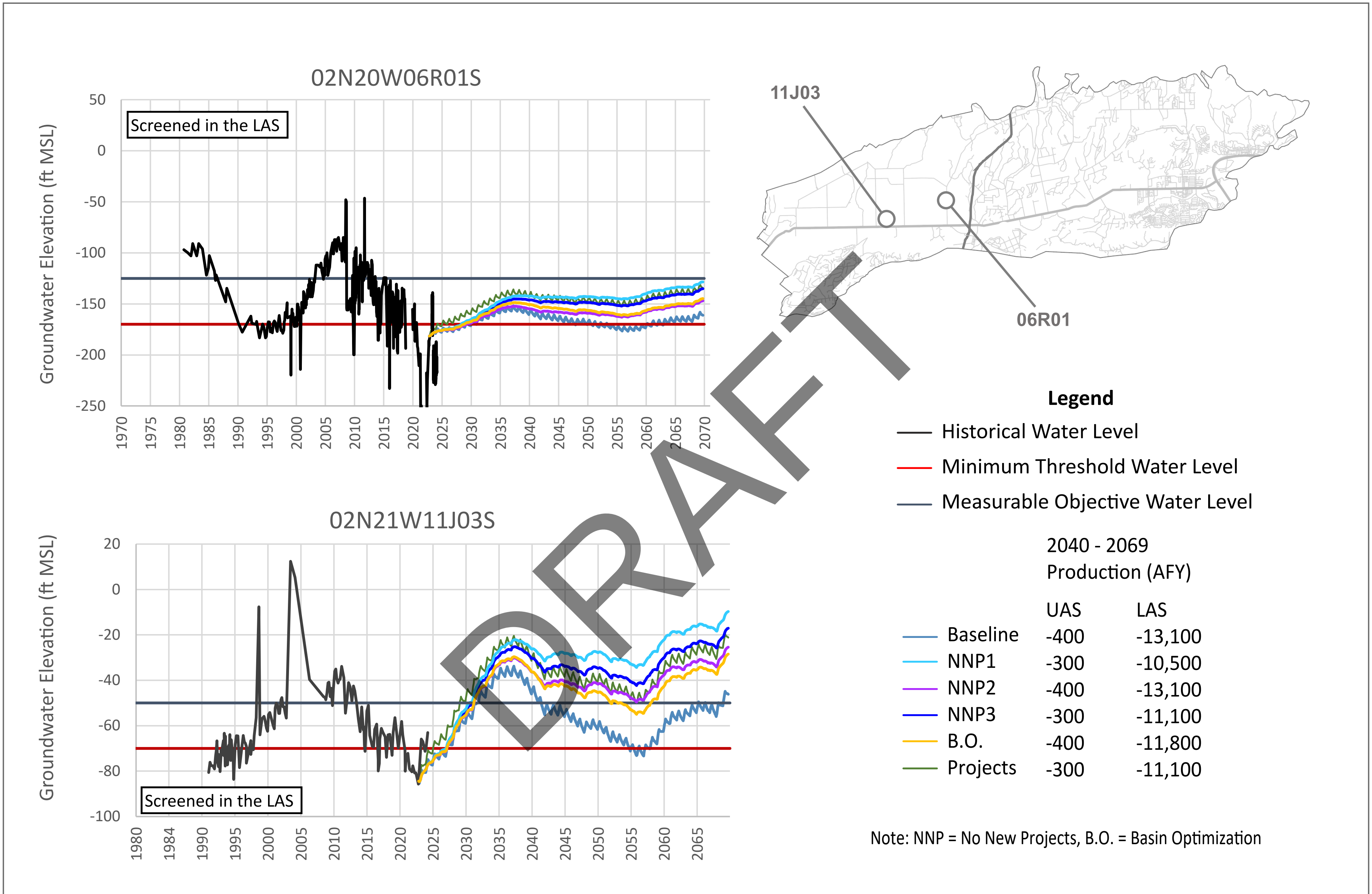

*Note: Simulated groundwater elevations at 06R01 were shifted by -60 ft to match the current water levels.

FIGURE 5-2a

Key Well Hydrographs in the West Las Posas Management Area

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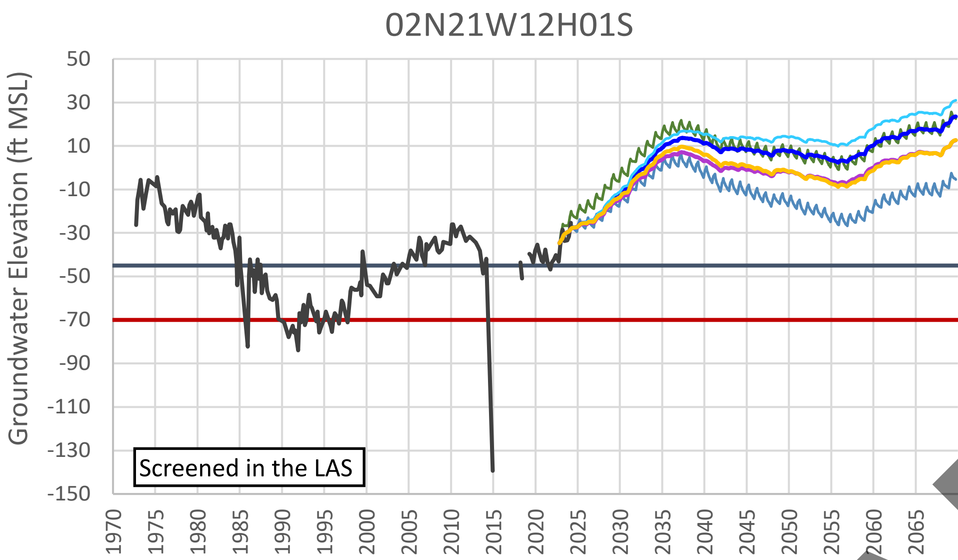

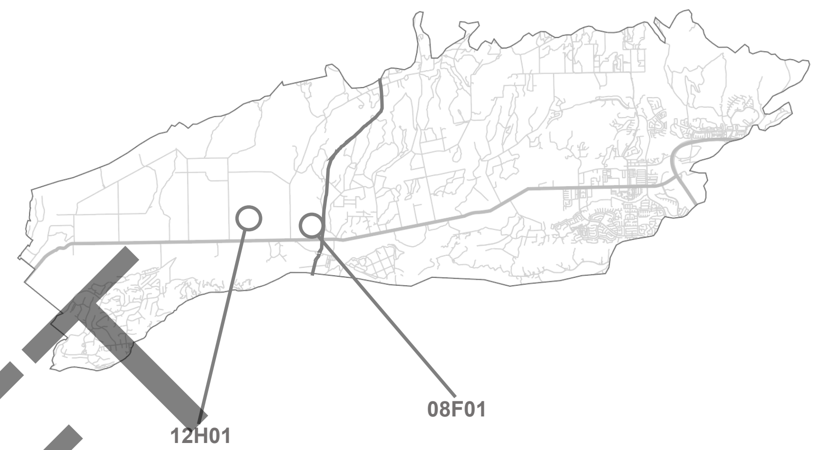

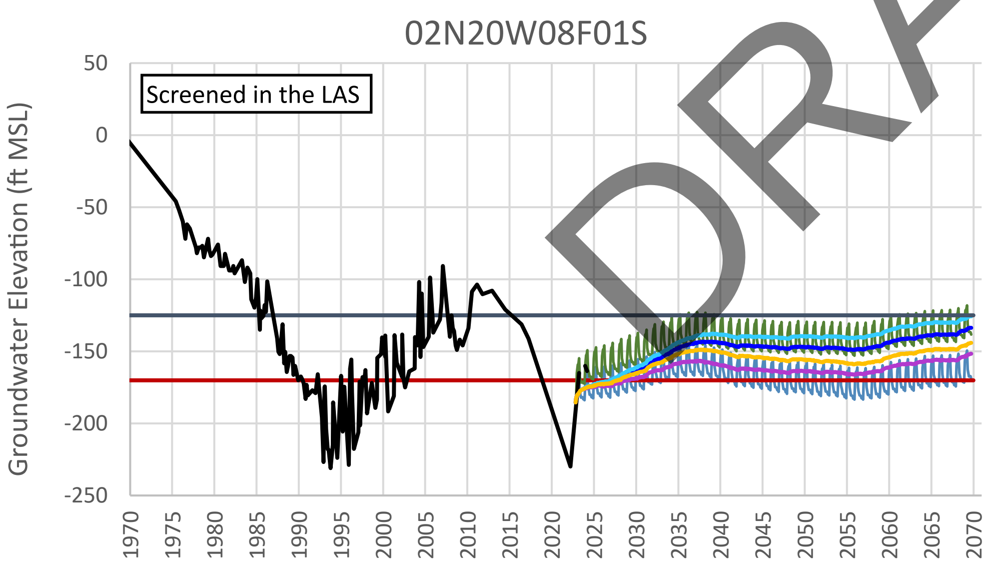

Legend

- Historical Water Level
- Minimum Threshold Water Level
- Measurable Objective Water Level

2040 - 2069 Production (AFY)

	UAS	LAS
Baseline	-400	-13,100
NNP1	-300	-10,500
NNP2	-400	-13,100
NNP3	-300	-11,100
B.O.	-400	-11,800
Projects	-300	-11,100

Note: NNP = No New Projects, B.O. = Basin Optimization

*Note: Simulated groundwater elevations at 12H01 were shifted by +70 ft to match the current water levels.

FIGURE 5-2b

Key Well Hydrographs in the West Las Posas Management Area

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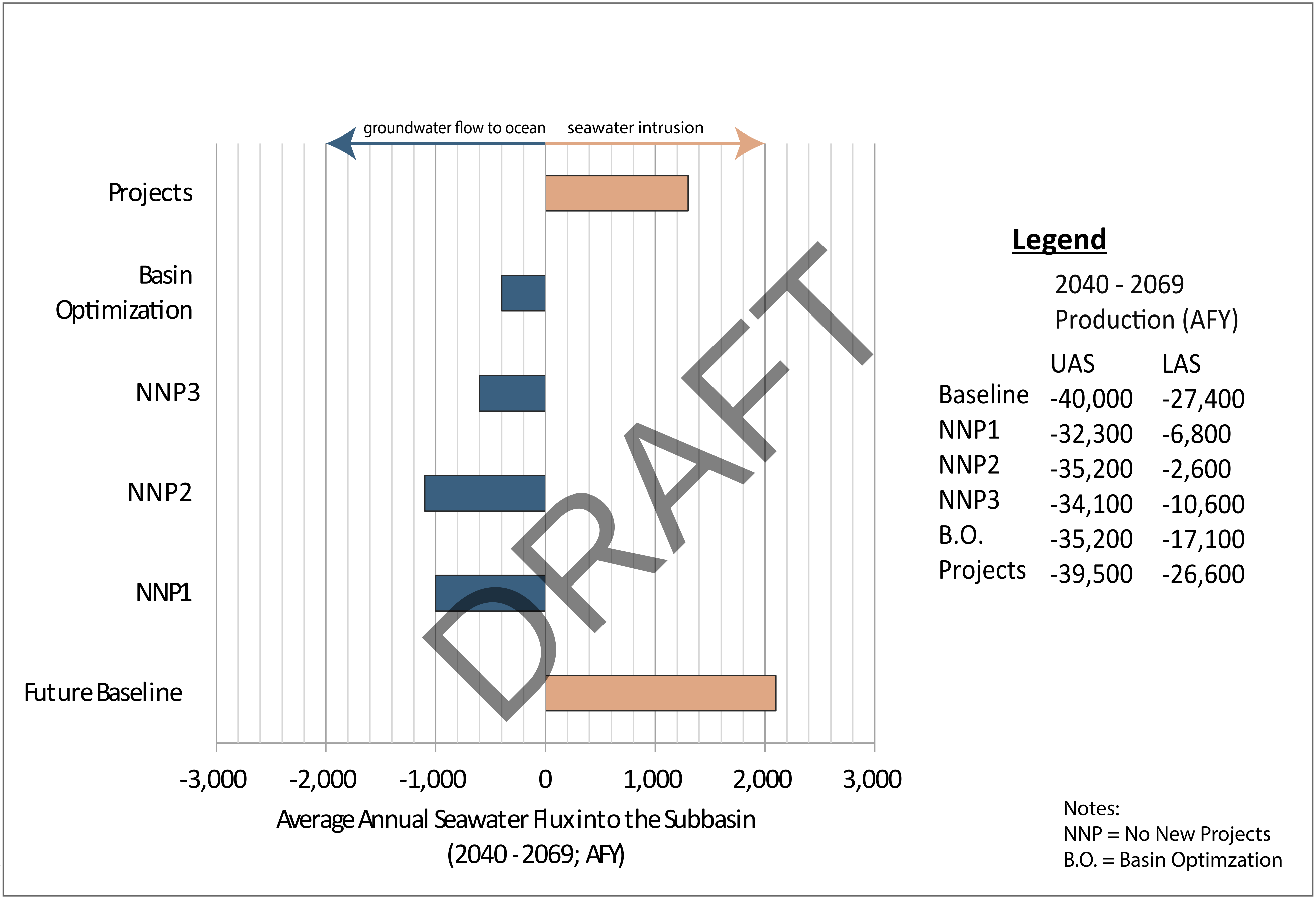

SOURCE: UWCD

FIGURE 5-3

Seawater Flux in the UAS: Future Model Scenarios without UWCD's EBB Project

DUDEK

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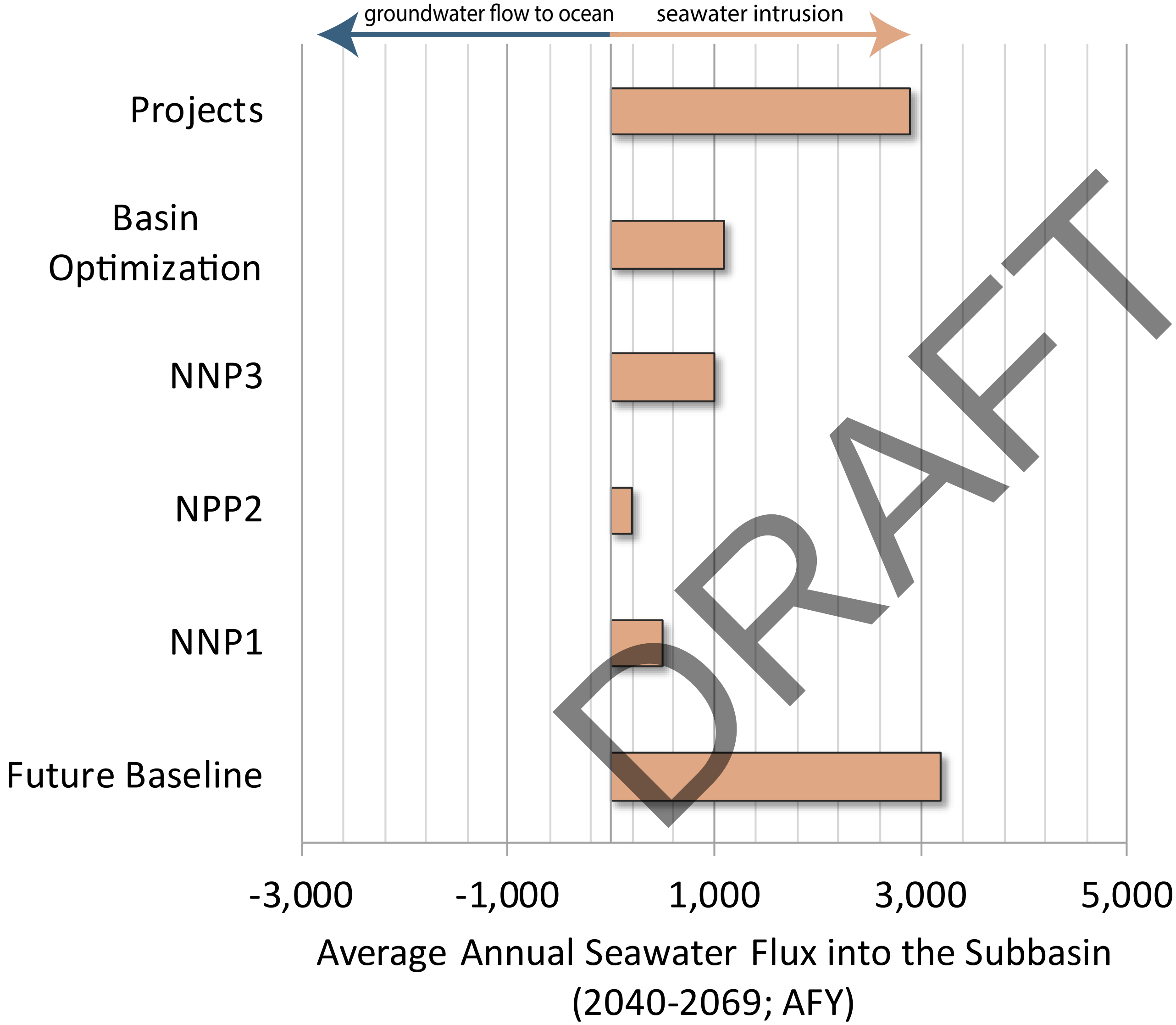

Legend

2040 - 2069 Production (AFY)

	UAS	LAS
Baseline	-40,000	-27,400
NNP1	-32,300	-6,800
NNP2	-35,200	-2,600
NNP3	-34,100	-10,600
B.O.	-35,200	-17,100
Projects	-39,500	-26,600

Notes:
NNP = No New Projects
B.O. = Basin Optimzation

SOURCE: UWCD

DUDEK

FIGURE 5-4

Seawater Flux in the LAS: Future Model Scenarios without UWCD's EBB Project

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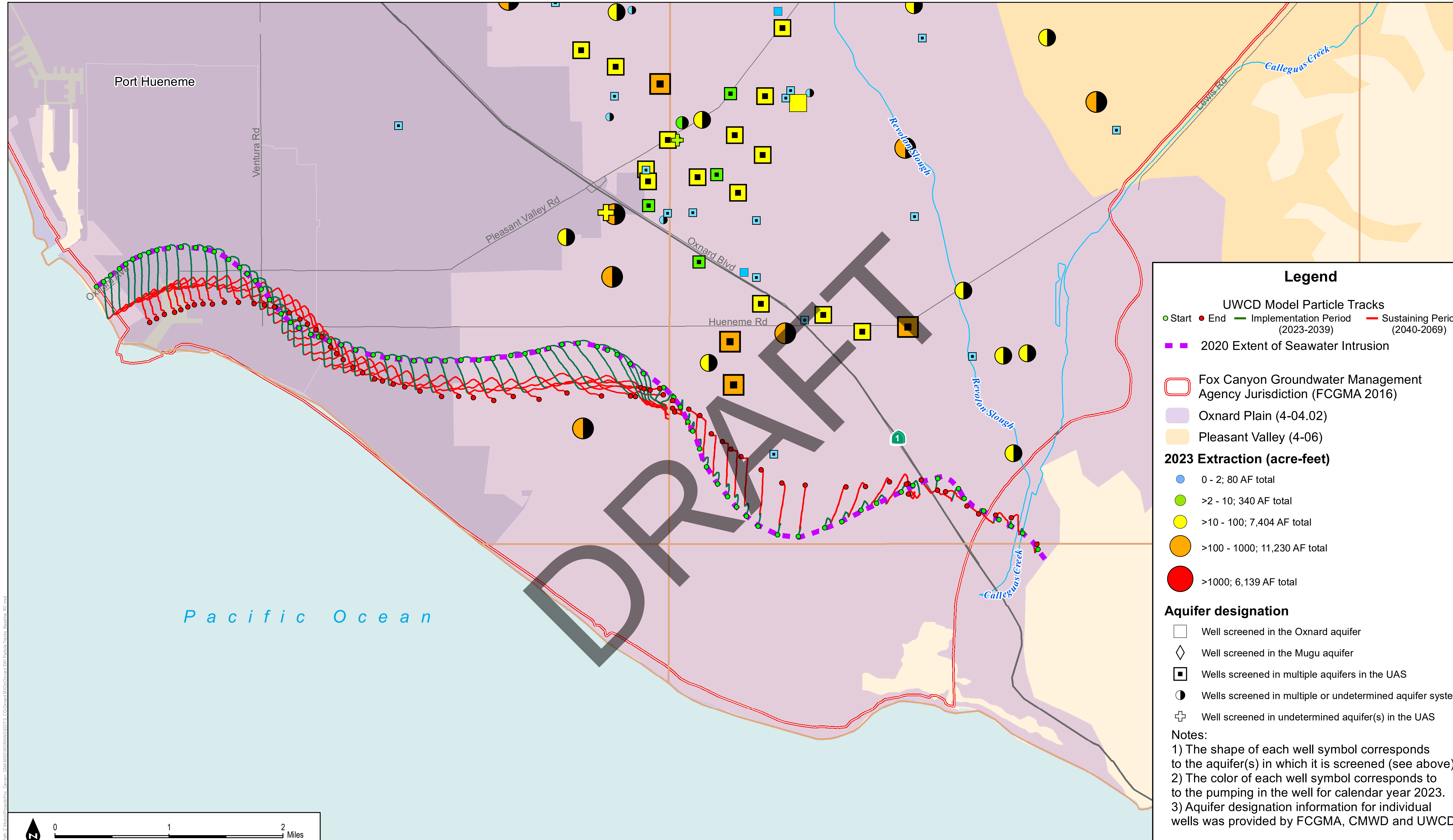

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

DUDEK

Figure 5-5
UWCD Model Particle Tracks, Oxnard Aquifer, Future Baseline

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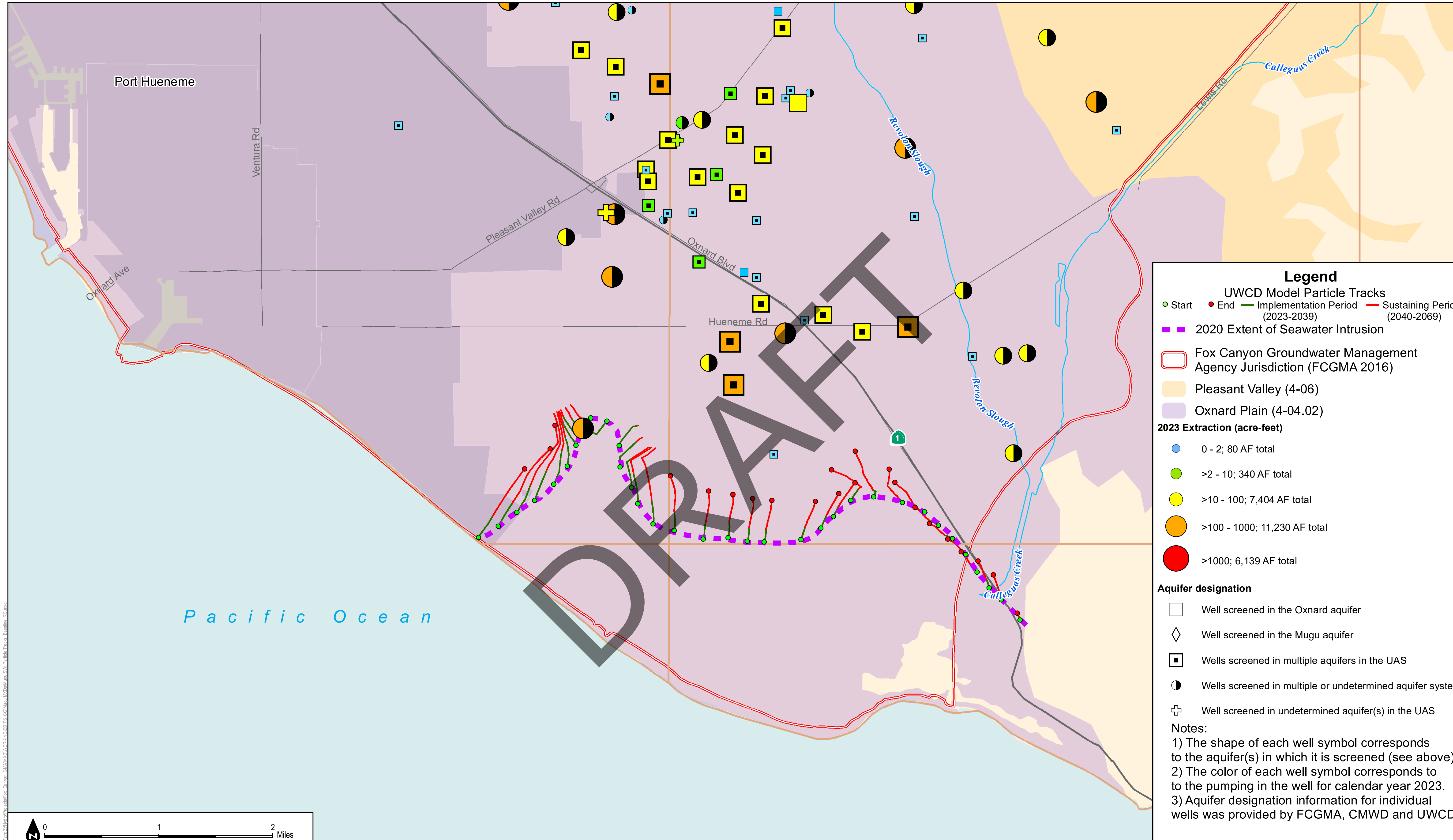

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

DUDEK

Figure 5-6
UWCD Model Particle Tracks, Mugu Aquifer, Future Baseline

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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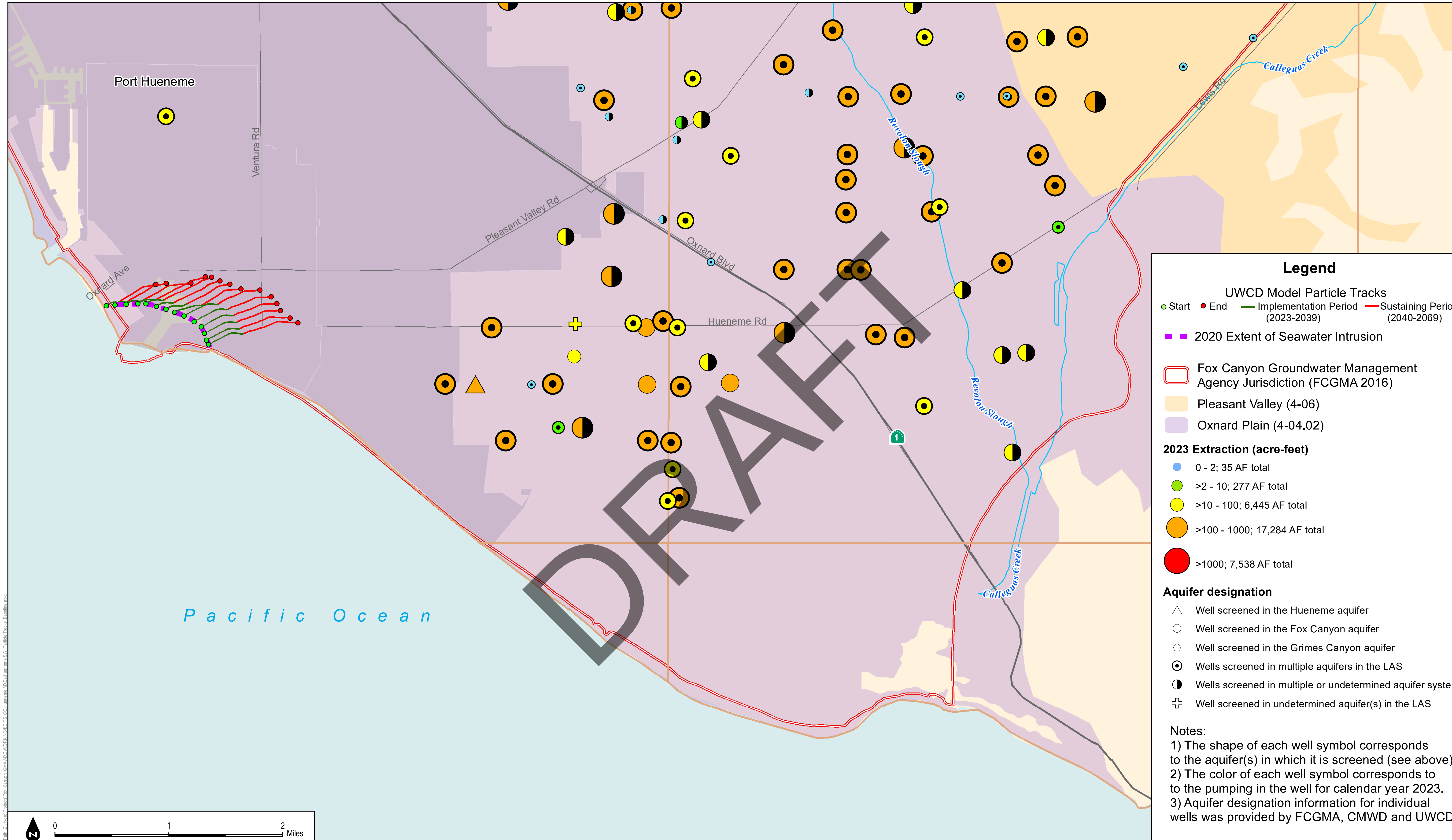

