CHOWCHILLA SUBBASIN ANNUAL REPORT

APRIL 2025

Prepared By
Davids Engineering, Inc.
Luhdorff & Scalmanini

Chowchilla Subbasin
Groundwater Sustainability Plan (GSP)
Annual Report

For Water Year 2024
(October 2023 – September 2024)

April 2025

Prepared For

Chowchilla Water District GSA

Madera County GSA – Chowchilla

Merced County GSA – Chowchilla

Triangle T Water District GSA

Prepared By

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List of Abbreviations

AF	acre-feet
AG	agricultural
AMSL	above mean sea level
AN	above normal
BN	below normal
C	critical
CASGEM	California State Groundwater Elevation Monitoring
CCR	California Code of Regulations
CVP	Central Valley Project
CWD	Chowchilla Water District
D	dry
DWR	California Department of Water Resources
EO	Executive Order
ETAW	ET of applied water
Flood-MAR	Flood Managed Aquifer Recharge
GSA	Groundwater Sustainability Agencies
GSP	Groundwater Sustainability Plan
GWE	Groundwater Elevation
GWS	groundwater system
IM	interim milestone
InSAR	Interferometric synthetic aperture radar
mg/L	milligrams per liter
MID	Madera Irrigation District
MO	measurable objective
MSL	mean sea level
MT	minimum threshold
NV	Native Vegetation Land
PMAs	projects and management actions
RMS	Representative monitoring sites
SEBAL	Surface Energy Balance Algorithm for Land
SGMA	Sustainable Groundwater Management Act of 2014
SMC	Sustainable Management Criteria
SVMWC	Sierra Vista Mutual Water Company
SWRCB	State Water Resources Control Board
SWS	surface water system
TTWD	Triangle T Water District
ug/L	micrograms per liter
UR	Urban Land
USACE	United States Army Corps of Engineers
USBR	U.S. Bureau of Reclamation, or Reclamation
USDA	U.S. Department of Agriculture
W	wet

Introduction

The California Code of Regulations Title 23 (23 CCR) §356.2 requires that Annual Reports be submitted to the California Department of Water Resources (DWR) by April 1 of each year following the adoption of the Groundwater Sustainability Plan (GSP). This Annual Report has been developed in compliance with the requirements of 23 CCR §356.2, describing conditions across the entire Chowchilla Subbasin (Subbasin) and the efforts made toward GSP implementation through April 2025.

The Subbasin is managed by four groundwater sustainability agencies (GSAs): Chowchilla Water District (CWD) GSA, Madera County GSA – Chowchilla (Madera County GSA), Merced County GSA – Chowchilla (Merced County GSA), and Triangle T Water District (TTWD) GSA. The jurisdictional areas of these four GSAs have been organized into five subregions for GSP planning and implementation efforts. These subregions include: CWD GSA, Madera County GSA – East, Madera County GSA – West, Sierra Vista Mutual Water Company (SVMWC), and TTWD GSA. The relationship between the Subbasin GSAs and subregions is summarized in **Table ES-1,** and shown in **Figures ES-1 and ES-2**. Each subregion represents either one entire GSA (CWD GSA, TTWD GSA), a portion of one GSA (Madera County GSA – East, Madera County GSA – West), or combined areas across more than one GSA (SVMWC).

This Annual Report provides basic information about the Subbasin plan area and presents technical information from water year 2015 (after the end of the historical water budget period) through the current reporting year (water year 2024) (23 CCR §356.2.b.5.B), including:

- Groundwater elevation data from monitoring wells
- Contour maps and hydrographs of groundwater elevations
- Total groundwater extractions
- Surface water supply used, including for groundwater recharge or other in-lieu uses
- Total water use
- Change in groundwater storage
- Progress towards implementing the GSP, including implementation of projects and management actions, as well as the status of groundwater conditions relative to the sustainable management criteria for each of the applicable sustainability indicators in the Subbasin.

The structure for the Annual Report generally follows the structure of the requirements outlined in 23 CCR §356.2. Groundwater elevation, groundwater extraction, surface water supply, and groundwater storage are summarized for the entire Subbasin, while progress towards GSP implementation is described for each subregion. The DWR water year ends on September 30th of the named year and begins on October 1st of the previous year. Therefore, the period covered by this