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-7
UWCD Model Particle Tracks, Hueneme Aquifer, Future Baseline

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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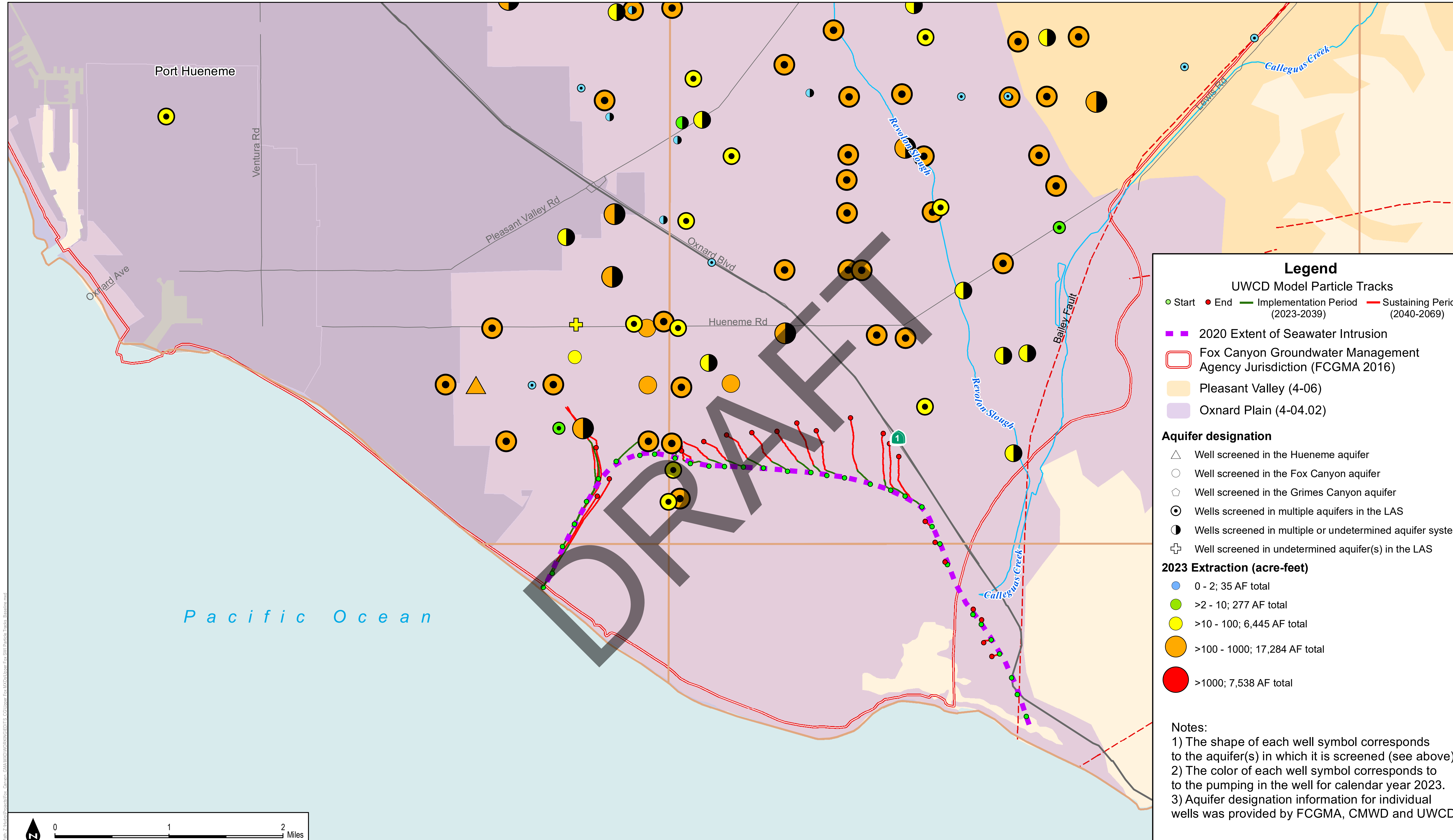

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-8
UWCD Model Particle Tracks, Upper Fox Canyon Aquifer, Future Baseline

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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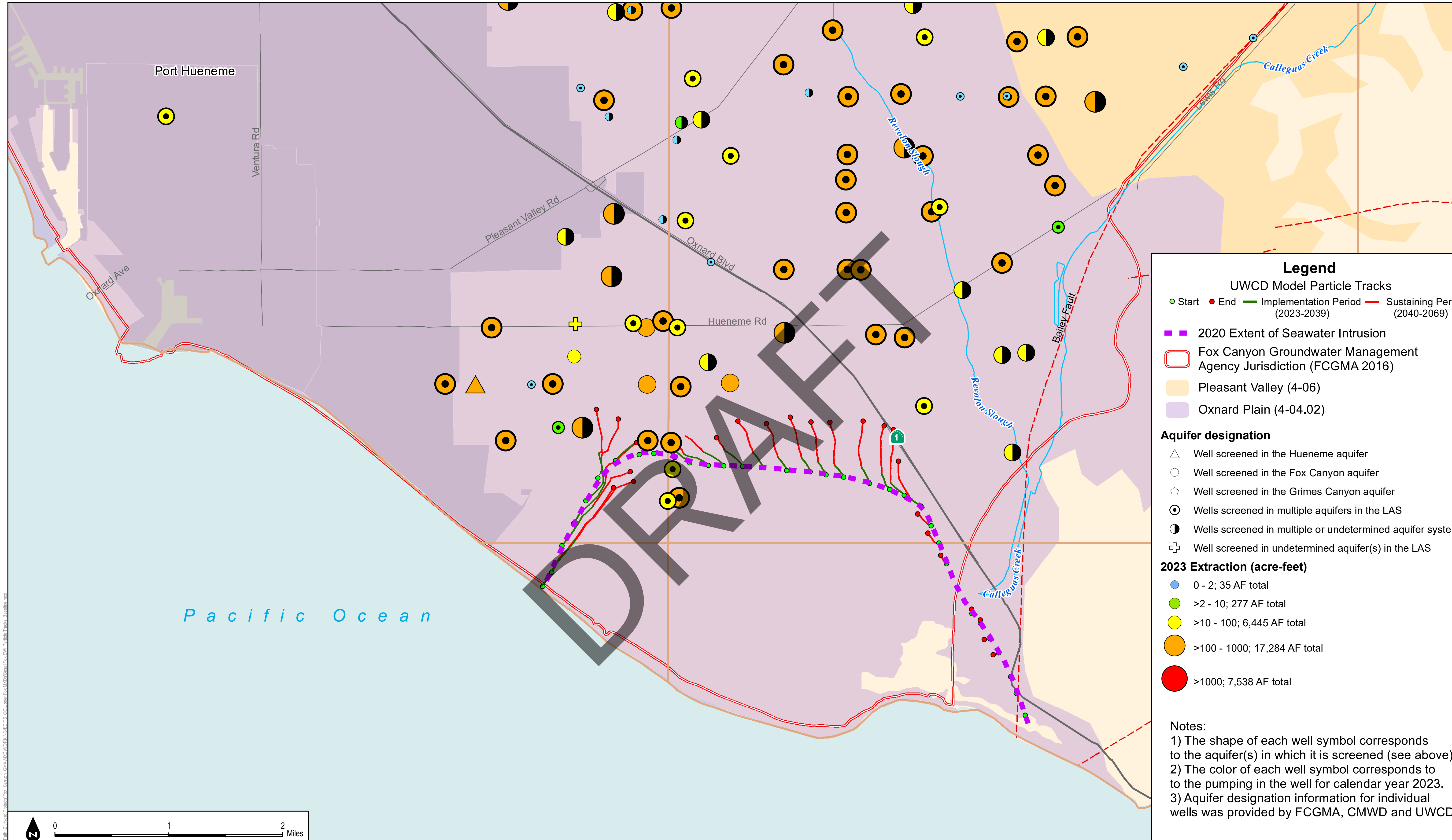

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

DUDEK

Figure 5-9
UWCD Model Particle Tracks, Basal Fox Canyon Aquifer, Future Baseline

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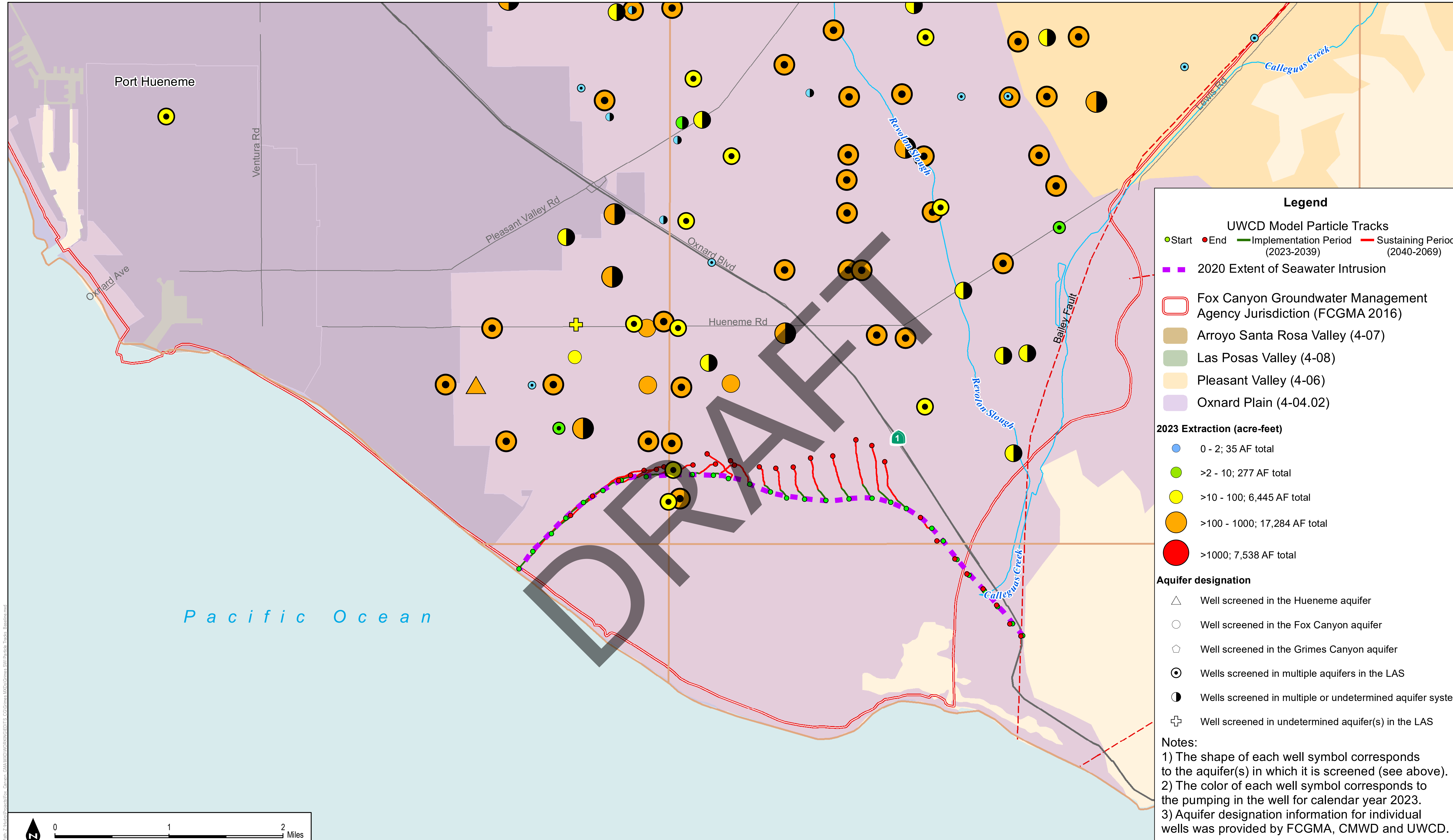

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-10
UWCD Model Particle Tracks, Grimes Canyon Aquifer, Future Baseline

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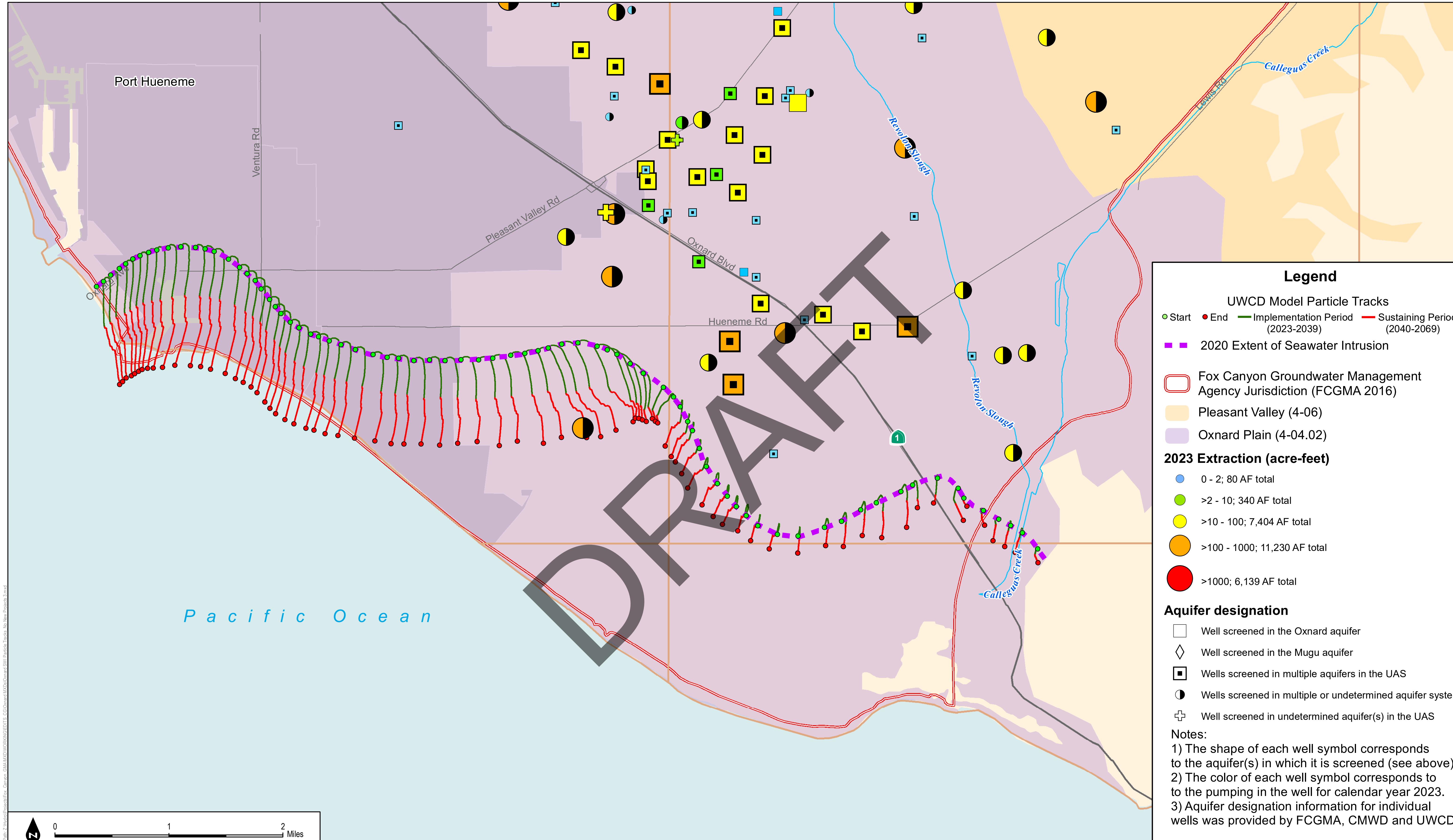

Notes:
1) The shape of each well symbol corresponds to the aquifer(s) in which it is screened (see above).
2) The color of each well symbol corresponds to to the pumping in the well for calendar year 2023.
3) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-11
UWCD Model Particle Tracks, Oxnard Aquifer, NNP3

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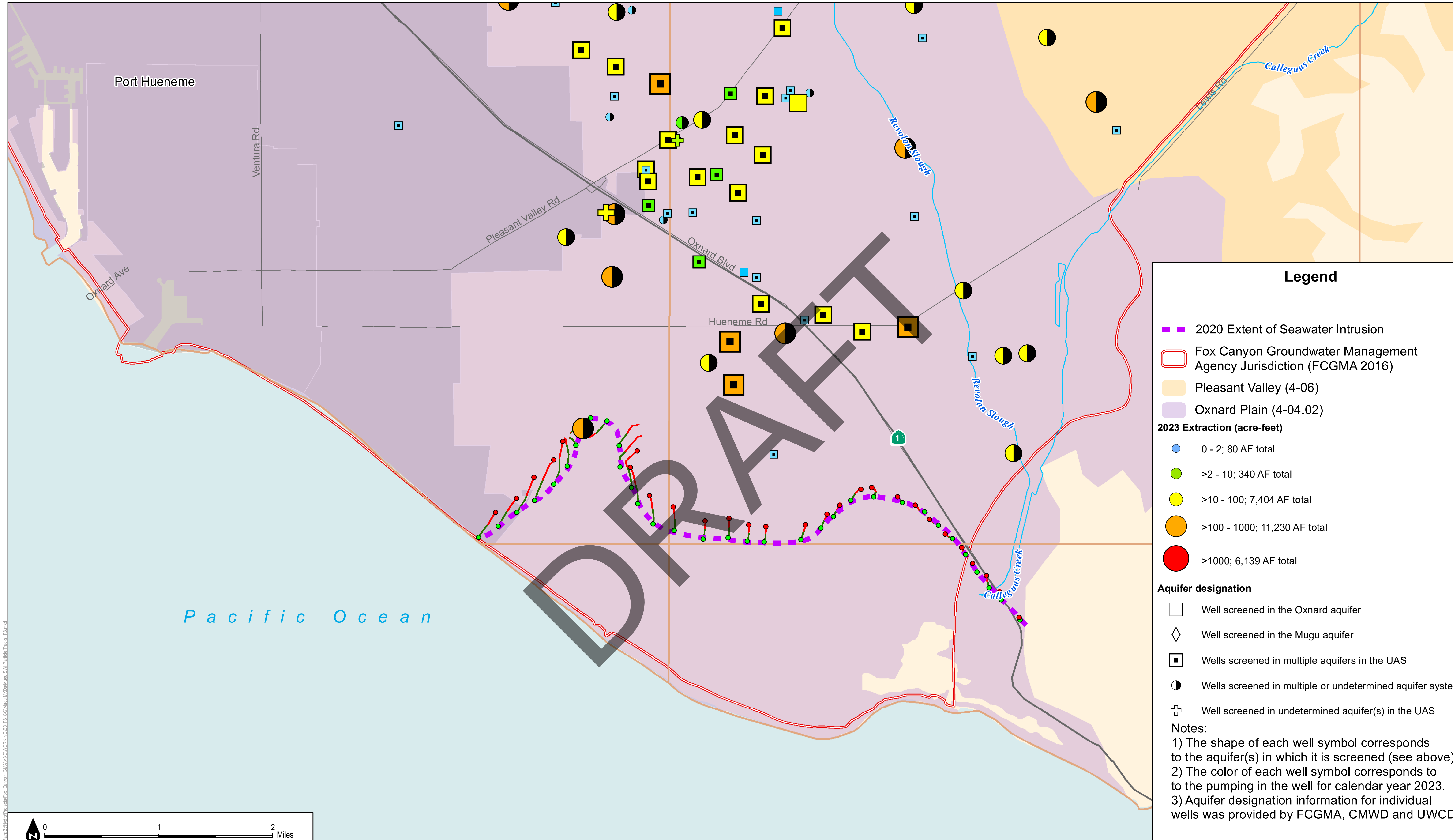

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-12
UWCD Model Particle Tracks, Mugu Aquifer, NNP3

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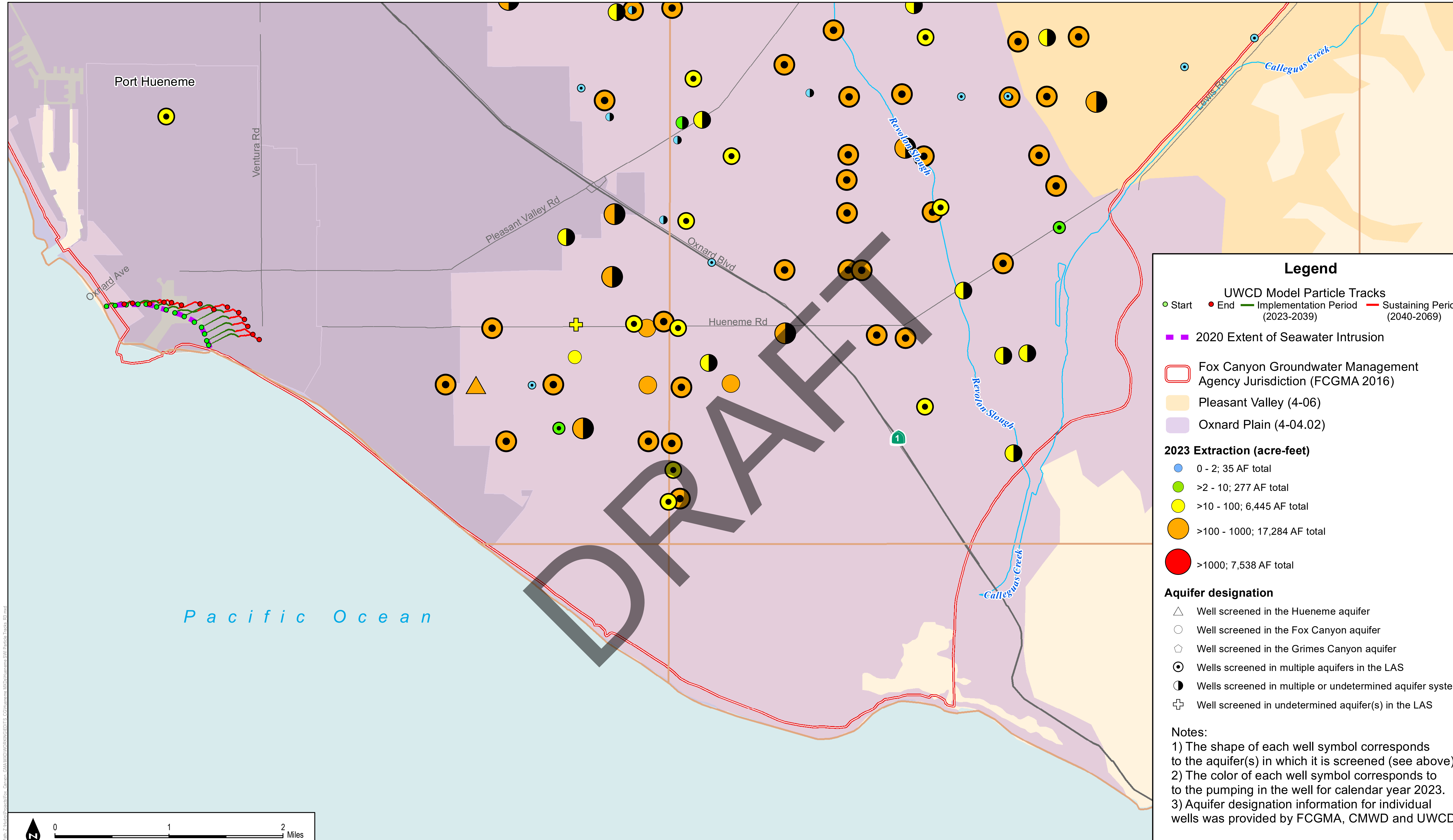

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-13
UWCD Model Particle Tracks, Hueneme Aquifer, NNP3

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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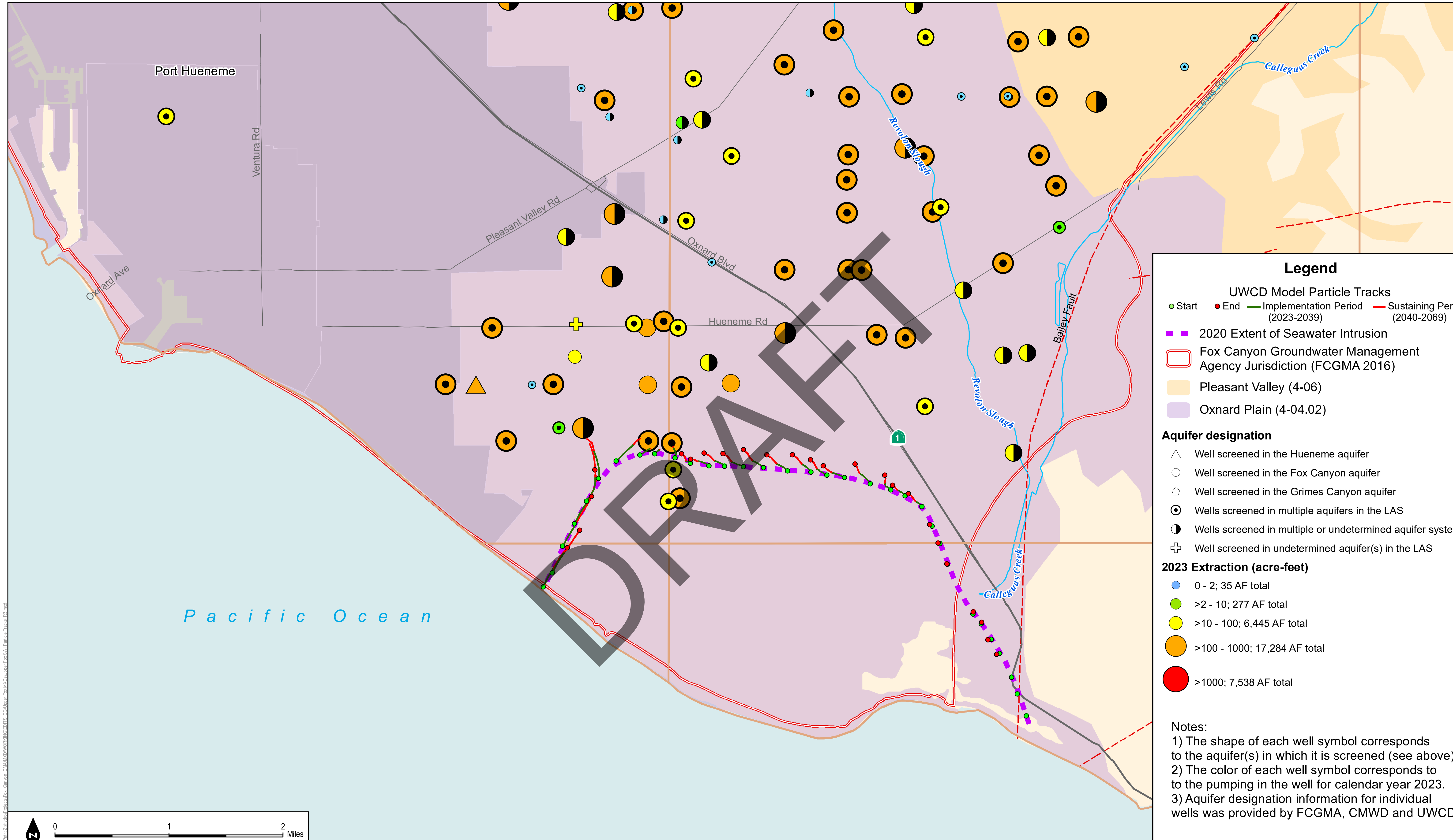

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-14
UWCD Model Particle Tracks, Upper Fox Canyon Aquifer, NNP3

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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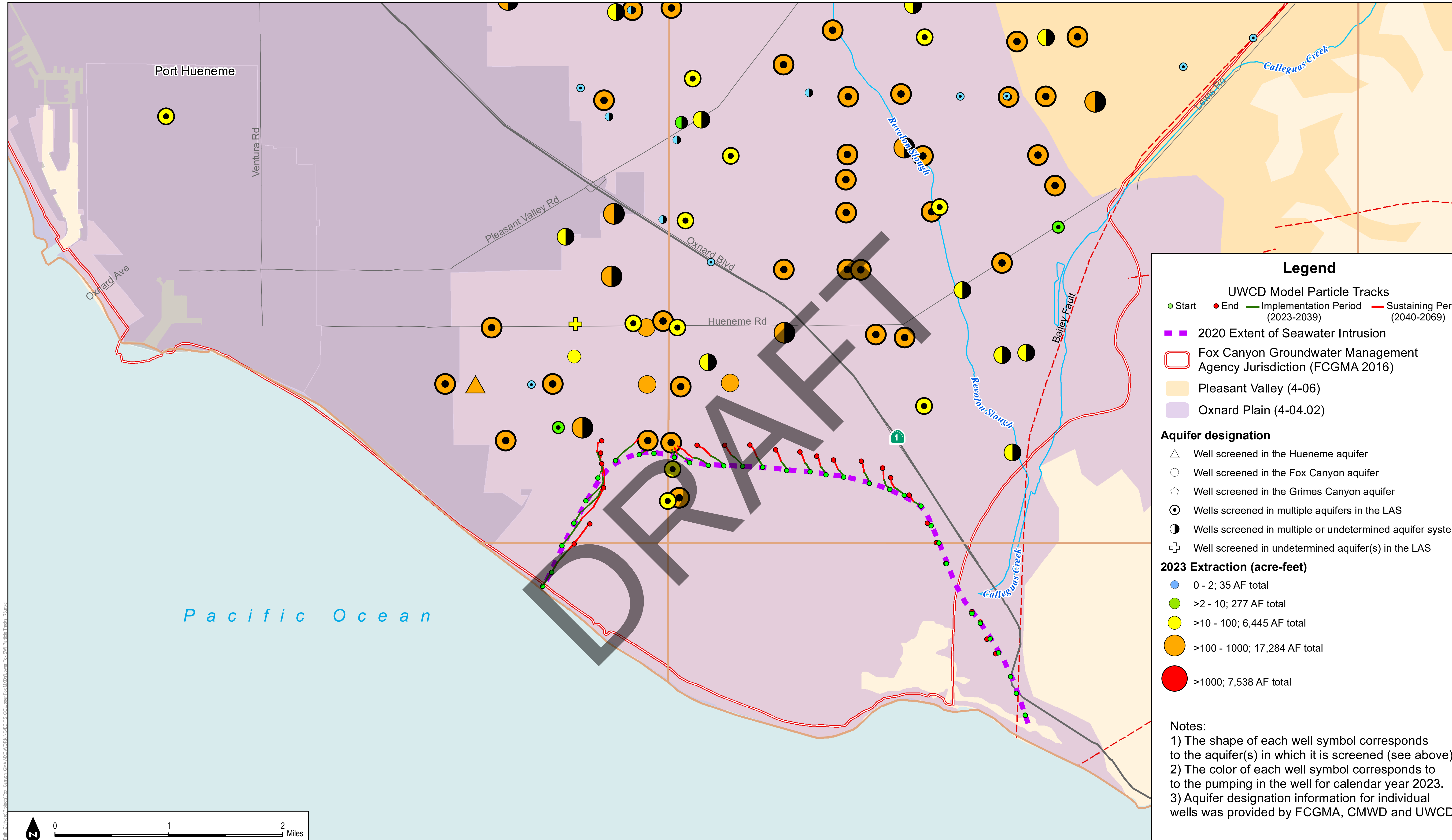

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-15
UWCD Model Particle Tracks, Basal Fox Canyon Aquifer, NNP3

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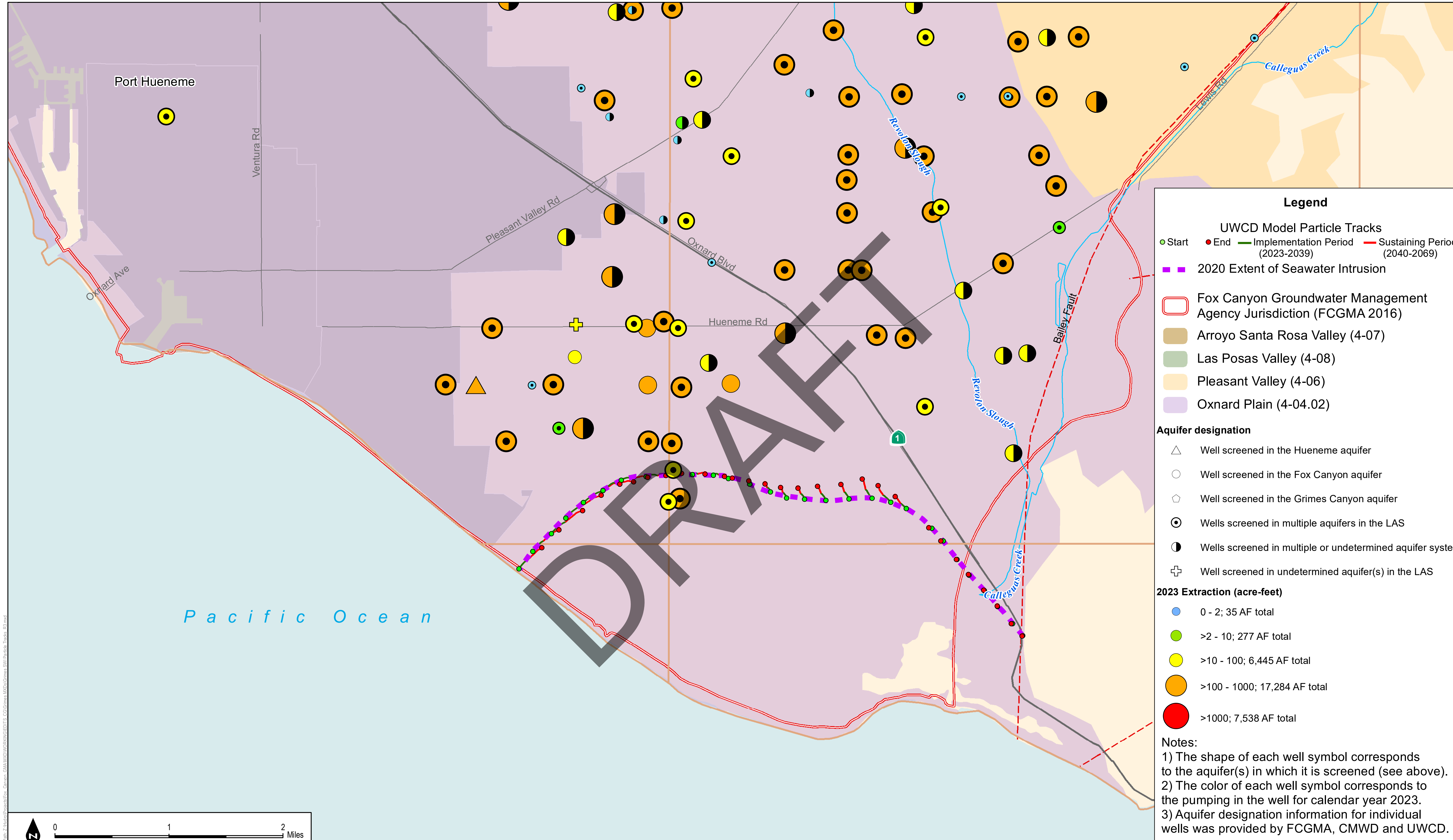

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-16
UWCD Model Particle Tracks, Grimes Canyon Aquifer, NNP3

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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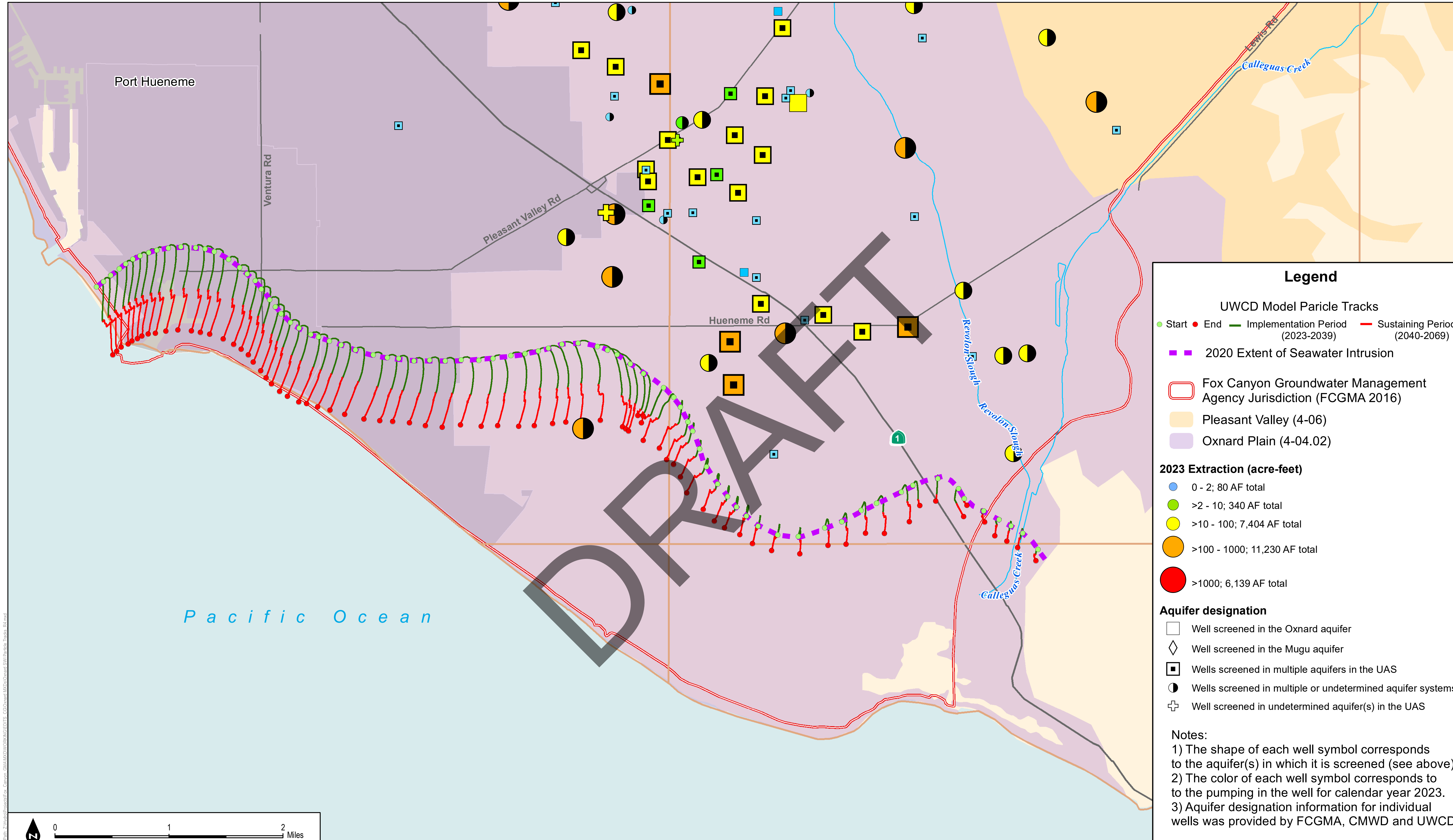

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-17
UWCD Model Particle Tracks, Oxnard Aquifer, Basin Optimization

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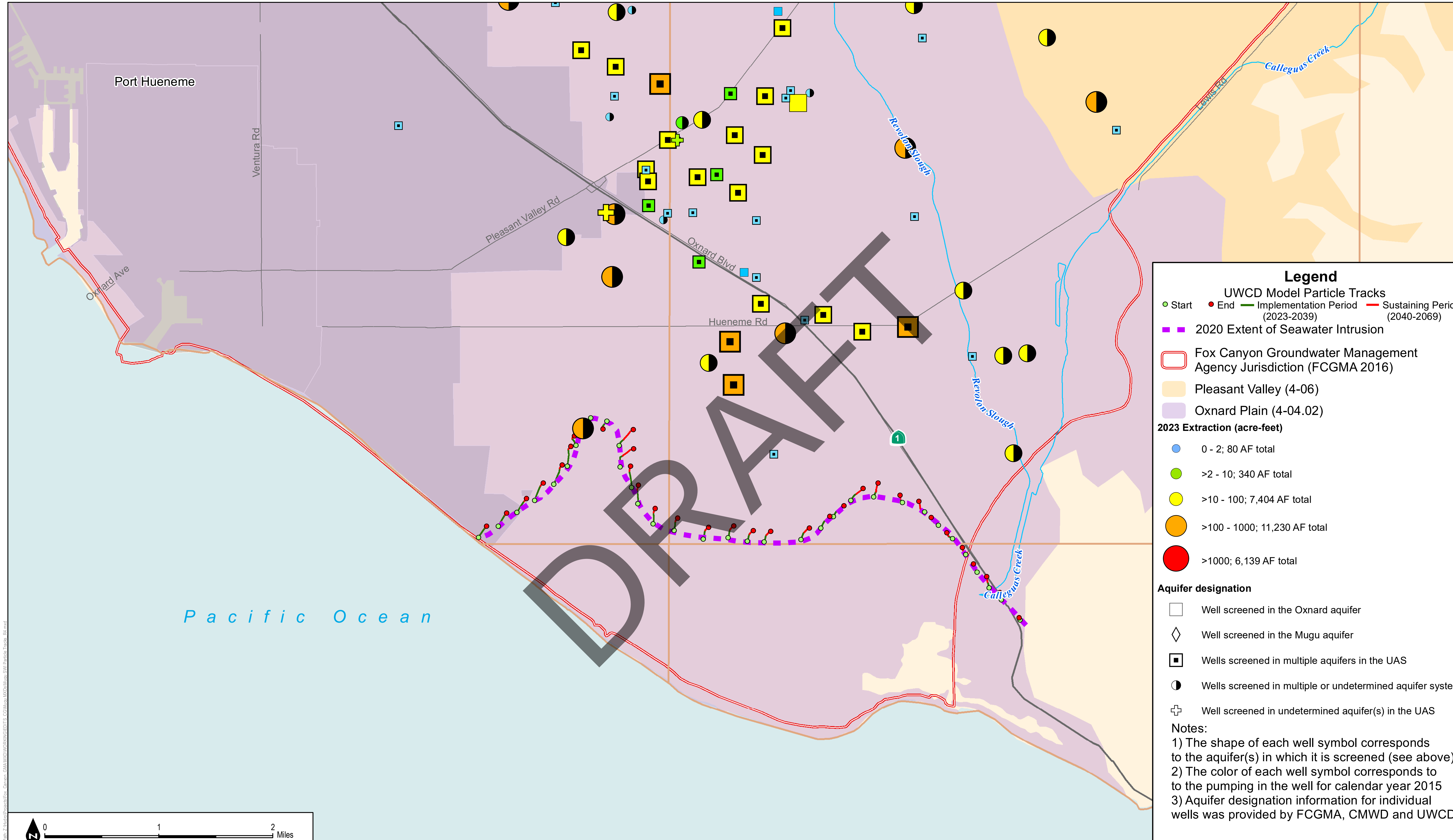

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-18
UWCD Model Particle Tracks, Mugu Aquifer, Basin Optimization

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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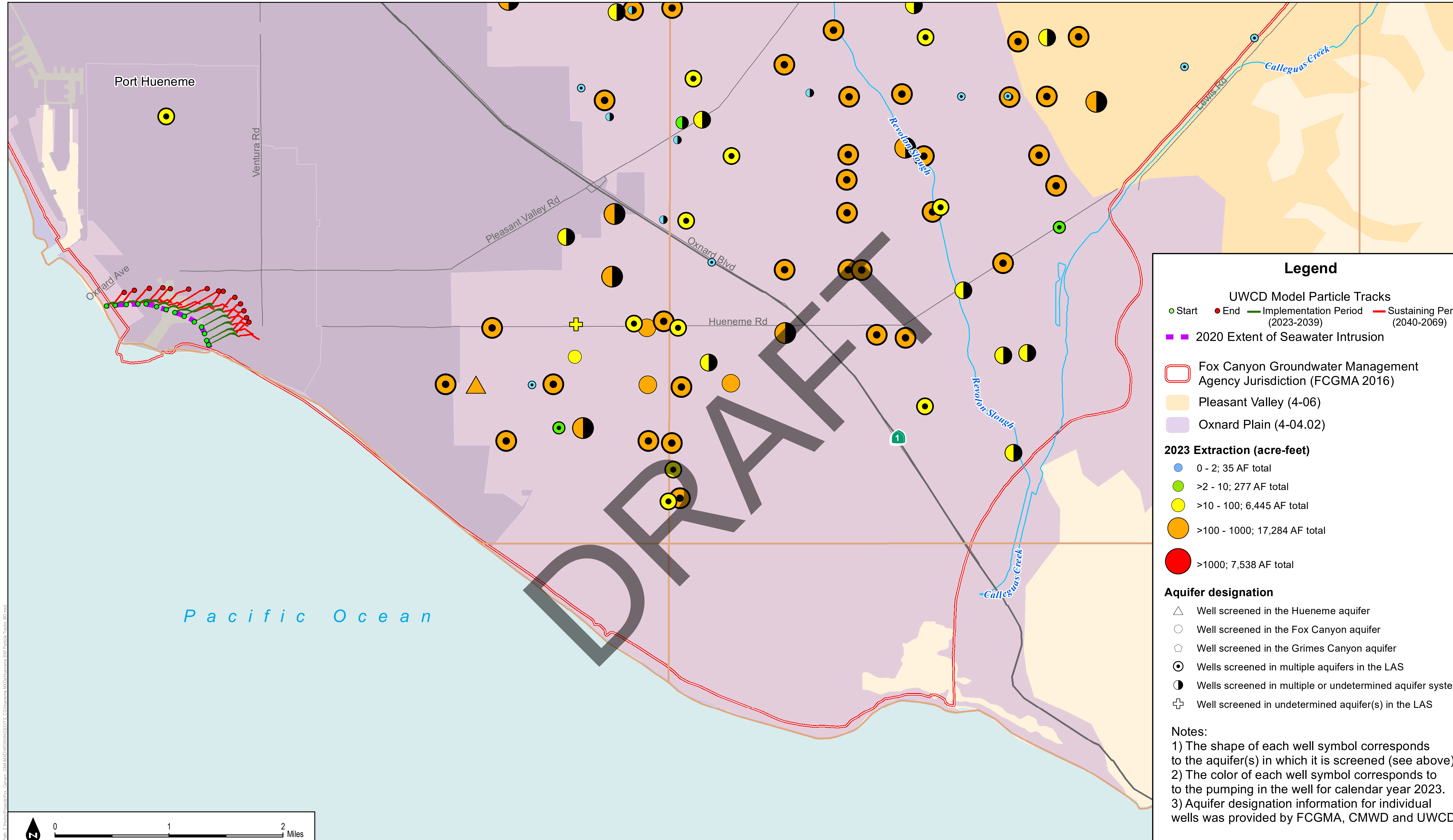

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-19
UWCD Particle Tracks, Hueneme Aquifer, Basin Optimization

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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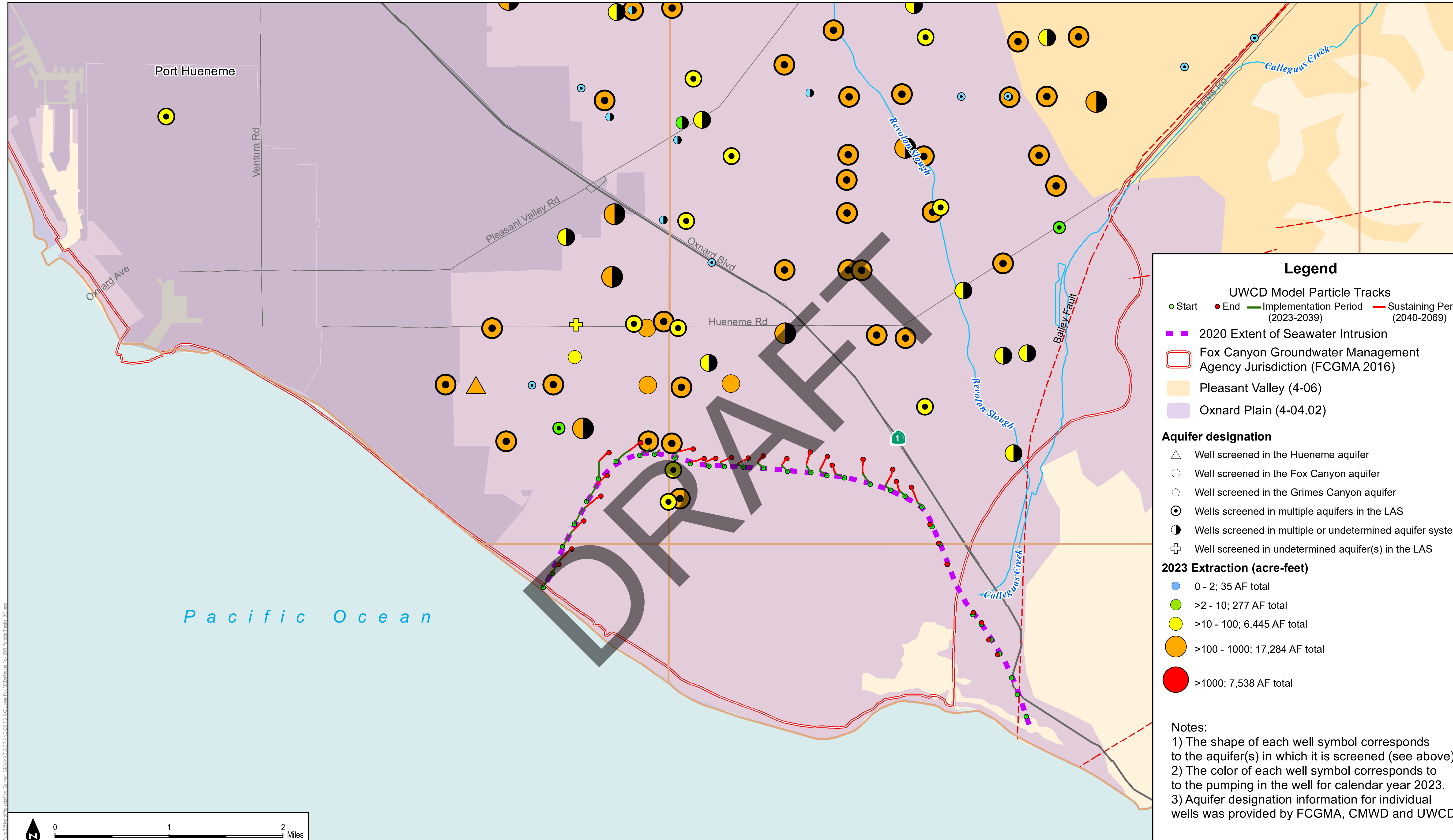

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-20
UWCD Model Particle Tracks, Upper Fox Canyon Aquifer, Basin Optimization

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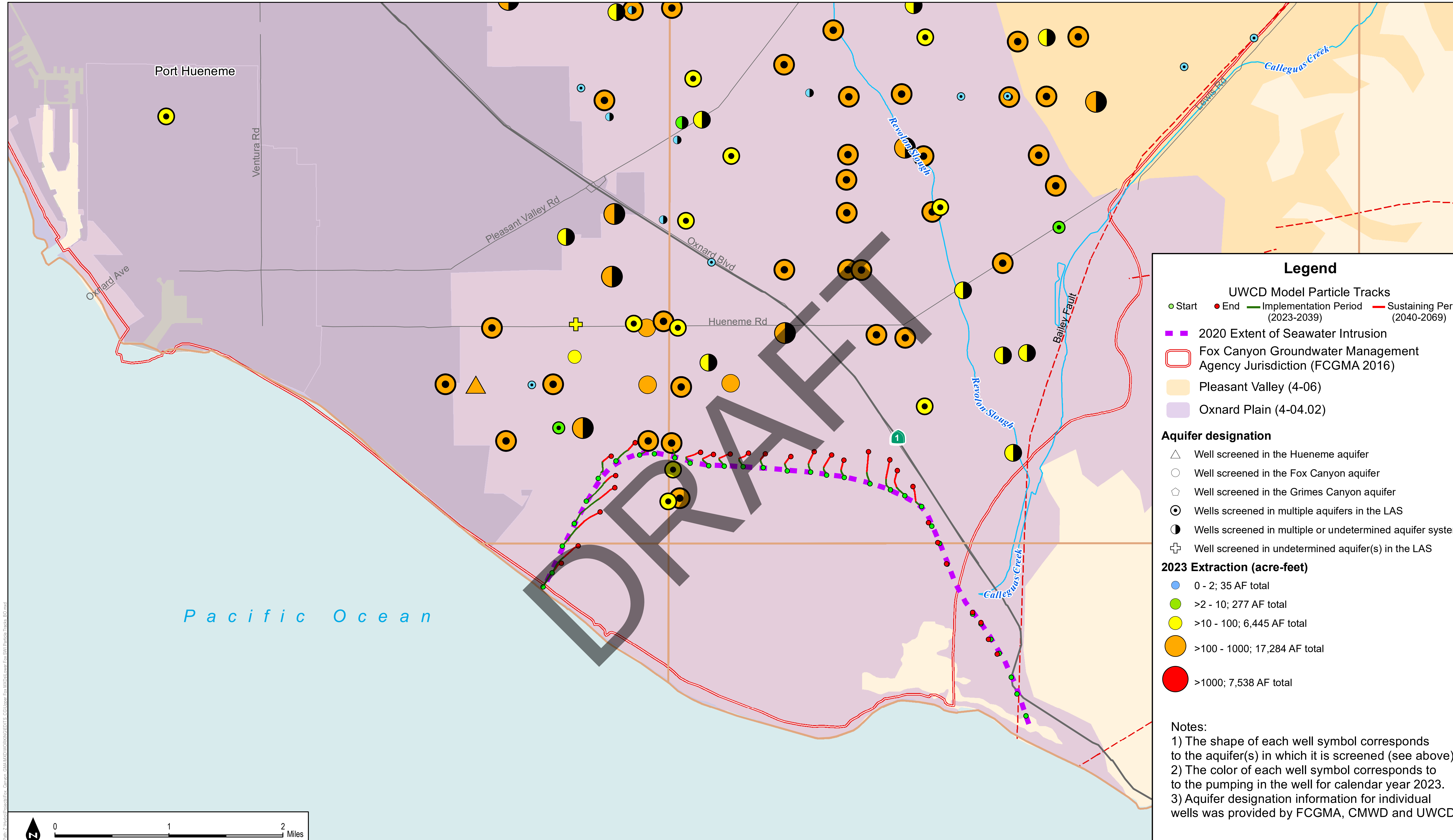

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-21
UWCD Model Particle Tracks, Basal Fox Canyon Aquifer, Basin Optimization

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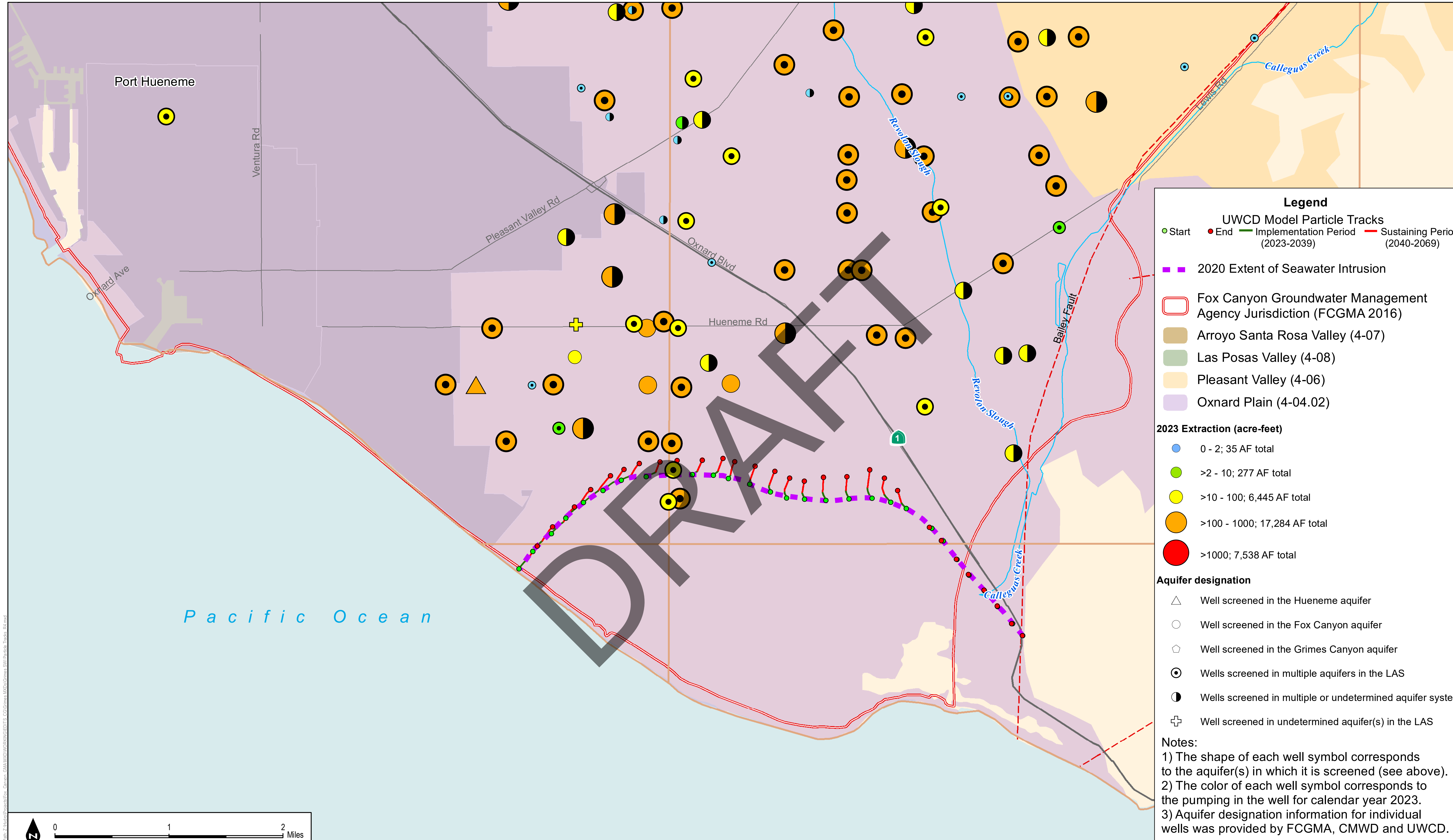

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-22
UWCD Model Particle Tracks, Grimes Canyon Aquifer, Basin Optimization

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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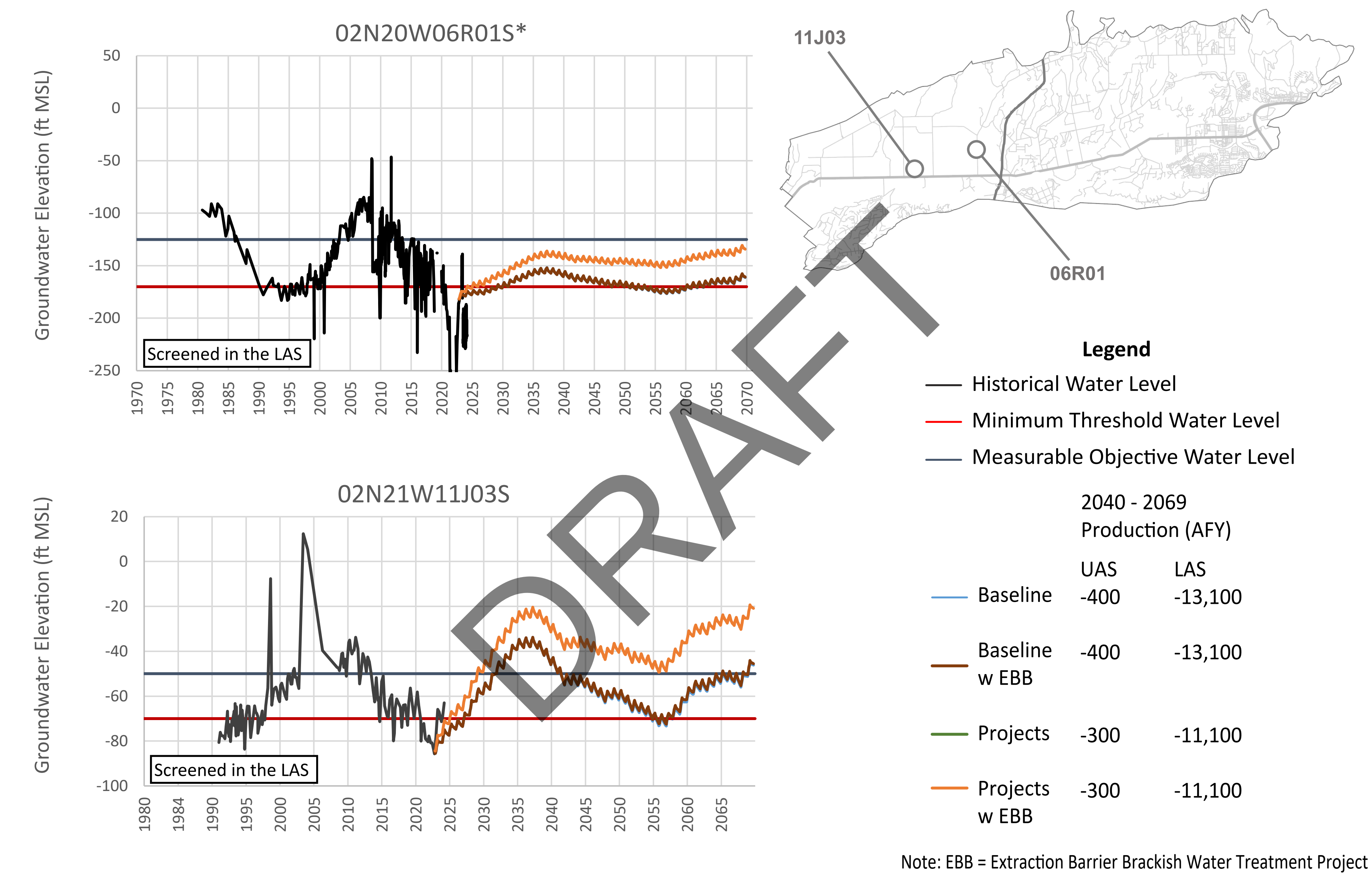

*Note: Simulated groundwater elevations at 06R01 were shifted by -60 ft to match the current water levels.

FIGURE 5-23a

Key Well Hydrographs in the West Las Posas Management Area

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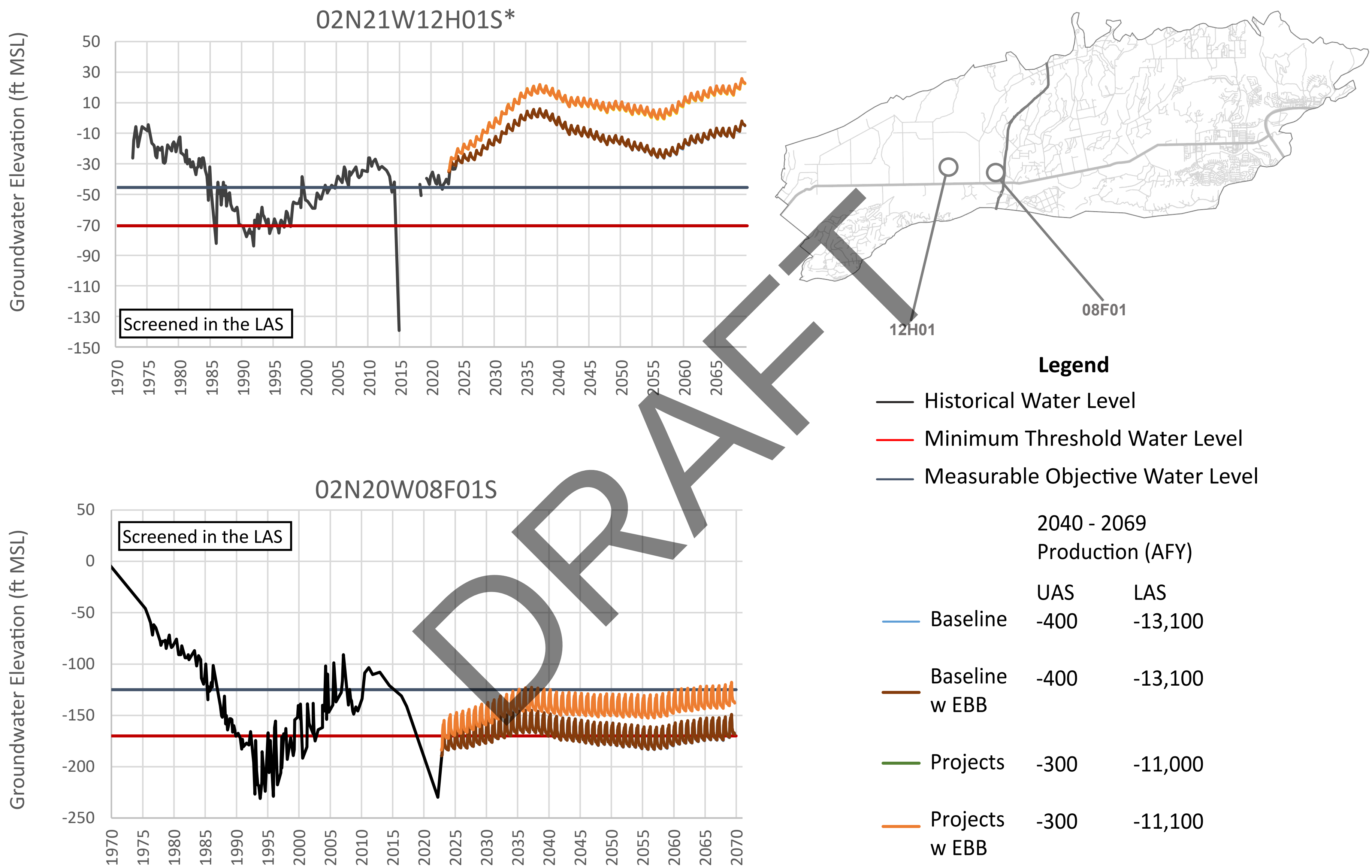

Note: EBB = Extraction Barrier Brackish Water Treatment Project

*Note: Simulated groundwater elevations at 12H01 were shifted by +70 ft to match the current water levels.

FIGURE 5-23b

Key Well Hydrographs in the West Las Posas Management Area

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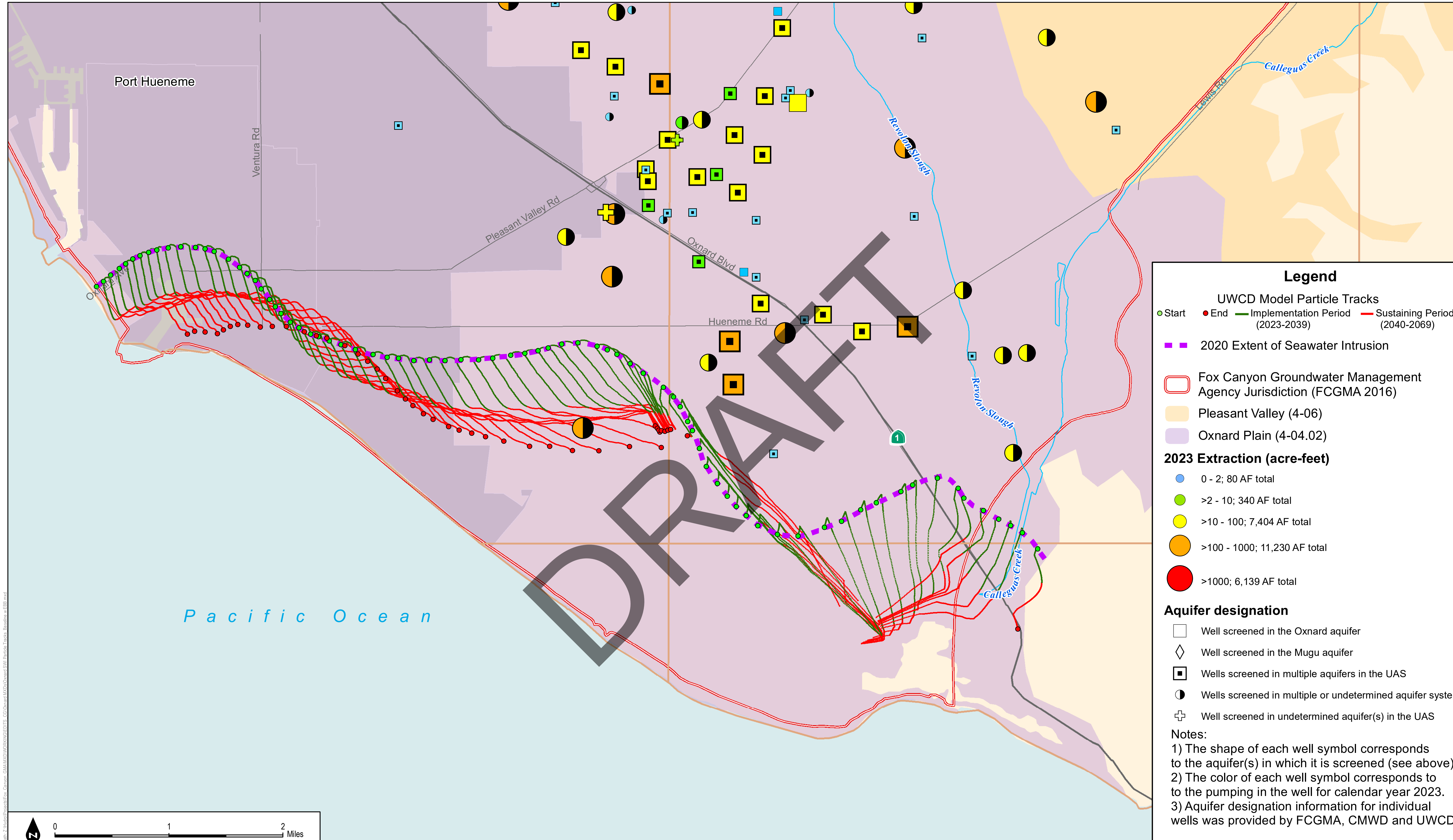

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

DUDEK

Figure 5-24
UWCD Model Particle Tracks, Oxnard Aquifer, Future Baseline with EBB

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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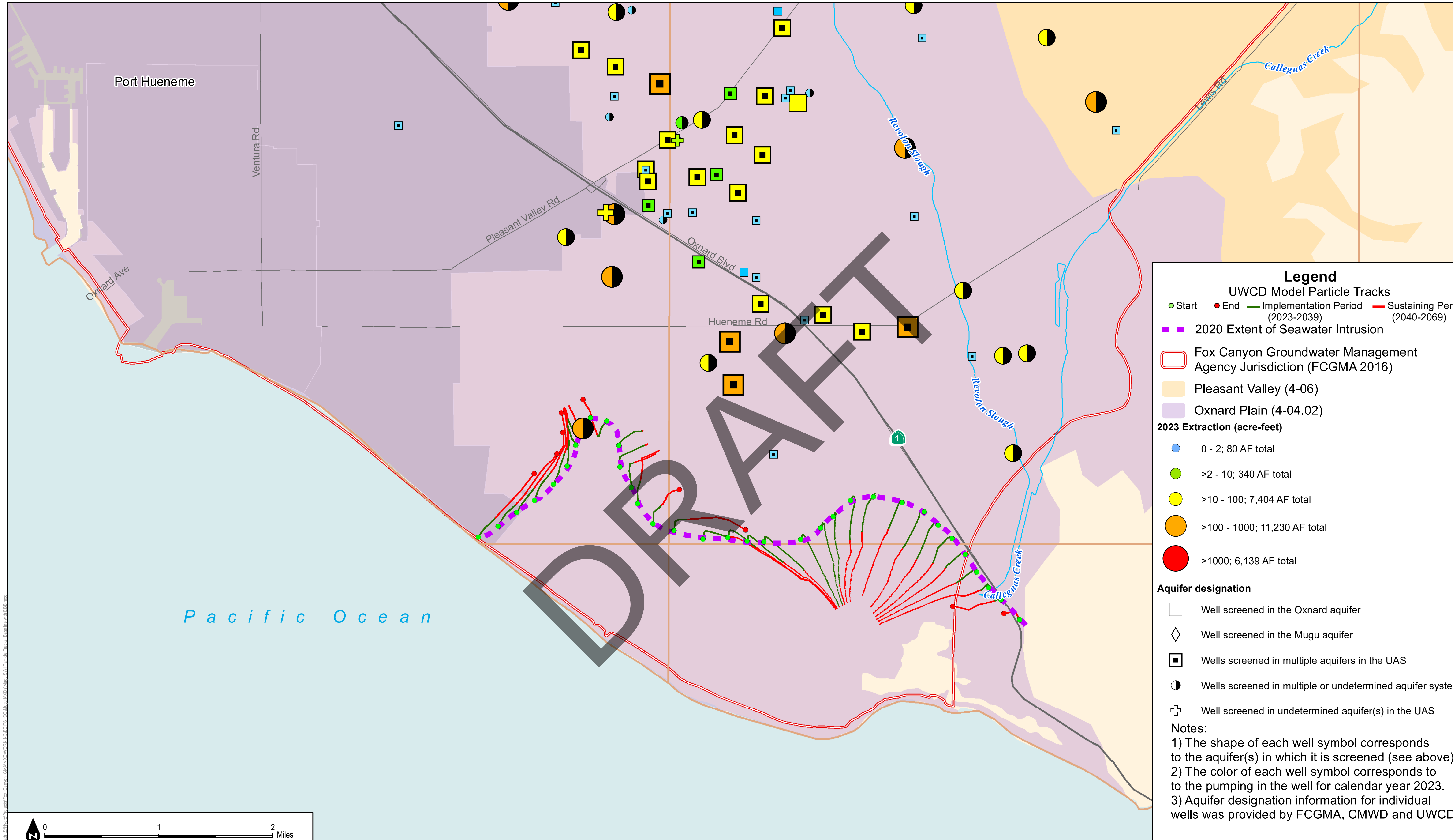

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

DUDEK

Figure 5-25
UWCD Model Particle Tracks, Mugu Aquifer, Future Baseline with EBB

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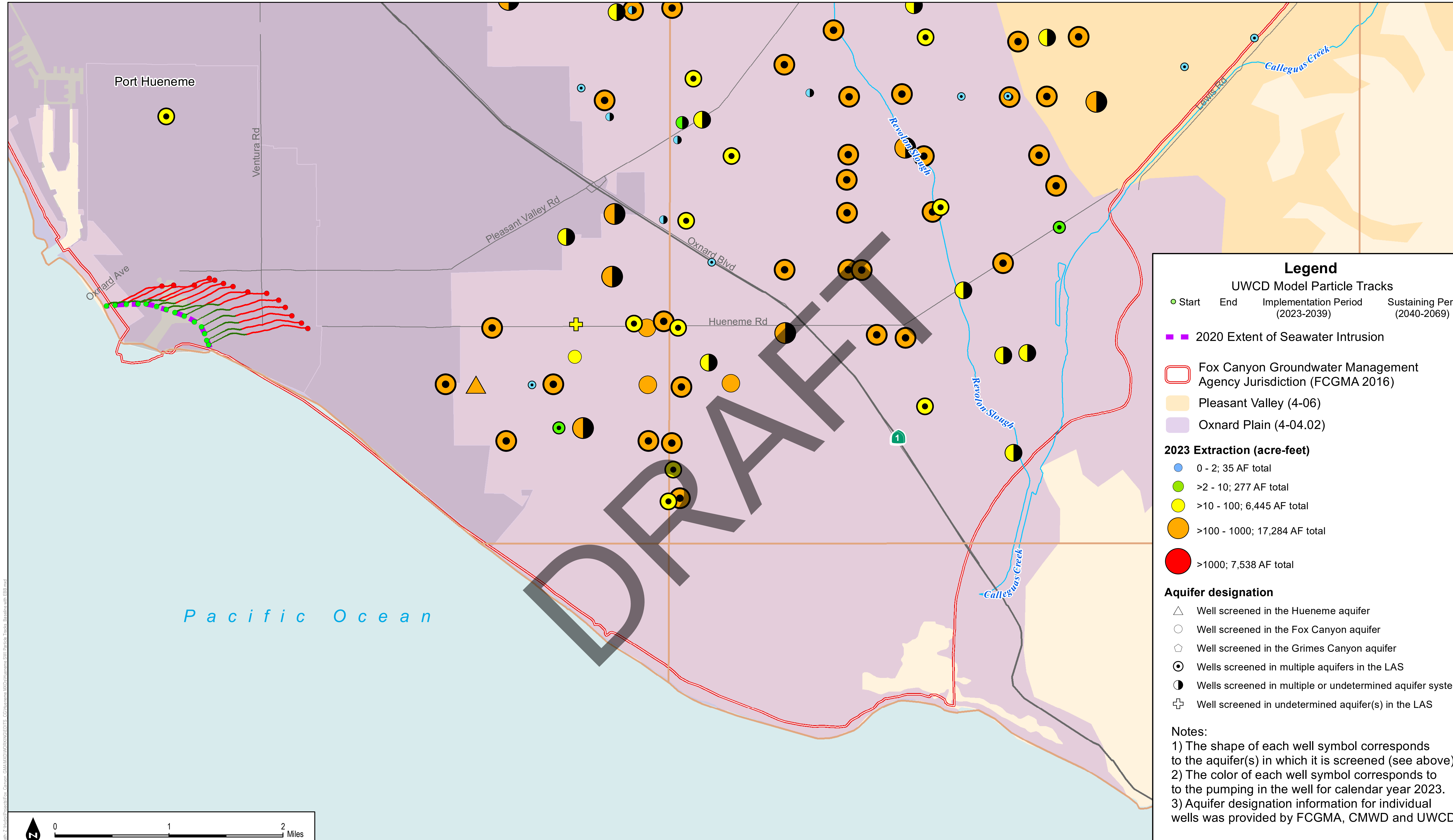

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

DUDEK

Figure 5-26
UWCD Model Particle Tracks, Hueneme Aquifer, Future Baseline with EBB

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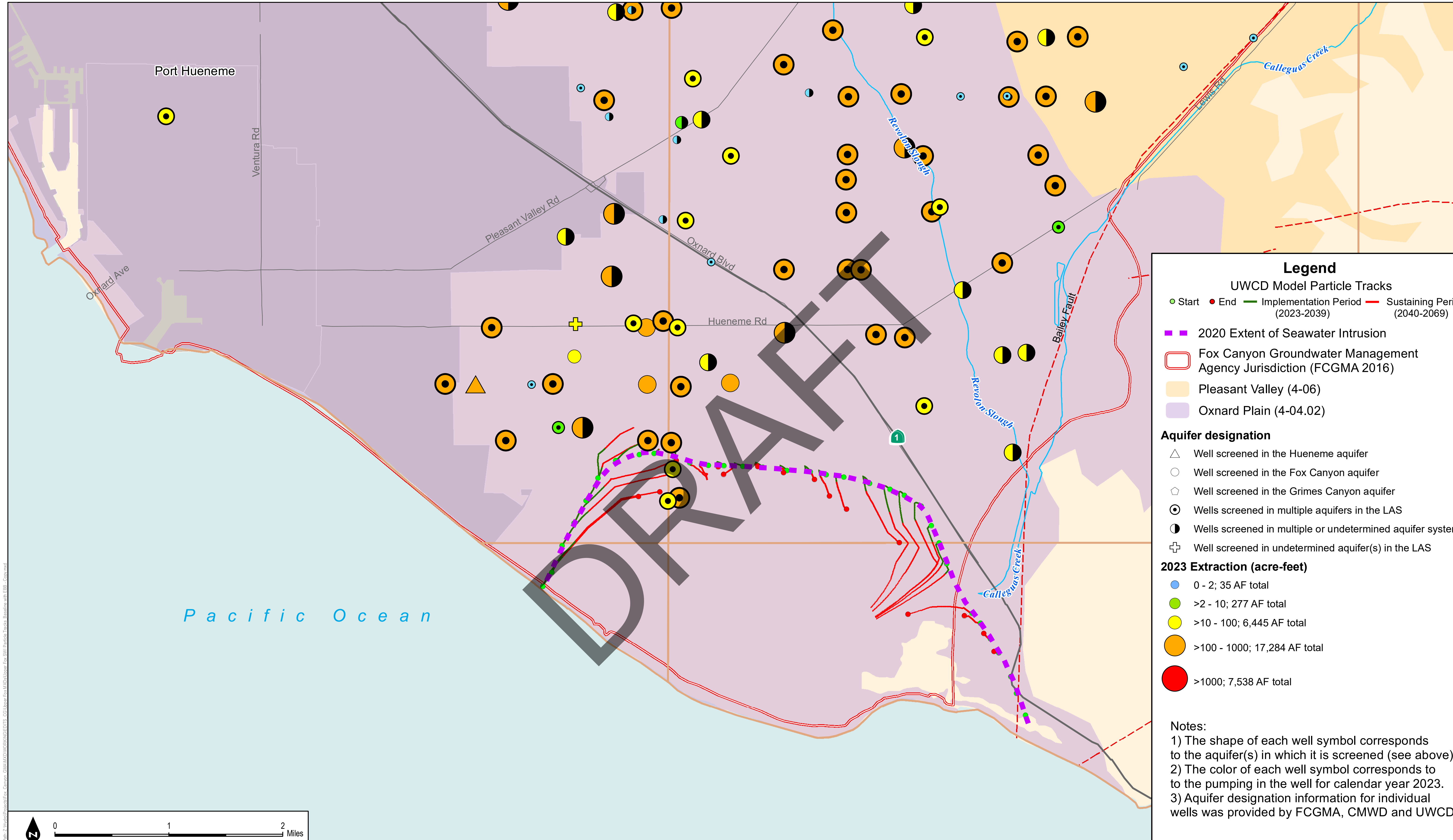

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

DUDEK

Figure 5-27
UWCD Model Particle Tracks, Upper Fox Canyon Aquifer, Future Baseline

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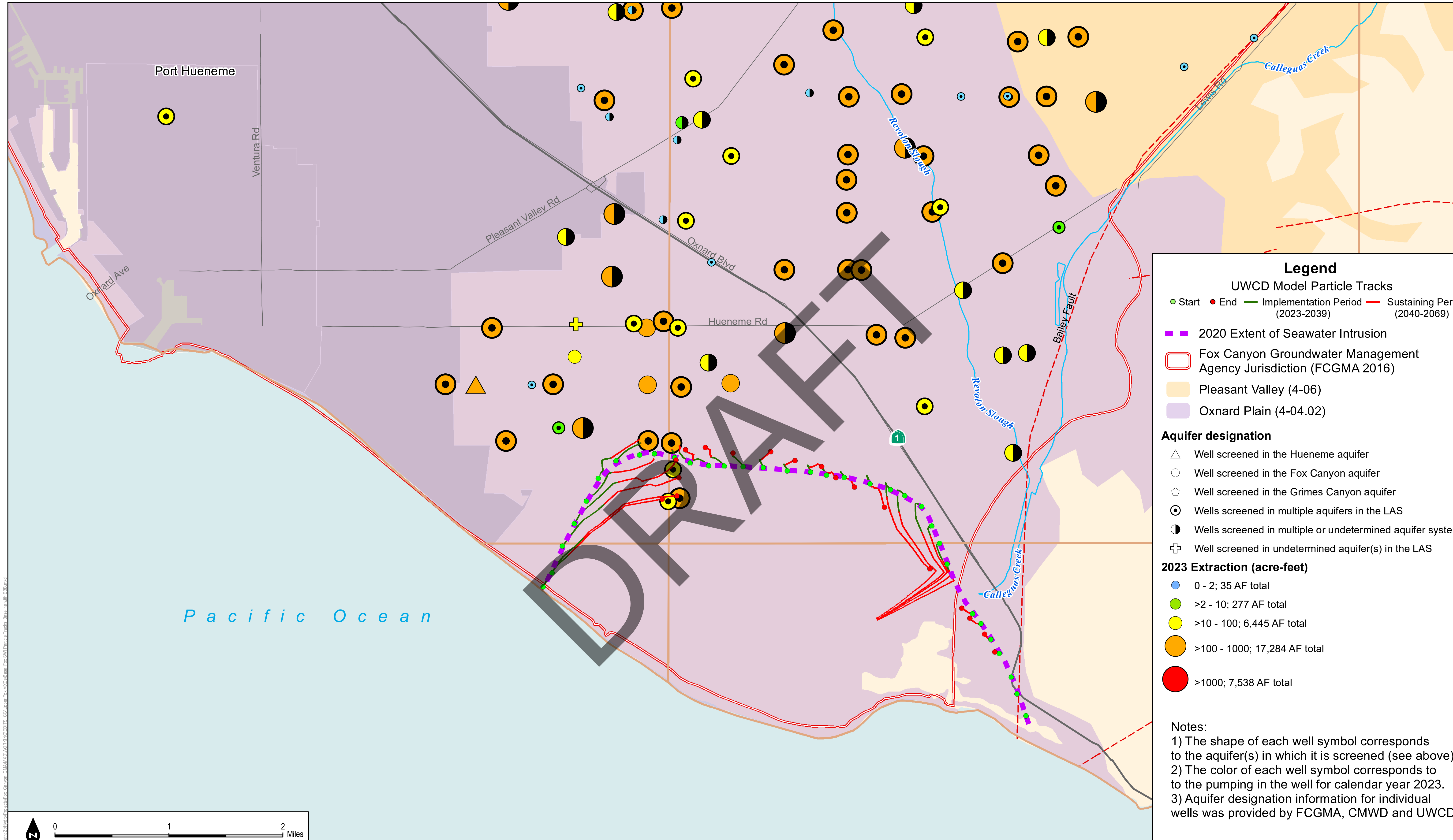

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-28
UWCD Model Particle Tracks, Basal Fox Canyon Aquifer, Future Baseline

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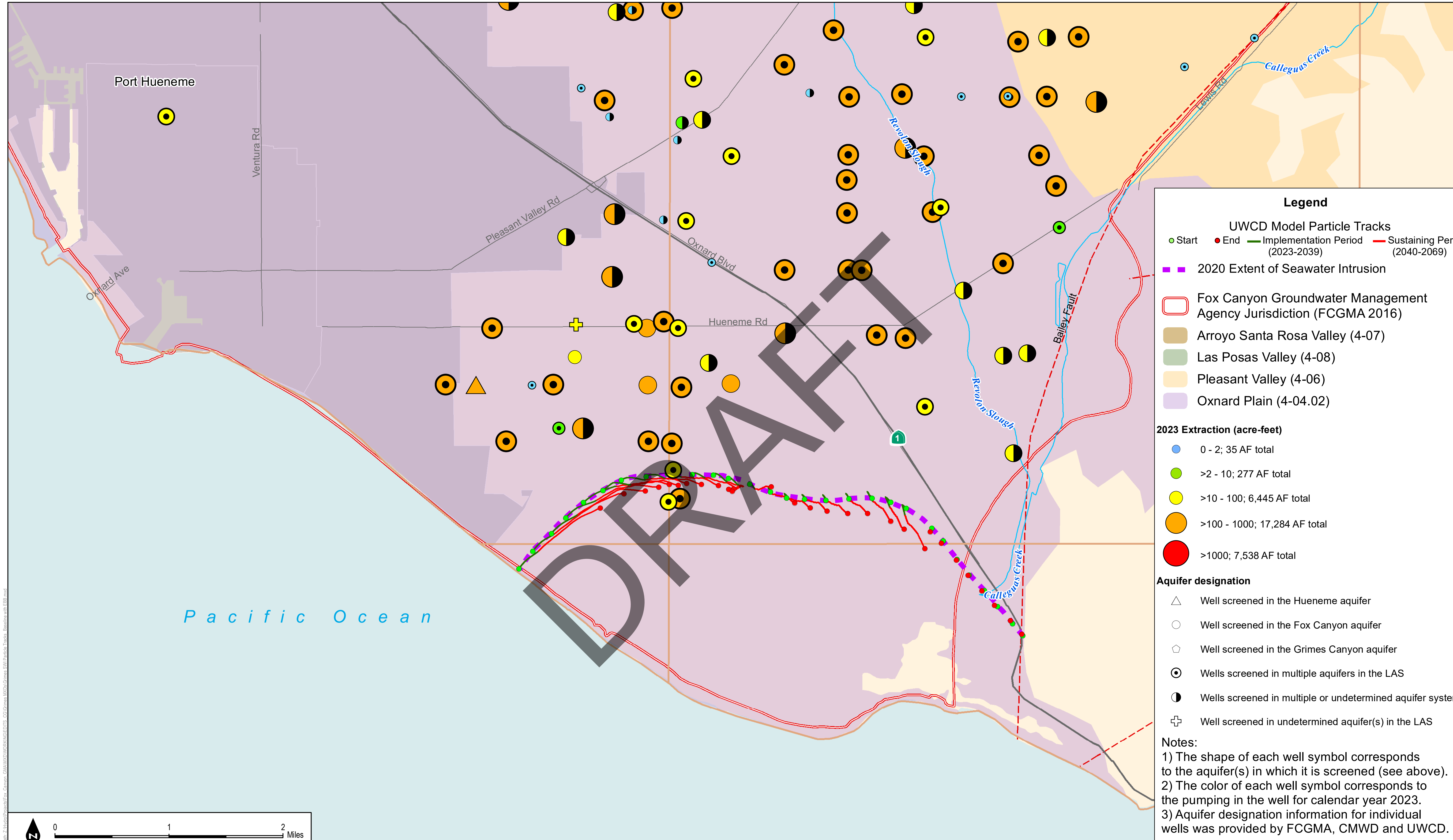

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-29
UWCD Model Particle Tracks, Grimes Canyon Aquifer, Baseline with EBB Scenario

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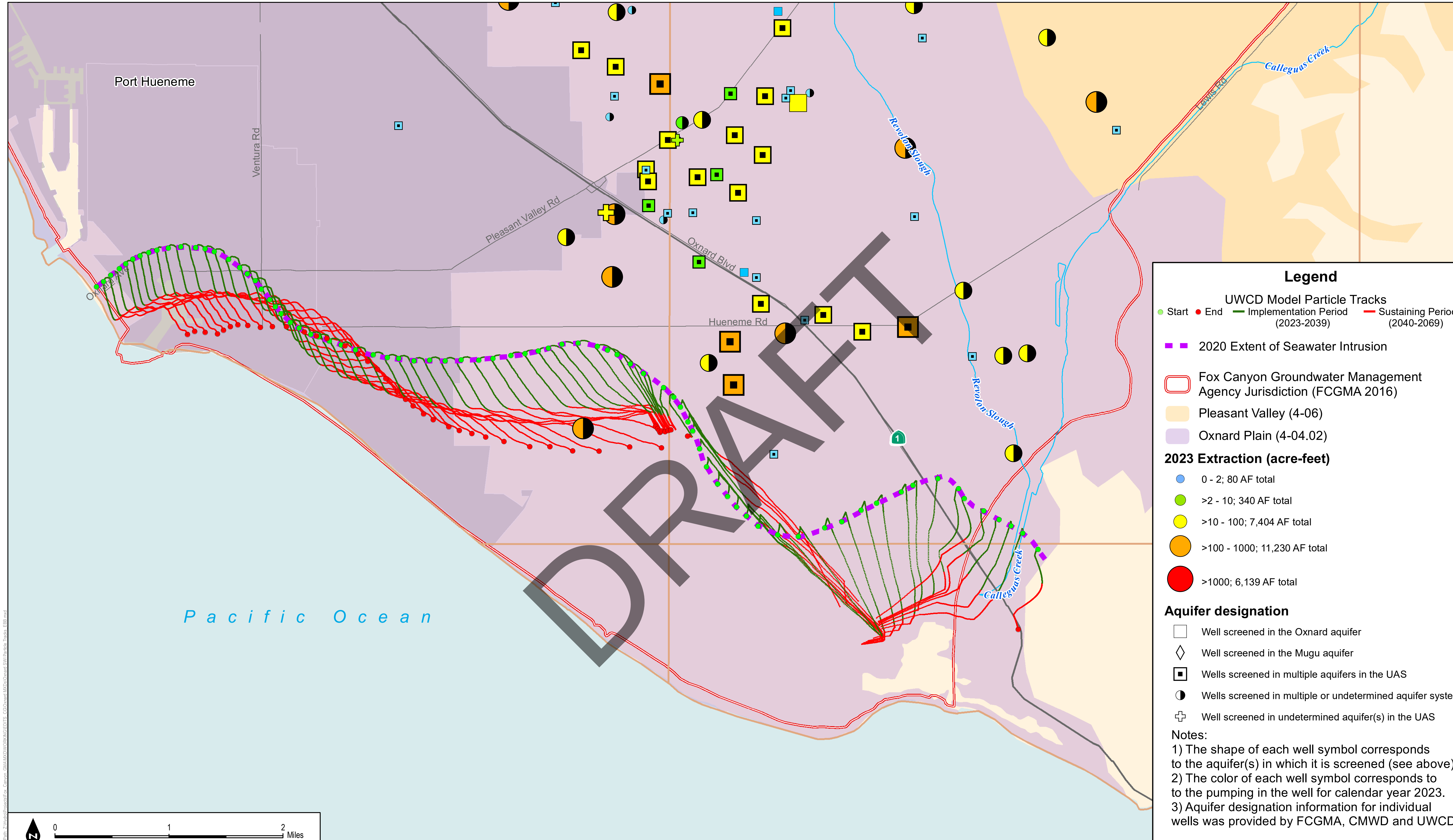

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

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Figure 5-30
UWCD Model Particle Tracks, Oxnard Aquifer, Projects with EBB

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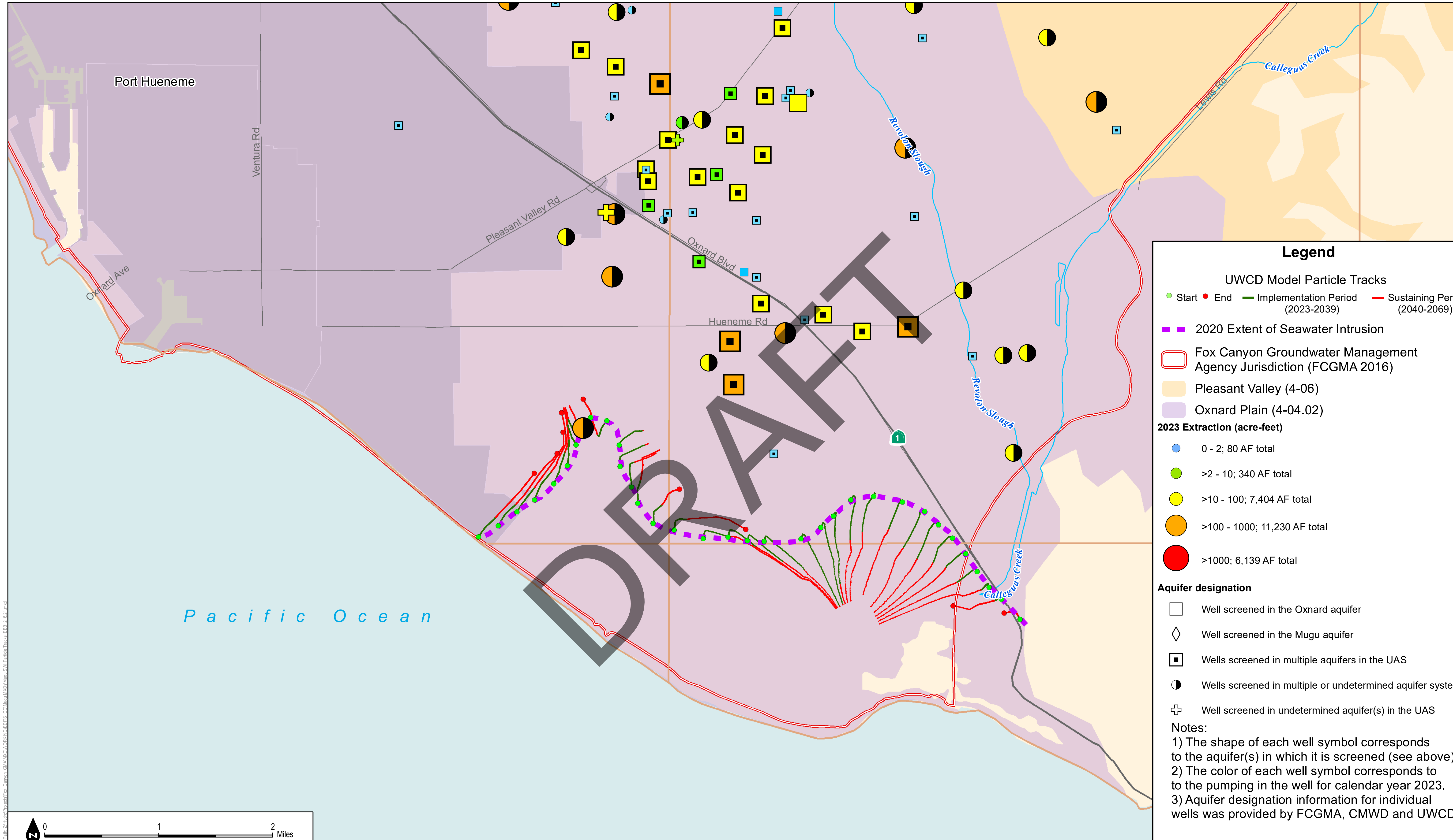

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

DUDEK

Figure 5-31
UWCD Model Particle Tracks, Mugu Aquifer, Projects with EBB

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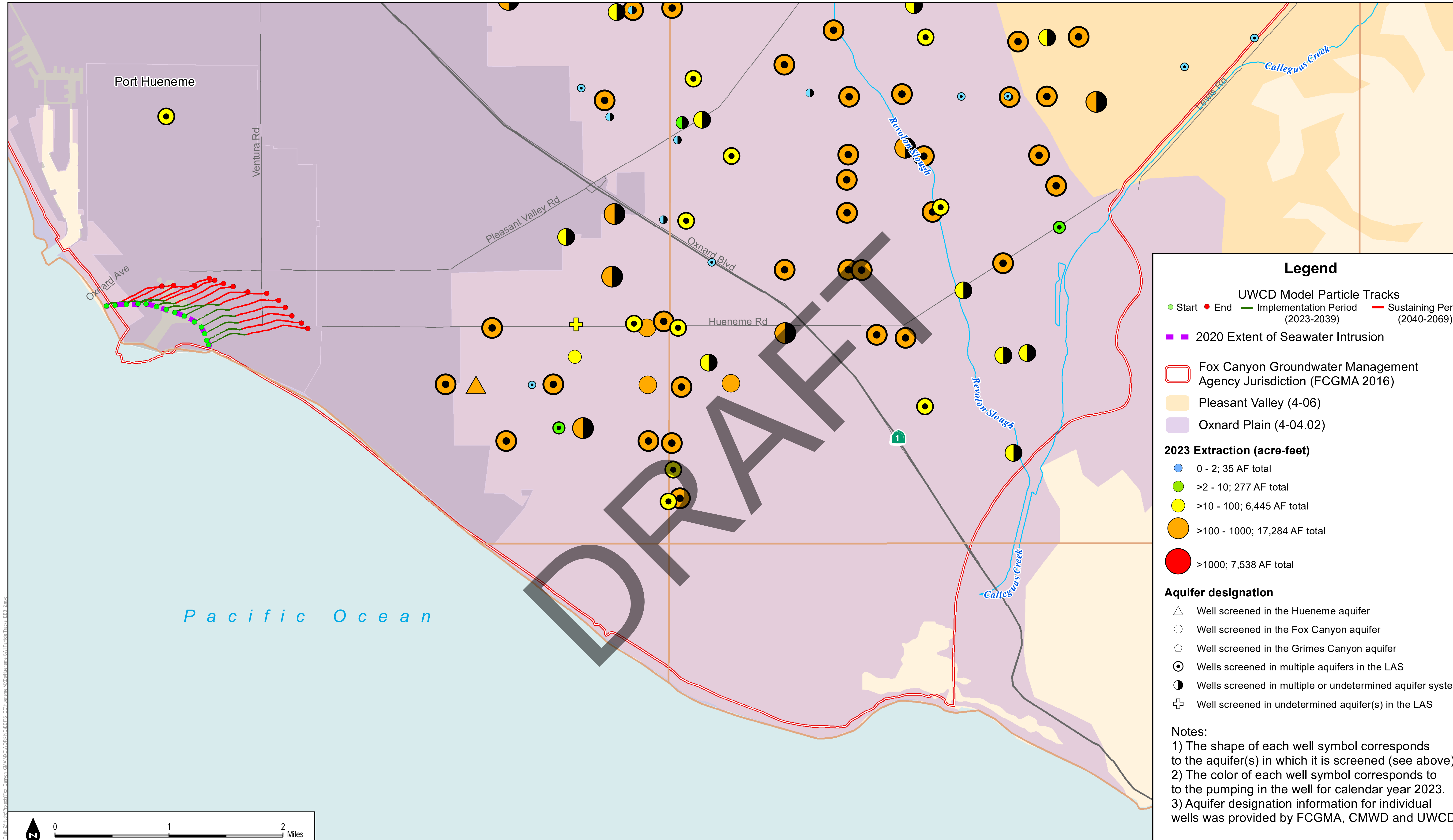

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
Climate Period 1930-1979; Climate Change Factor 2070

Figure 5-32
UWCD Model Particle Tracks, Hueneme Aquifer, Projects with EBB

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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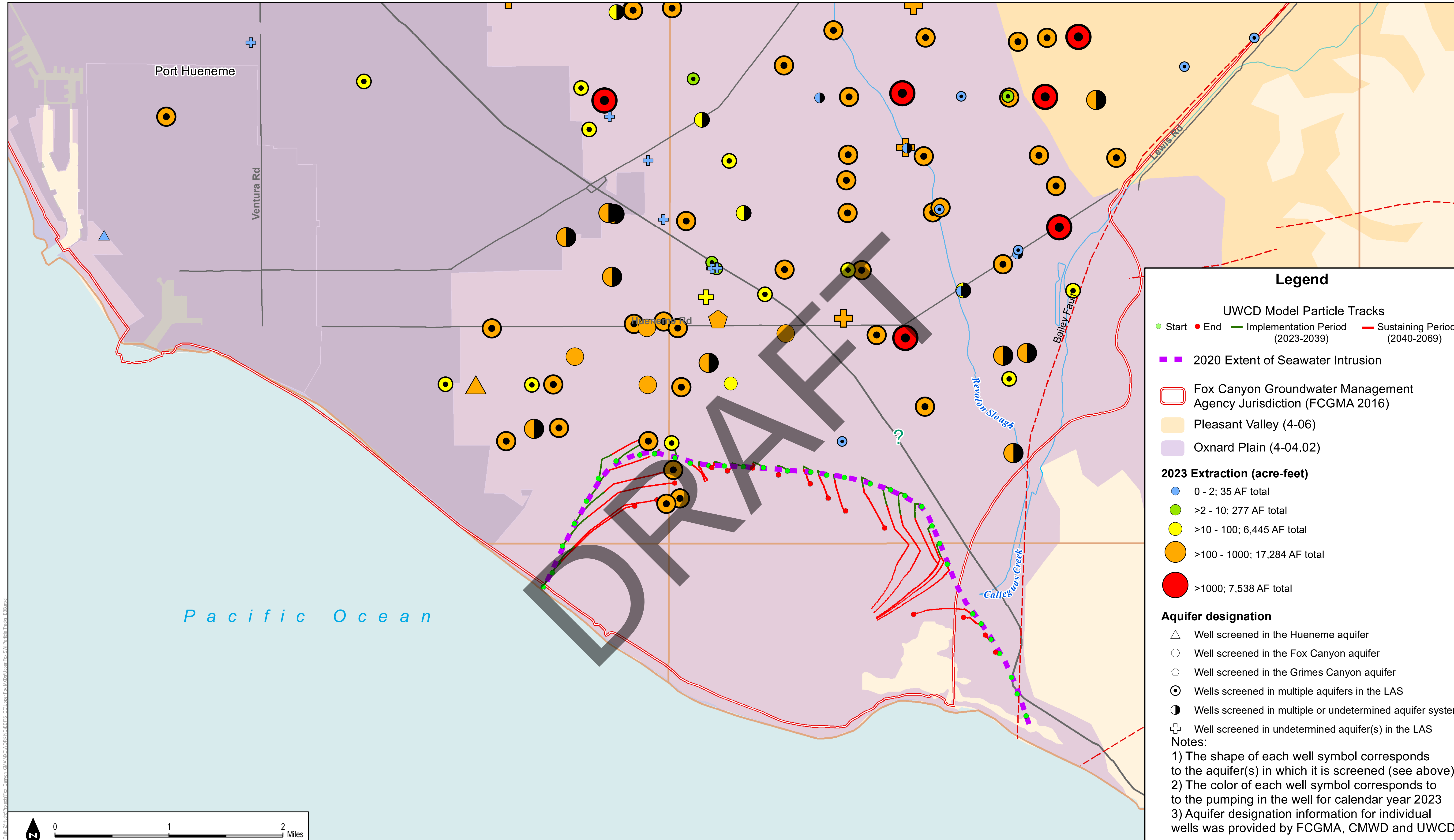

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-33
UWCD Model Particle Tracks, Upper Fox Canyon Aquifer, Projects with EBB

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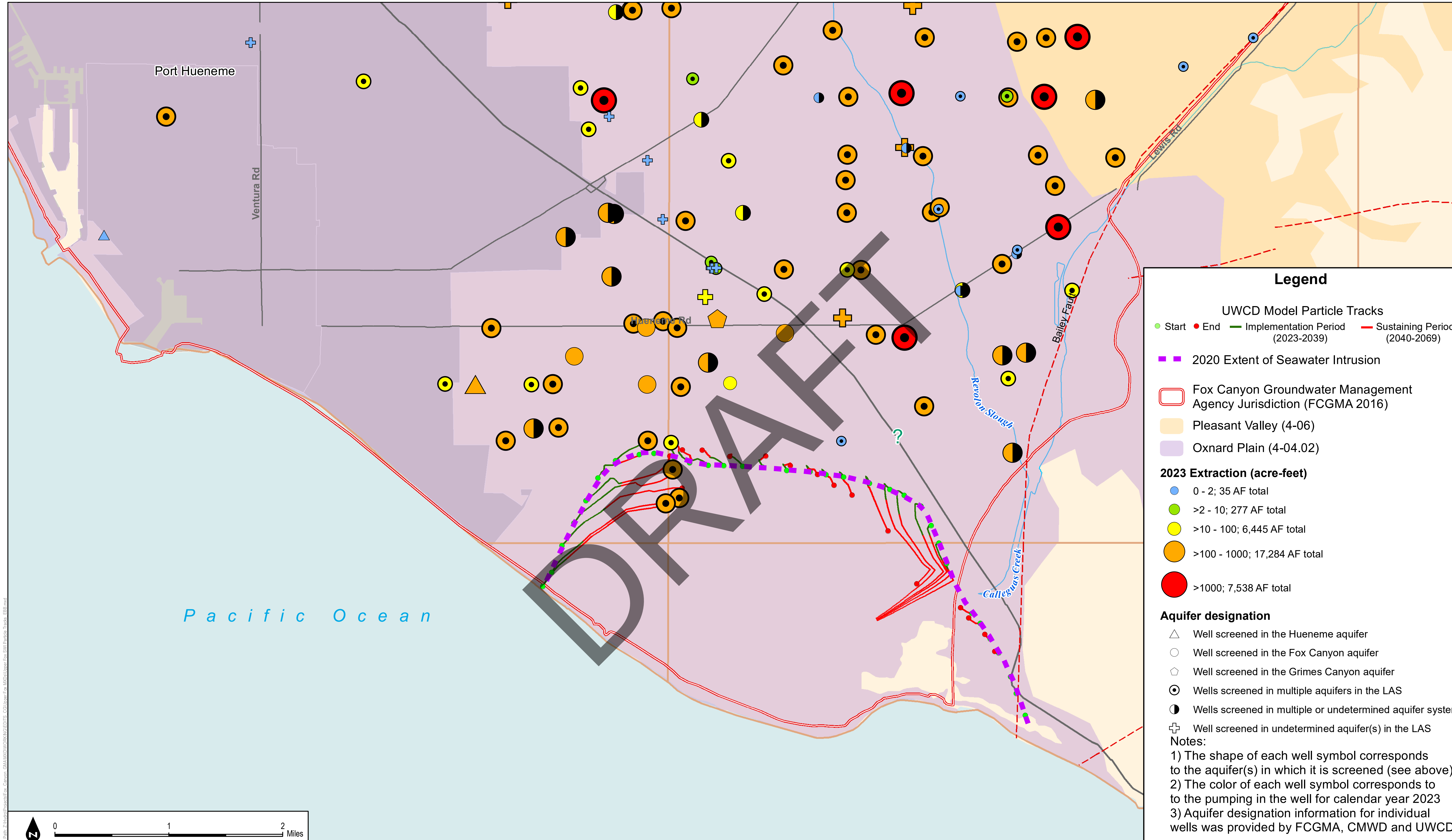

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-34
UWCD Model Particle Tracks, Basal Fox Canyon Aquifer, Projects with EBB

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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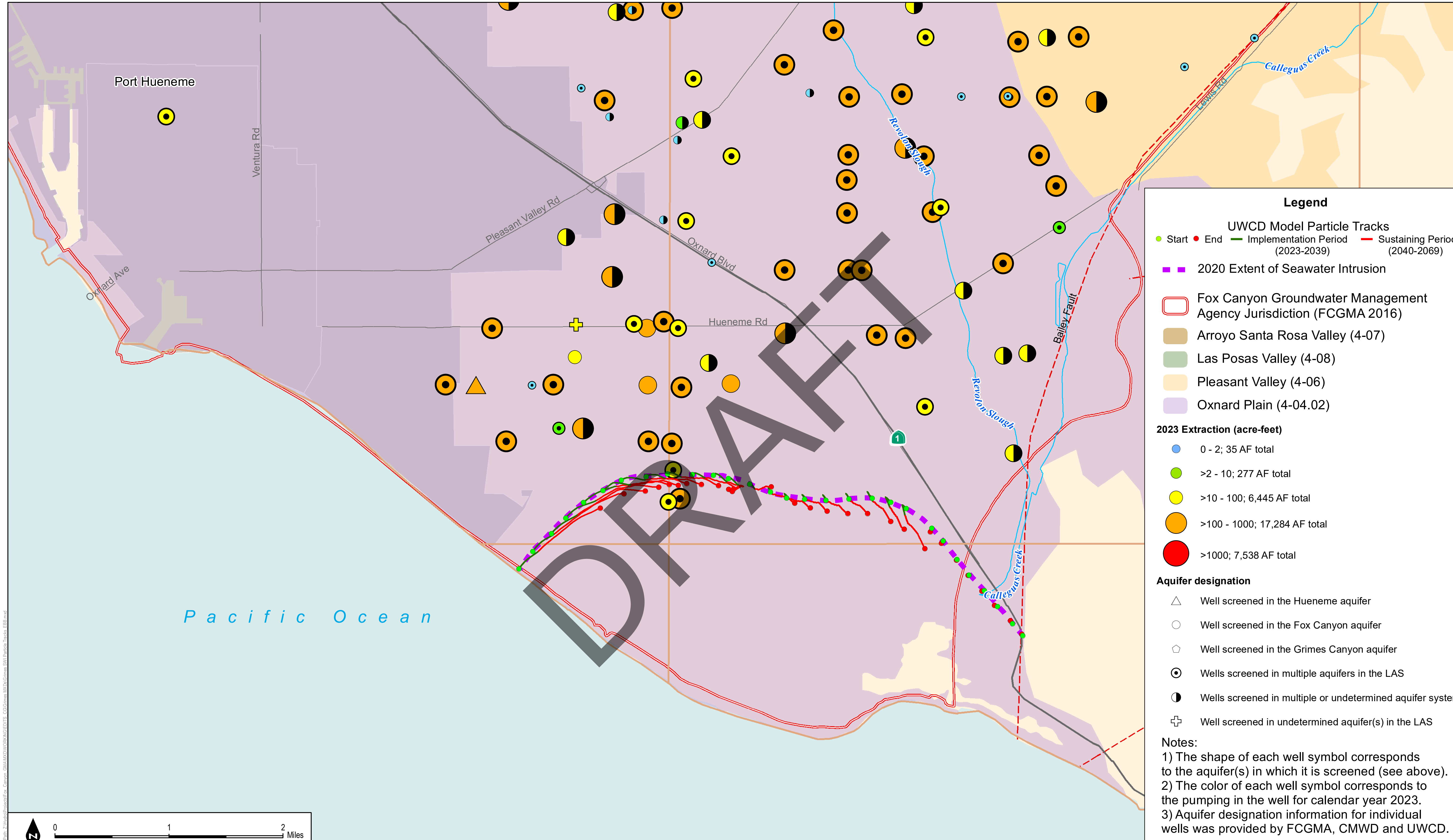

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD
1930-1979 Climate Period; 2070 Climate Change Factor

Figure 5-35
UWCD Model Particle Tracks, Grimes Canyon Aquifer, Projects with EBB

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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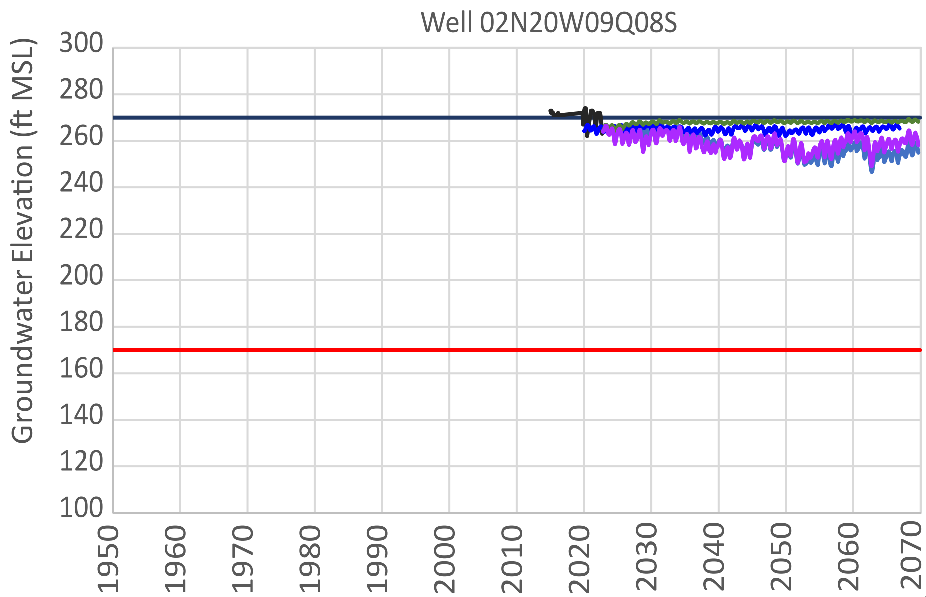

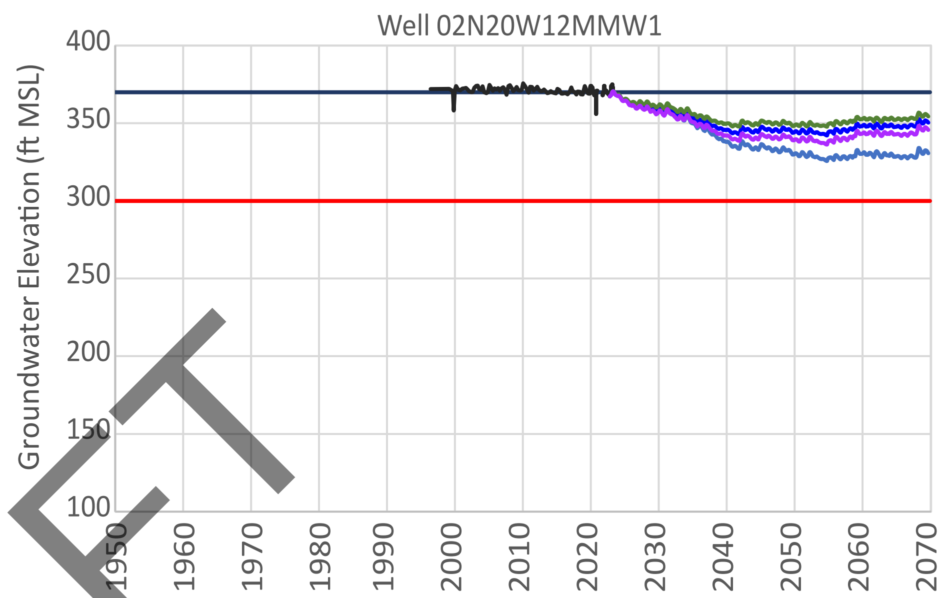

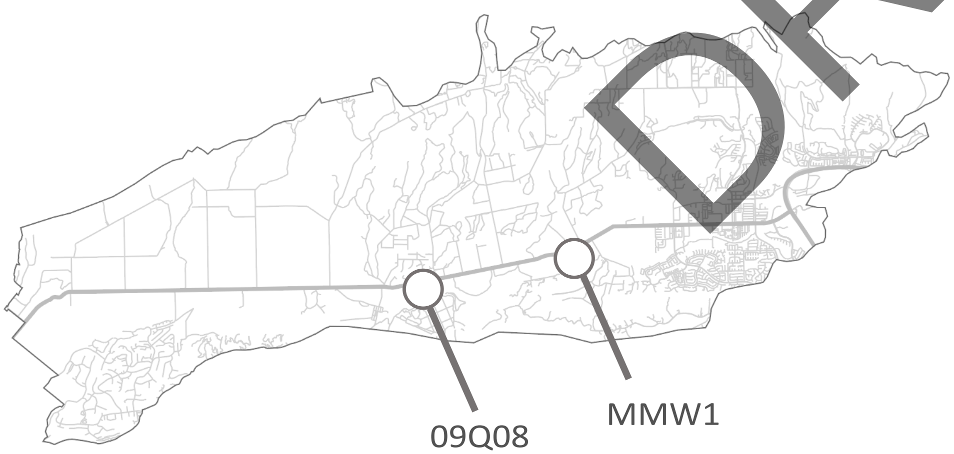

Legend

- Historical Water Level
- Minimum Threshold Water Level
- Measurable Objective Water Level

	2040 - 2069 Production (AFY)	
	Epworth	ELPMA
Future Baseline	-1,470	-21,070
NNP1	-1,330	-19,230
NNP2	-1,330	-19,230
Projects	-1,330	-19,230

Note: NNP = No New Projects

FIGURE 5-36a

Key Well Hydrographs in the East Las Posas Management Area - Shallow Alluvial Aquifer

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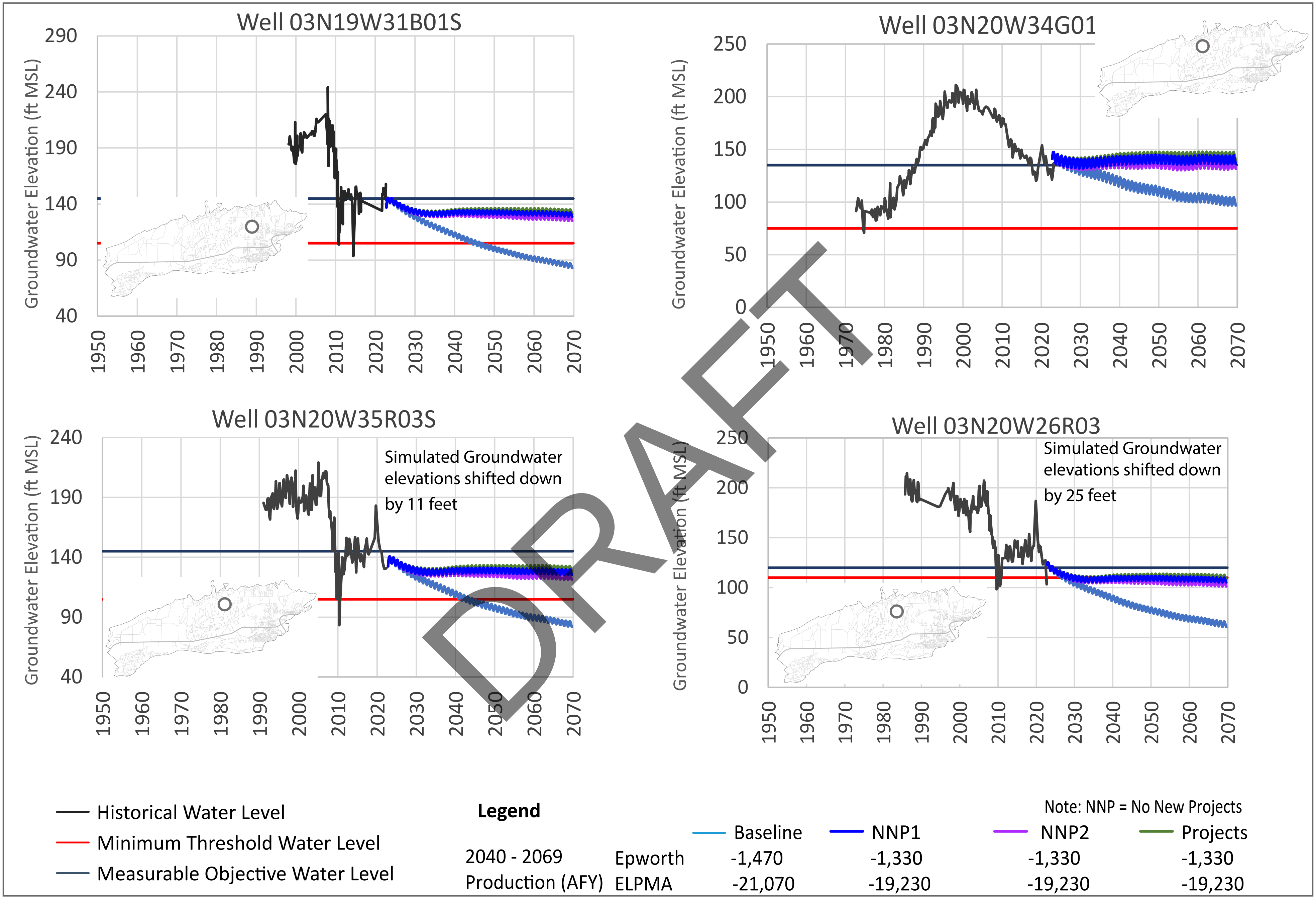

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FIGURE 5-36b

Key Well Hydrographs in the East Las Posas Management Area - Fox Canyon Aquifer

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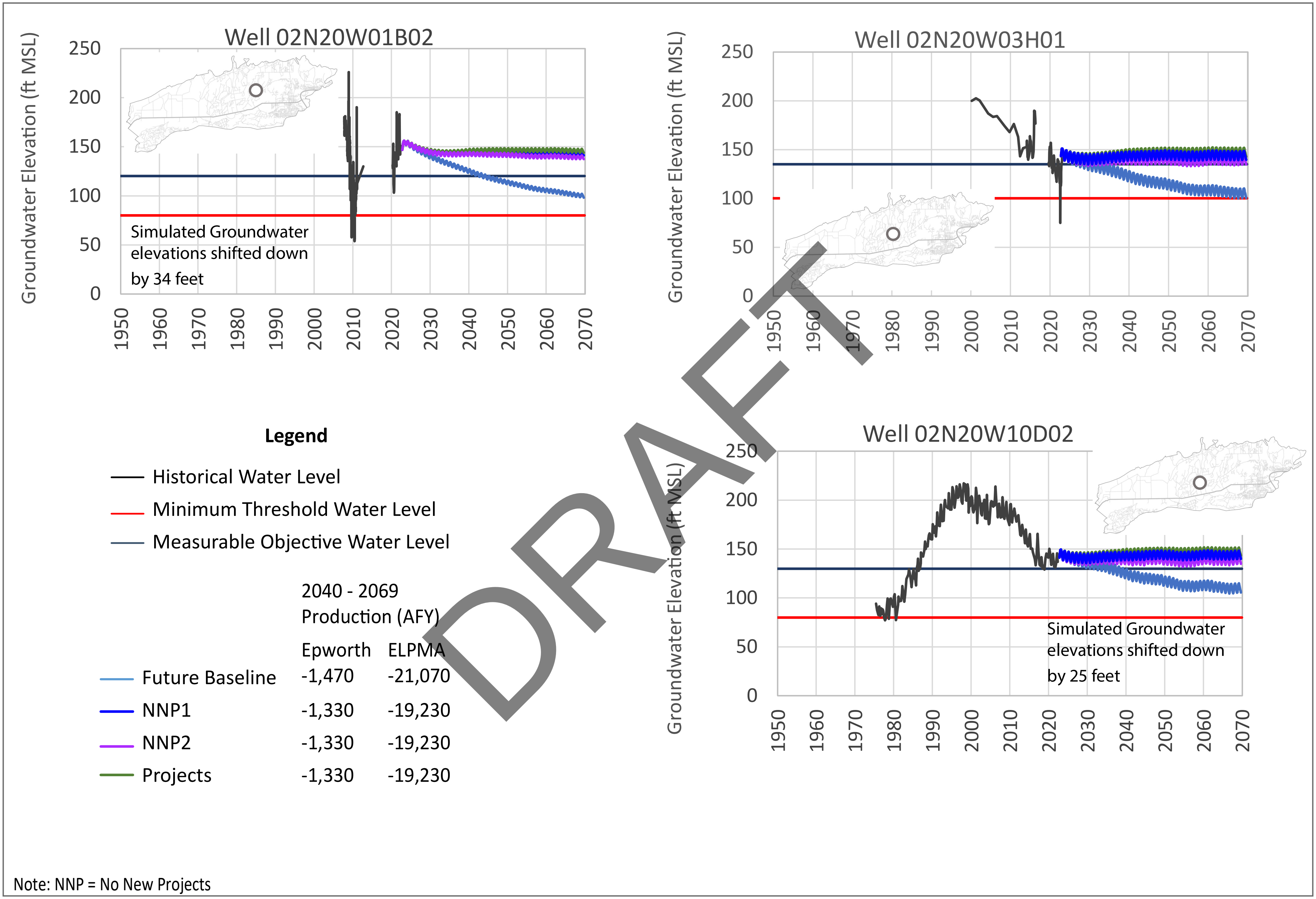

FIGURE 5-36c

Key Well Hydrographs in the East Las Posas Management Area - Fox Canyon Aquifer

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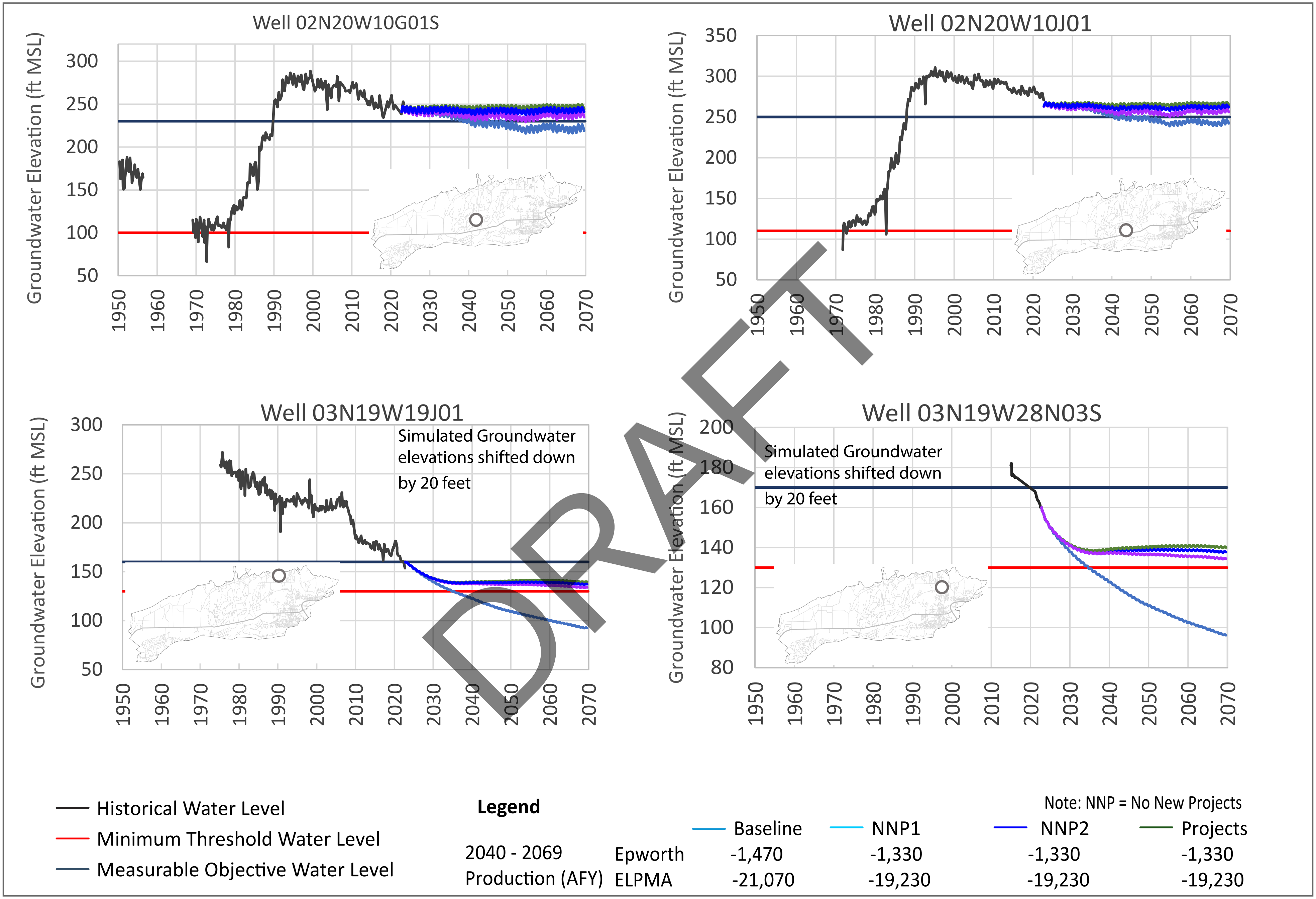

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FIGURE 5-36d

Key Well Hydrographs in the East Las Posas Management Area - Fox Canyon Aquifer

Groundwater Sustainability Plan for the Las Posas Valley Basin: First Periodic Evaluation

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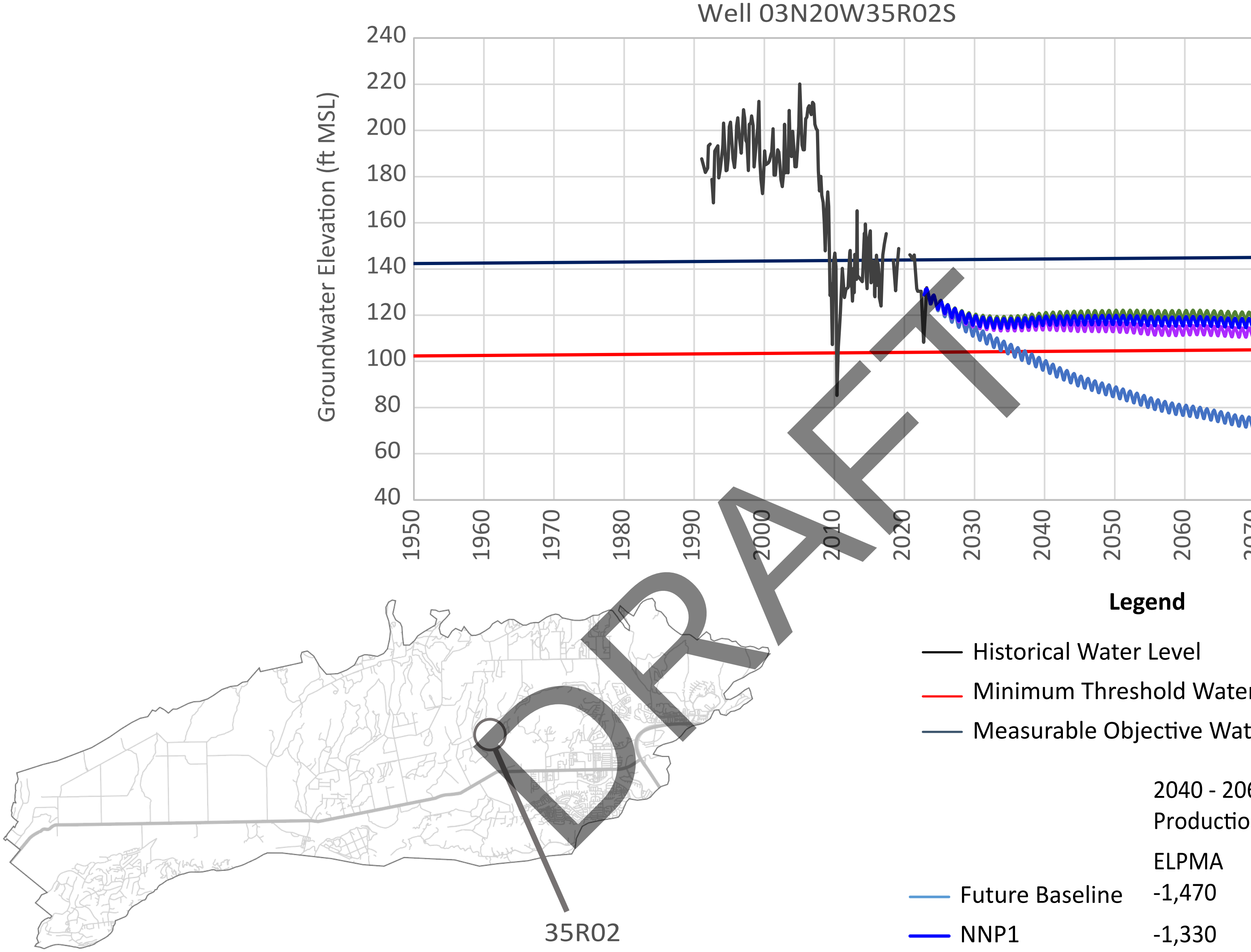

Legend

- Historical Water Level
- Minimum Threshold Water Level
- Measurable Objective Water Level

	2040 - 2069 Production (AFY)	
	ELPMA	Epworth Gravels
Future Baseline	-1,470	-21,070
NNP1	-1,330	-19,230
NNP2	-1,330	-19,230
Projects	-1,330	-19,230

Note: Simulated Groundwater elevations shifted down by 23 feet

Note: NNP = No New Projects

FIGURE 5-36e

Key Well Hydrographs in the East Las Posas Management Area - Fox Canyon Aquifer

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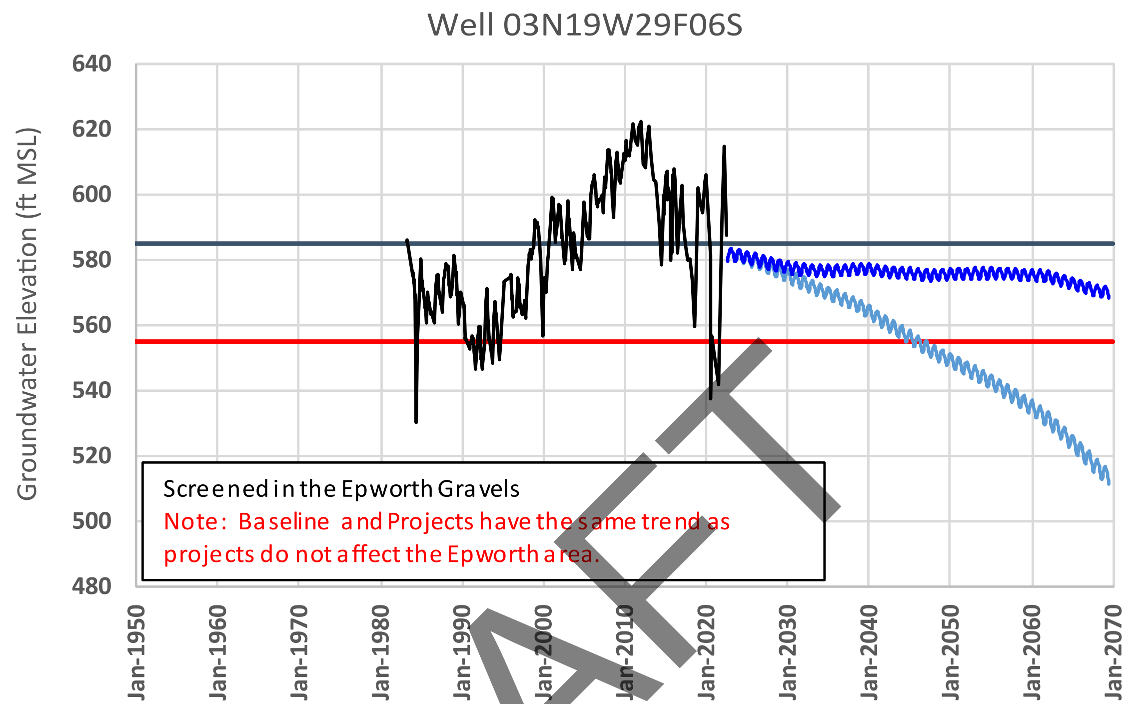

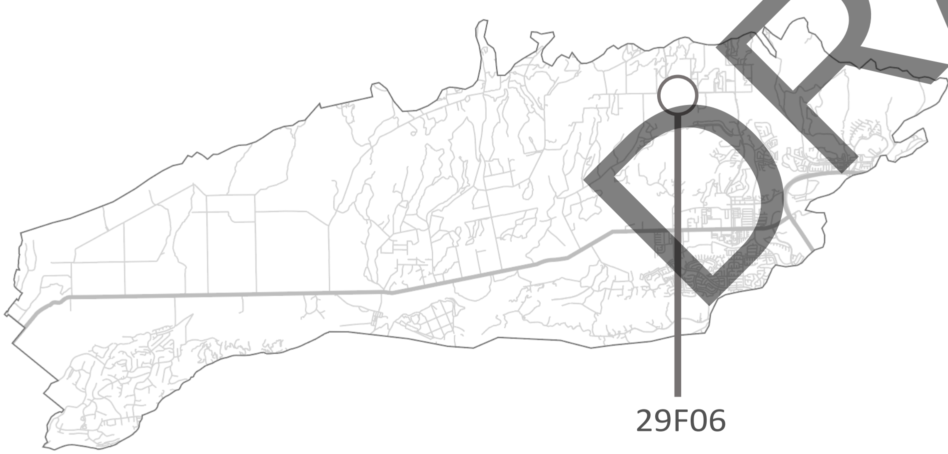

Legend

- Historical Water Level
- Minimum Threshold Water Level
- Measurable Objective Water Level

	2040 - 2069 Production (AFY) Epworth	ELPMA
Future Baseline	-1,470	-21,070
NNP1	-1,330	-19,230
NNP2	-1,330	-19,230
Projects	-1,330	-19,230

Note: NNP = No New Projects

FIGURE 5-37

Key Well Hydrographs in the Epworth Gravels Management Area

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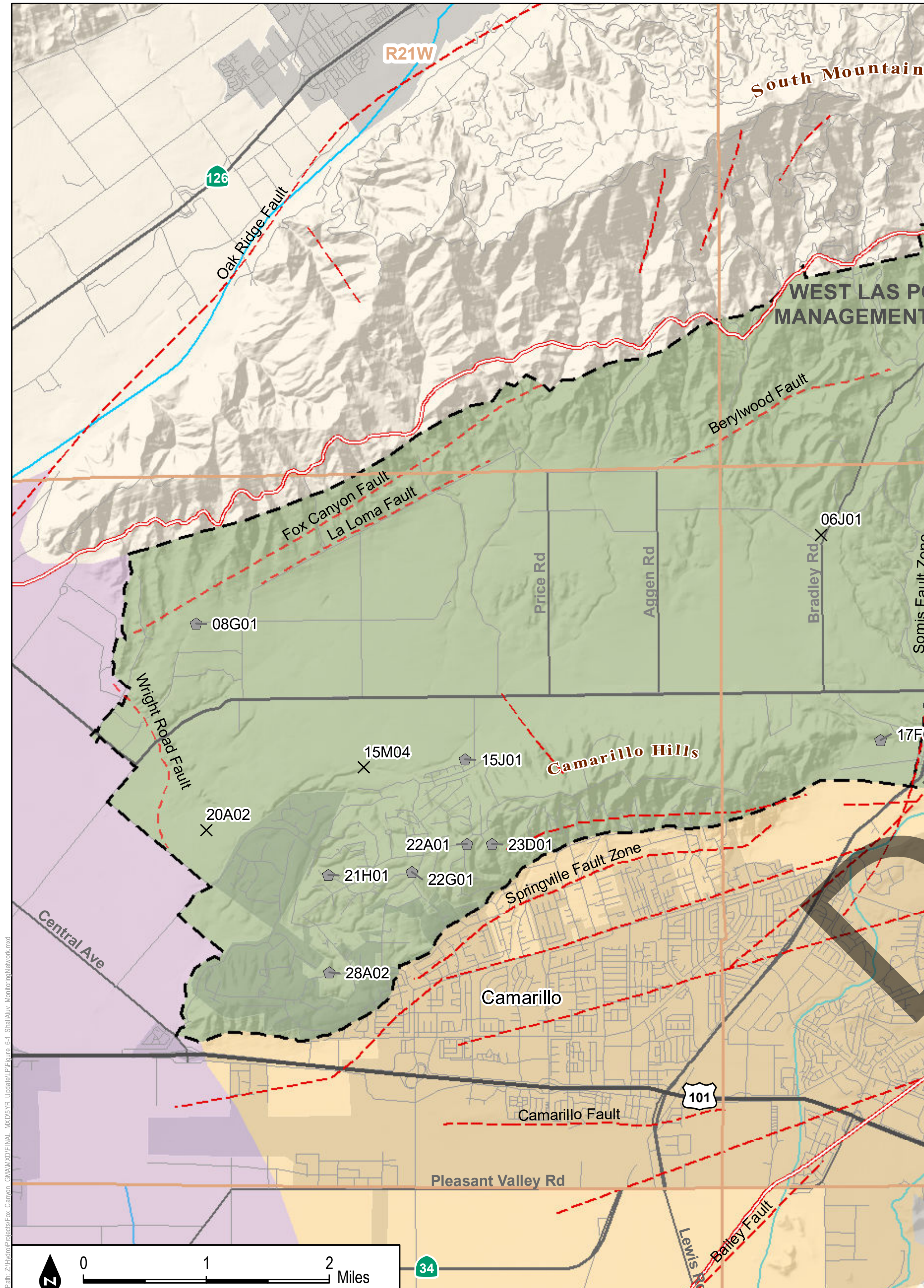

Legend

Wells in the Shallow Alluvium
- Monitored by the CMWD
- Not monitored by the CMWD

Wells in the Epworth Aquifer
- Monitored by CMWD/VCWPD
- Not monitored by CMWD/VCWPD

Wells in the Grimes Canyon Aquifer
- Monitored by VCWPD
- Not monitored by VCWPD
- Monitoring Wells in Unassigned Aquifers
- 15P01 Abbreviated State Well Number (see notes)
- Key Wells

- Fox Canyon Groundwater Management Agency Boundary (FCGMA 2016)
- Epworth Gravels Management
- Township (North-South) and Range (East-West)
- Faults (Ventura County 2016)
- Las Posas Management Areas

Revised Bulletin 118 Groundwater Basins and Subbasin (DWR 2019)
- Arroyo Santa Rosa Valley (4-007)
- Las Posas Valley (4-008)
- Pleasant Valley (4-006)
- Oxnard (4-004.02)

Notes:
1) Well labels consist of an abbreviated State Well Number (SWN). SWNs are based on Township and Range in the Public Land Survey System. To construct a full SWN from the abbreviation shown on the map, concatenate the Township, Range, abbreviation, and the letter "S". Example: the SWN for the well labeled "15L01" located in Township 02N (T02N) and Range 22W (R22W) is 02N22W15L01S.
2) Aquifer designation information for individual wells was provided by FCGMA, CMWD and UWCD.

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 6-1

Monitoring and Non-Monitoring Wells Screened in the Shallow Alluvial Aquifer, Epworth Gravels, and Grimes Canyon Aquifer in the Las Posas Valley Basin

Groundwater Sustainability Plan for the Las Posas Valley Basin: First 5-Year Evaluation

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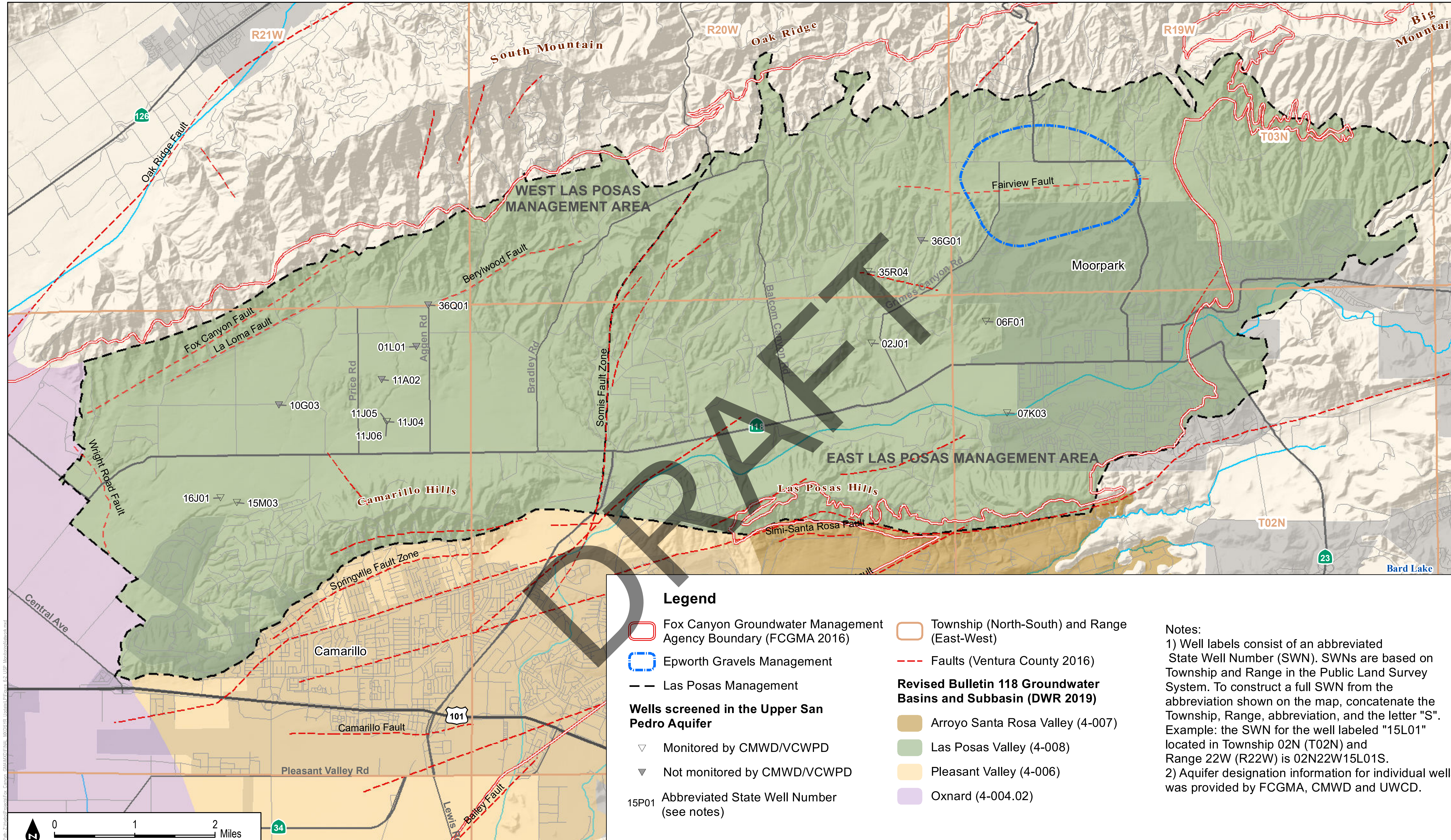

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 6-2

Monitoring Wells Screened in the Upper San Pedro Aquifer in the Las Posas Valley Basin

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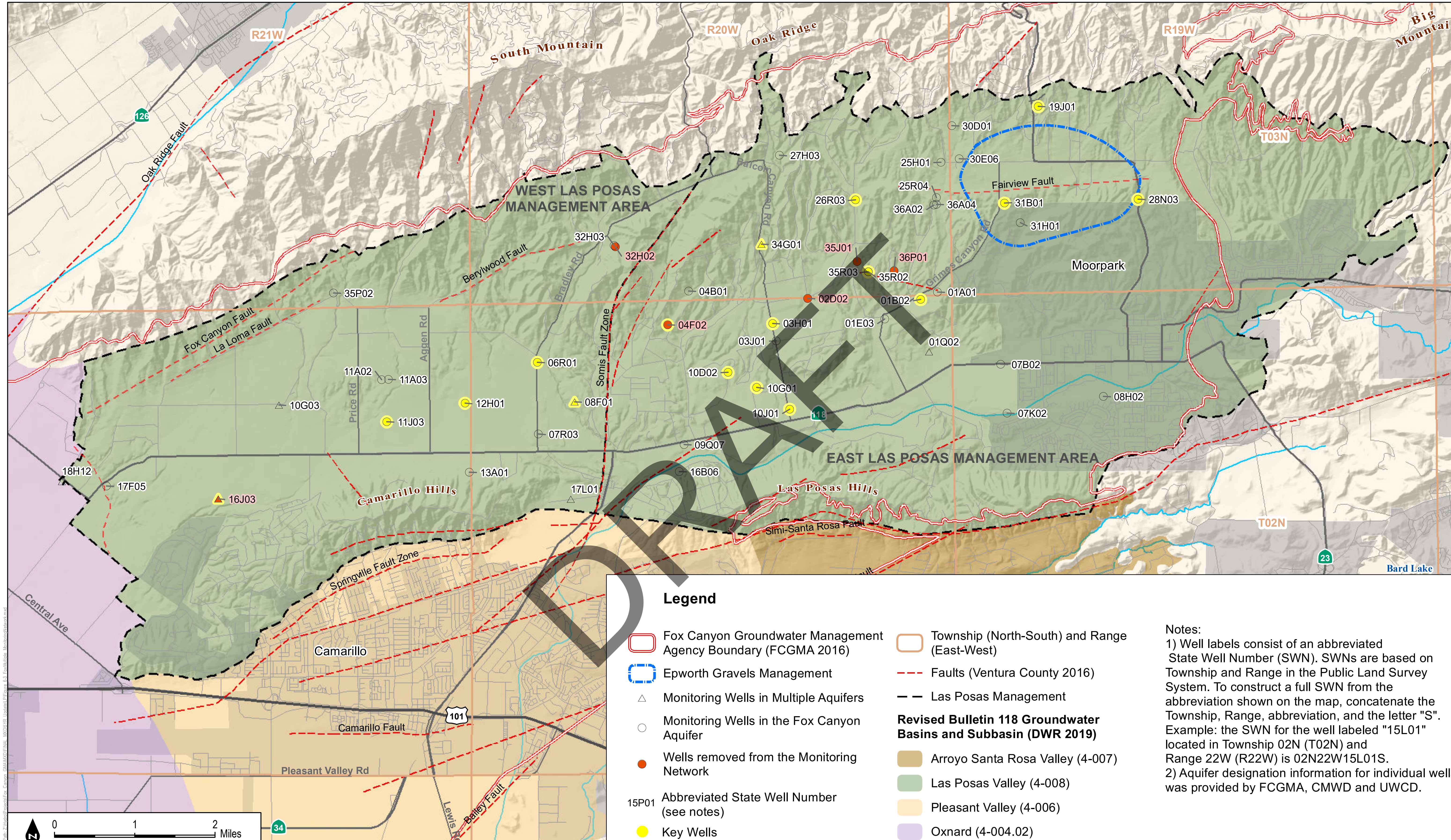

DUDEK

SOURCE: DWR; Ventura County; UWCD; CMWD

FIGURE 6-3

Monitoring Wells Screened in the Fox Canyon Aquifer in the Las Posas Valley Basin

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Appendix A

Investigation of the Relationship Between Native Flows in Arroyo Simi-Las Posas and Potential Groundwater Dependent Ecosystems

A.1 Department of Water Resources Recommended Corrective Action

In its approval of the Las Posas Valley Basin (LPVB) Groundwater Sustainability Plan (GSP), the California Department of Water Resources provided one recommended corrective action related to groundwater-surface water connections in the East Las Posas Management Area (ELPMA) (DWR 2022):

> Investigate the hydraulic connectivity of the Arroyo Simi-Las Posas, shallow aquifers, and principal aquifer to understand the reliance of the potential GDEs [groundwater-dependent ecosystems] on the native flow and depletion of interconnected surface water bodies. Also, identify specific locations where Arroyo Simi-Las Posas is connected to the underlying aquifer and conduct necessary investigation to quantify the depletion of interconnected surface water along with the timing of depletions.
>
> Provide a schedule detailing when and how the data gaps identified in the GSP related to shallow groundwater monitoring near surface water bodies will be fulfilled and confirm the identification of potential GDEs.

In order to refine the understanding of the surface water and groundwater conditions that contributed to the development of vegetation and in-stream habitat on Arroyo Simi-Las Posas and address the question of the reliance of the potential GDEs on the native flow in Arroyo Simi-Las Posas, Fox Canyon Groundwater Management Agency conducted an additional review of historical aerial photographs, groundwater production rates, and groundwater elevations.

A.2 Historical Aerial Photograph Review

Ventura County aerial photographs indicate that Arroyo Simi-Las Posas in the LPVB was dry prior to the 1970s (FCGMA 2019). By 2016, however, vegetation lined much of the reach of Arroyo Las Posas within the LPVB, and, in several places, vegetation density exceeded 75% (Figure A1). For this updated study, Fox Canyon Groundwater Management Agency reviewed a series of aerial photographs from 1969 through 2023 to examine the timing of vegetation growth along Arroyo Simi Las Posas and changes since the GSP was prepared (Figures A2 through A5). Review of the 2023 aerial photograph indicates that there has been little change in vegetation location and density since 2016 (Figure A2). This is consistent with the depth to groundwater measured in well MMW-1, a shallow well adjacent to Arroyo Las Posas, which has remained at approximately 31 feet below ground surface (ft bgs) since 2016 (Figure A2). Additionally, between 2014 and 2023 the greenness and water content of the vegetation along the upstream reaches of Arroyo Las Posas, as measured with the normalized difference vegetation index (NDVI) and normalized difference moisture index, has increased (TNC 2024).

Between 1994 and 2013, aerial photos show that vegetation location along Arroyo Las Posas is similar to the location mapped in 2016 (Figures A3 and A4). Depth to groundwater in well MMW-1 was approximately 28 ft bgs in 2003, and 31 ft bgs in 2013. Depth to groundwater was first measured in well MMW-1 in1996. For earlier measurements of depth to groundwater in the vicinity of Arroyo Las Posas, this review relies on well 02N20W12G02, which, for the period of overlap in the record, was approximately 2 feet shallower than the water level in well MMW-1. In 1994, the depth to groundwater in well 02N20W12G02 was approximately 24 ft bgs (Figure A4).

In contrast to the period from 1994 through 2023, when vegetation coverage is relatively stable, the vegetation coverage in Arroyo Las Posas is greatly reduced in 1985 relative to the later period of time. Only the upstream areas of the Arroyo have visible vegetation in the 1985 aerial photos, whereas the downstream areas remain dry (Figure A4). This reflects the recharge of the surface water discharges to the Arroyo upstream of the LPVB. Flow in the Arroyo is still ephemeral at this time. The groundwater elevation in well 02N20W12G02 was approximately 28 ft bgs in 1985.

Prior to 1985, there was no naturally occurring vegetation adjacent to Arroyo Las Posas and flow in the Arroyo was ephemeral (Figure A5). The groundwater elevation in well 02N20W12G02 was approximately 28 ft bgs in 1985. In 1979 the depth to groundwater was approximately 50 ft bgs, and in 1969 the depth to groundwater was approximately 70 ft bgs. The trends in groundwater elevation, vegetation density, and location of vegetation all demonstrate that the potential GDEs on Arroyo Las Posas are not dependent on native flow in the Arroyo, as discussed in the GSP. Instead, these potential GDEs are reliant on the surface water infiltration and, potentially, higher groundwater elevations that occurred since the onset of non-native discharges to the Arroyo upstream of LPVB.

A.3 Groundwater Production

Between 1985 and 2023 calendar year groundwater production rates in the ELPMA of the LPVB ranged from 11,935 AF, in 1996, to 30,315 in 2007 (Figure A6). On average, groundwater production rates were approximately 6,800 AFY lower between 1985 and 2006 than they were between 2007 and 2022 (Figure A6). Between 2007 and 2022, during the time of higher groundwater production rates, the depth to groundwater in well MMW-1, adjacent to Arroyo Las Posas, ranged from 24 to 43 ft bgs. Between 1996 and 2007, when groundwater production rates were lower, the depth to groundwater in well MMW-1 ranged from 25 to 42 ft bgs, which is effectively the same range as was measured between 2007 and 2022. This indicates that groundwater production in the principal aquifers of the ELPMA has not impacted the groundwater level in the shallow alluvial aquifer adjacent to the Arroyo near well MMW-1.

The groundwater elevation in the shallow alluvial aquifer well 20N20W09Q08S, which is downstream of well MMW-1, has a declining trend in fall water levels between 2016 and 2022 (Figure A6). This trend is not correlated with changes in groundwater production, although it may reflect the combined influences of groundwater production, drought, and declining dry season discharges to the Arroyo.

A.4 Conclusions

The Arroyo Simi-Las Posas, shallow aquifer is hydraulically connected to the principal aquifer in the ELPMA, as demonstrated by long-term trends in groundwater elevation. However, the potential GDEs in the ELPMA do not rely on native flow, but rather on upstream surface water discharges to the Arroyo. Depletion of interconnected surface water bodies has not occurred in relation to current groundwater production, although this could occur in the future if upstream surface water discharges decrease.

FCGMA has actively sought funding for additional monitoring wells to further characterize the interconnections between the shallow alluvial aquifer and the underlying principal aquifer. As funding becomes available data gaps identified in the GSP related to shallow groundwater monitoring near surface water bodies will be fulfilled.

A.5 References

DWR. 2022. Statement of Findings Regarding the Approval of the Las Posas Valley Basin Groundwater Sustainability Plan. January 13, 2022. Online Access: https://sgma.water.ca.gov/portal/gsp/assessments/18.

FCGMA (Fox Canyon Groundwater Management Agency). 2019. Groundwater Sustainability Plan for the Las Posas Valley Basin. Available online: https://fcgma.org/groundwater-sustainability-plans-gsps/.

TNC (The Nature Conservancy) 2024. GDE Pulse Data Viewer. Accessed June 2, 2024: https://gde.codefornature.org/#/map.

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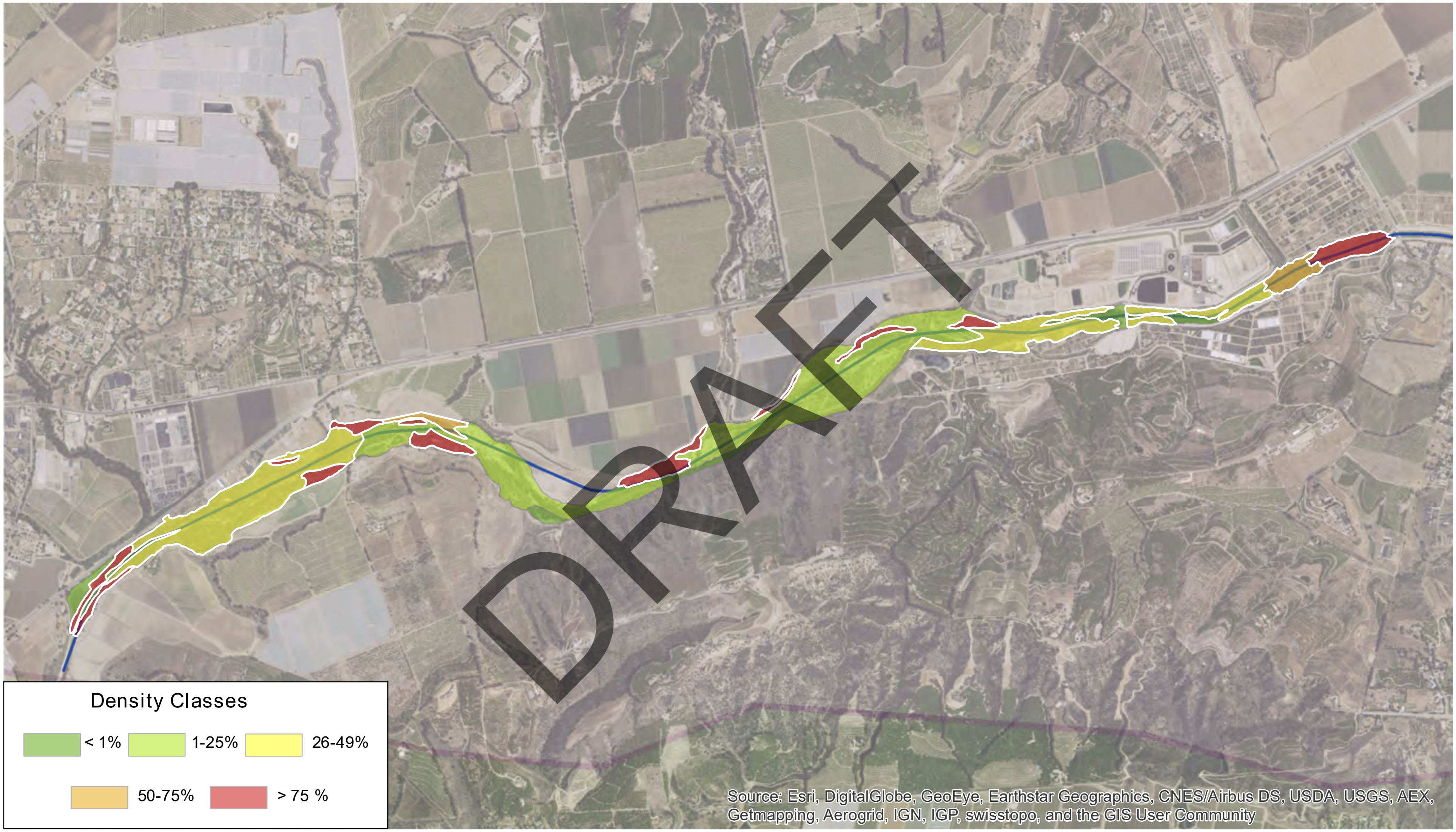

FIGURE A1

Arroyo Las Posas Vegetation Density

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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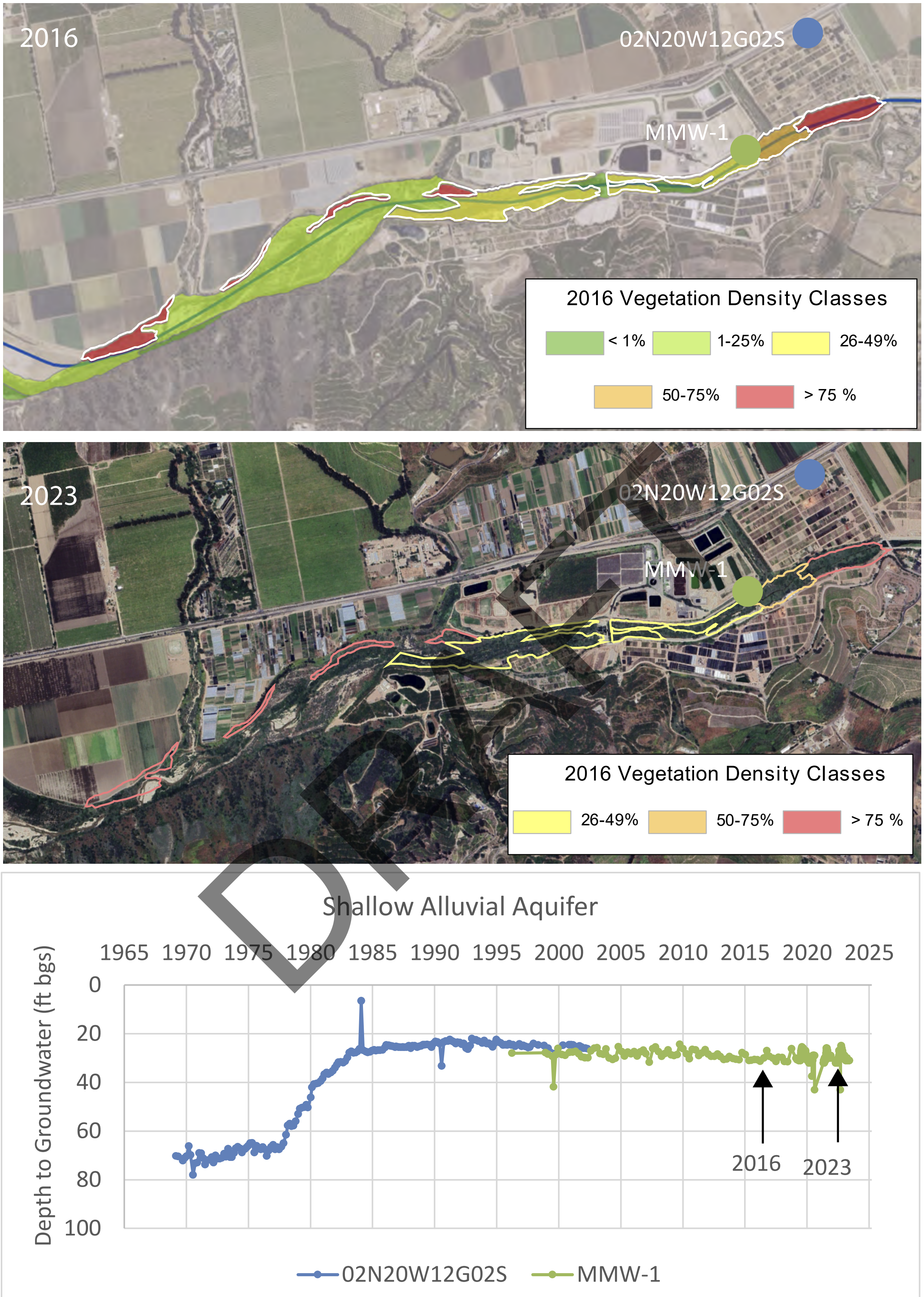

SOURCE:

FIGURE A2

Vegetation Density and Depth to Groundwater 2018 to 2023

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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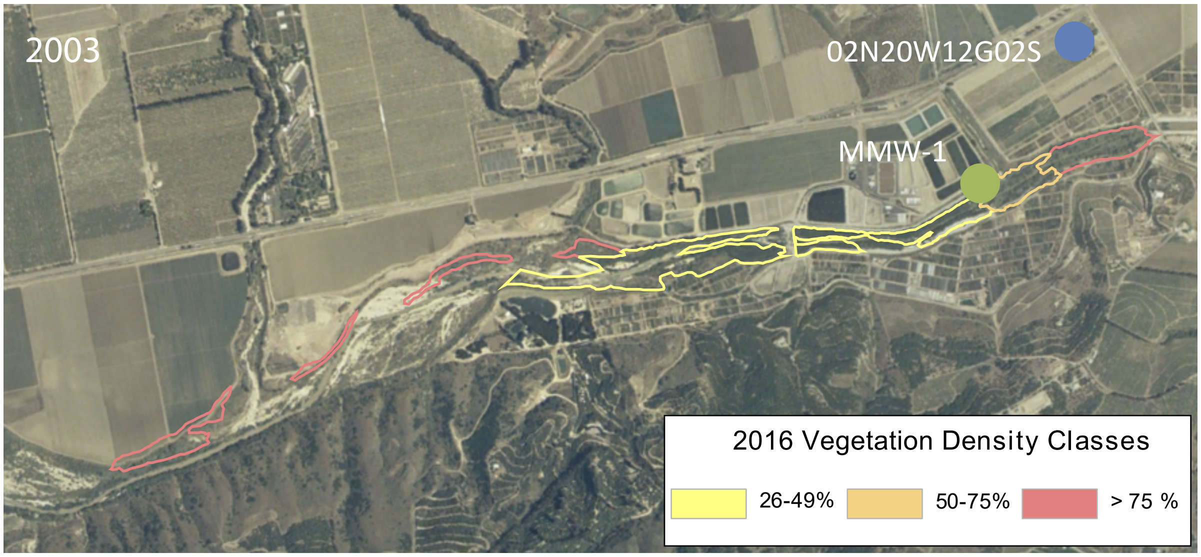

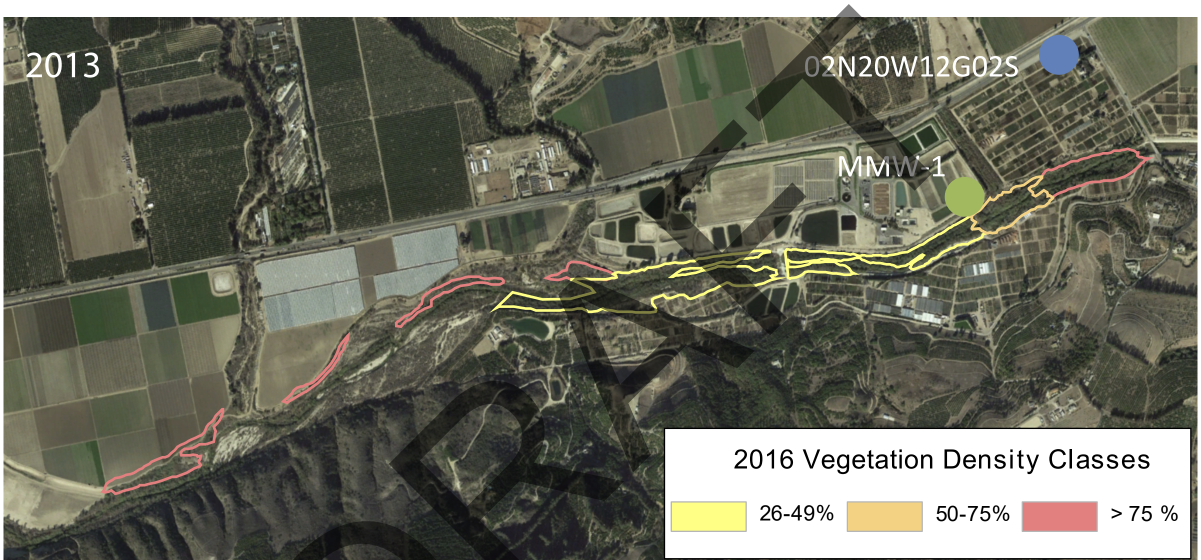

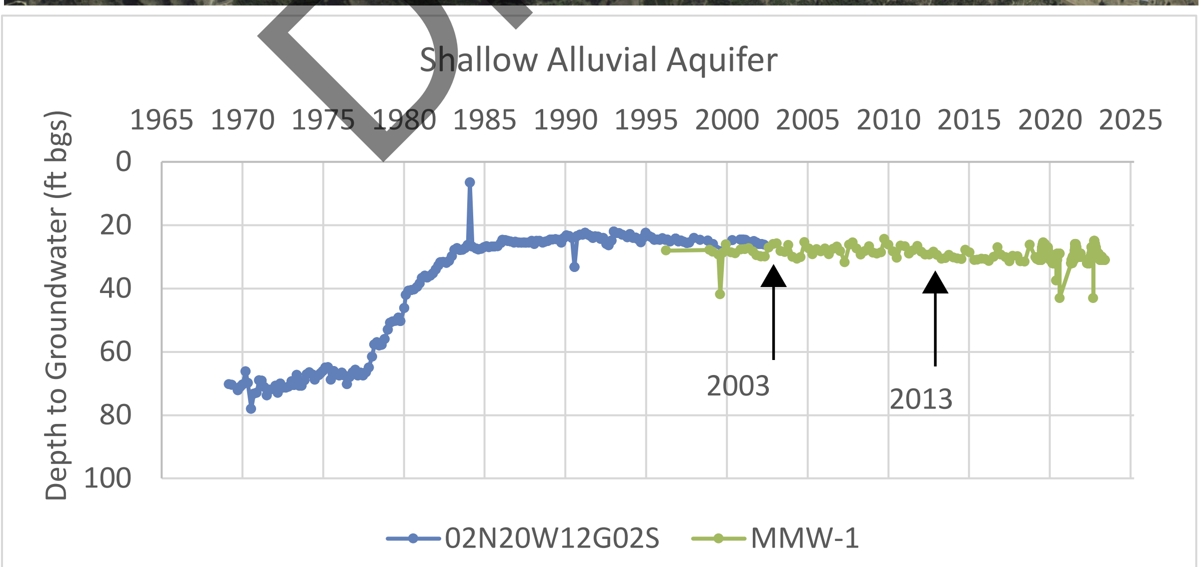

SOURCE:

FIGURE A3

Vegetation Density and Depth to Groundwater 2003 to 2013

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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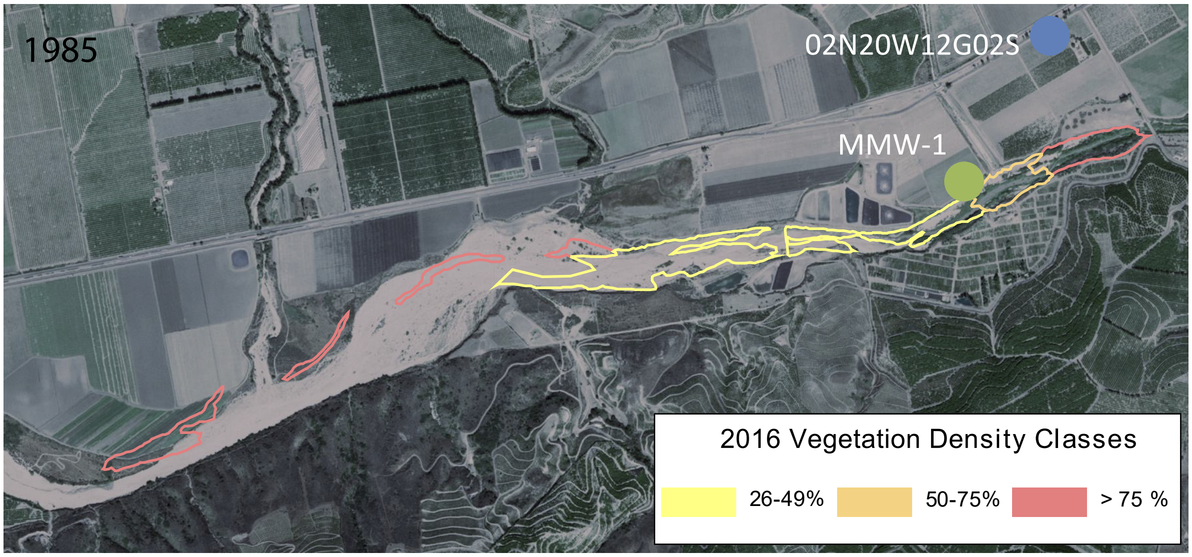

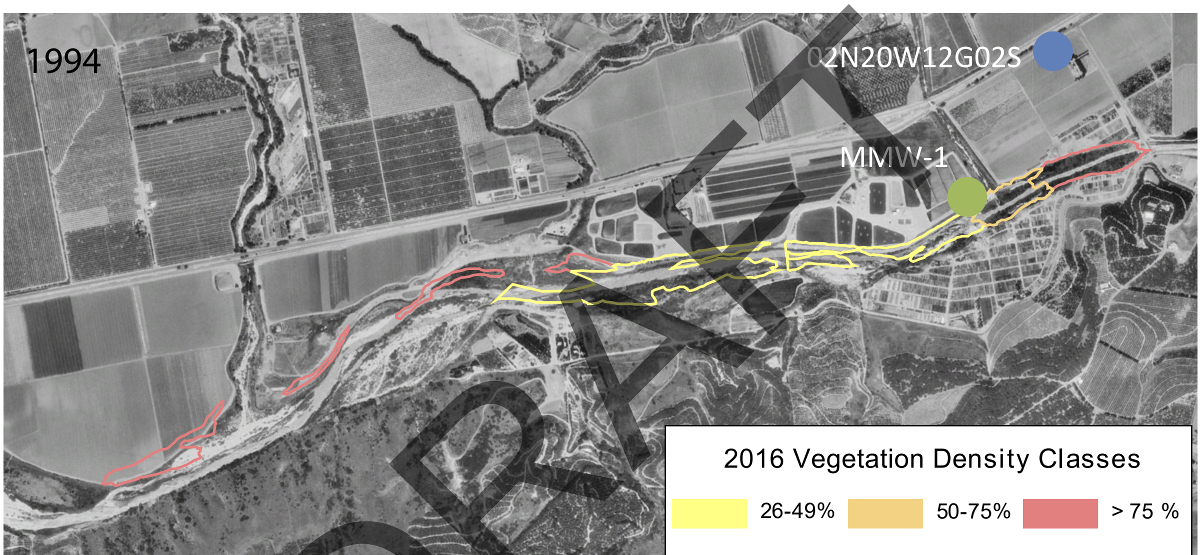

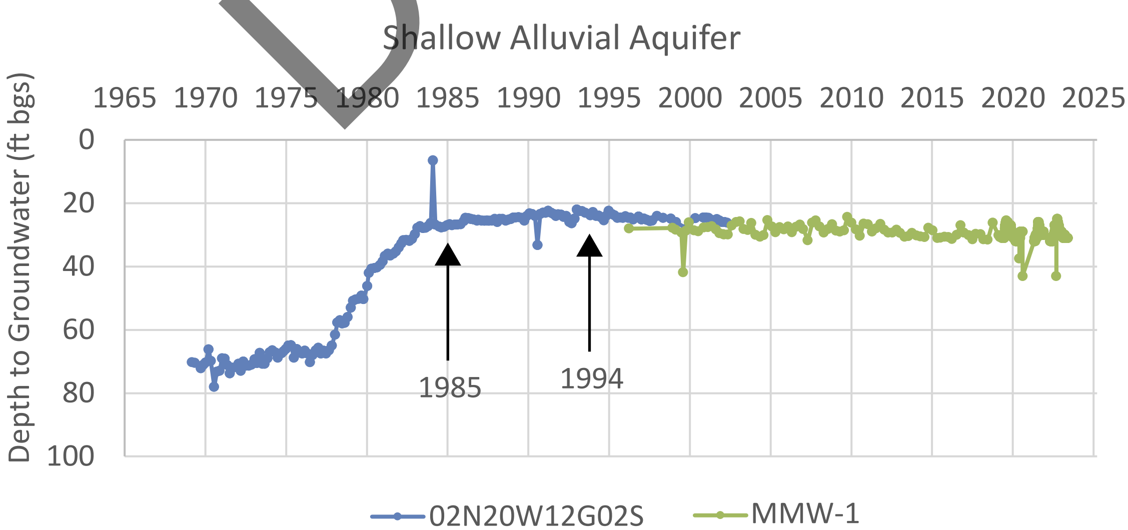

SOURCE:

FIGURE A4

Vegetation Density and Depth to Groundwater 1985 to 1994

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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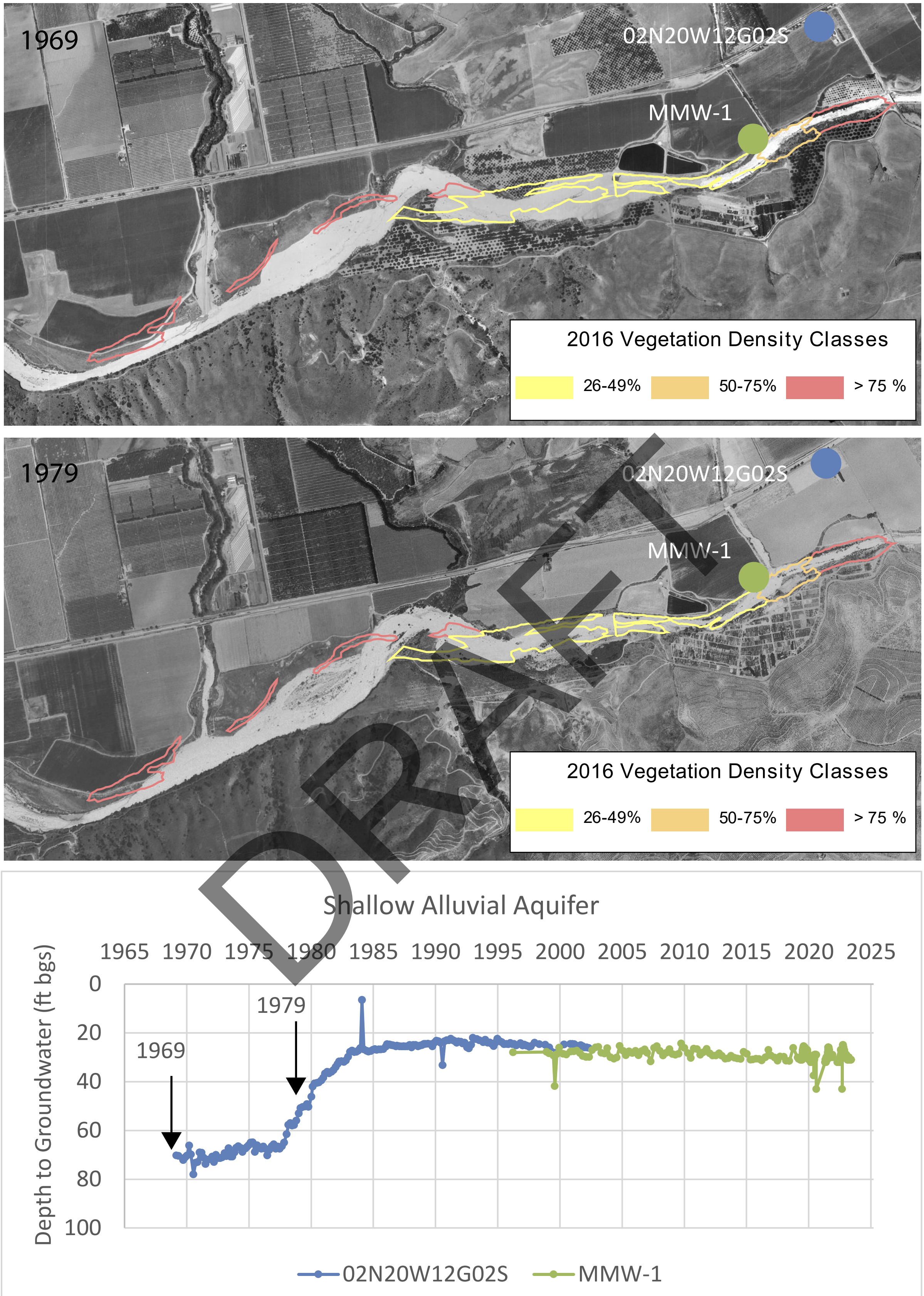

SOURCE:

FIGURE A5

Vegetation Density and Depth to Groundwater 1969 to 1979

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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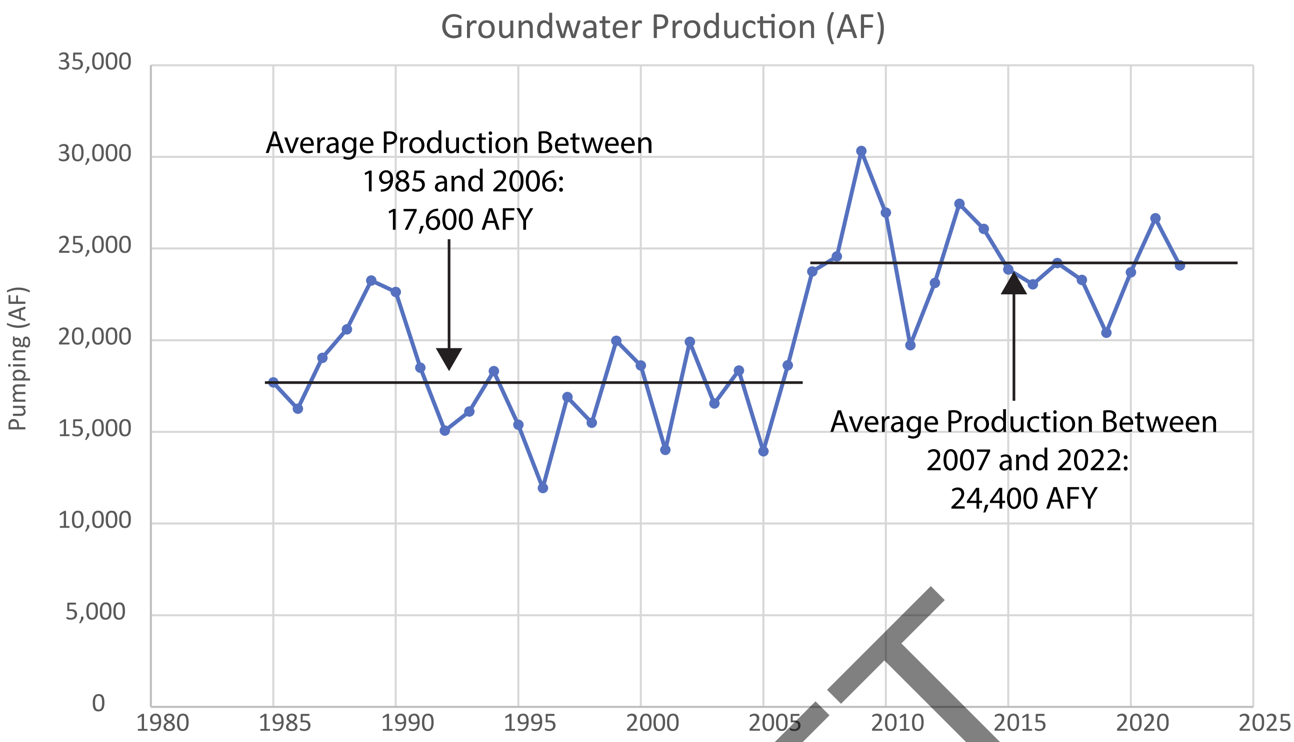
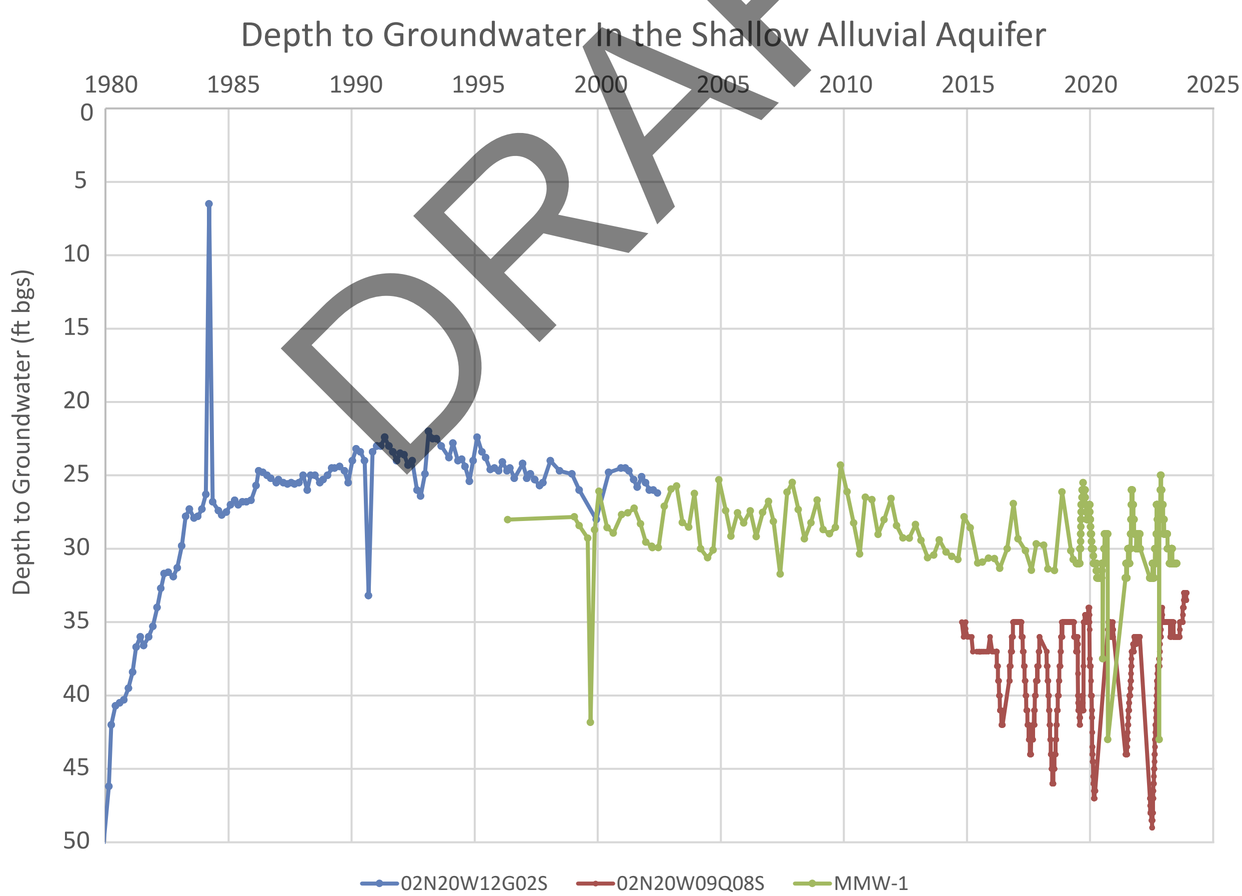


Note: Groundwater production shown for 1985 thorugh 2020 is calendar-year production, whereas 2021 and 2022 are water-year production.
FCGMA switched from calendar year to water year reporting after the GSP was submitted.



SOURCE:

FIGURE A6

Groundwater Production and Water Level Trends 1985 to 2022

5-Year Evaluation of the Groundwater Sustainability Plan for the Las Posas Valley Basin

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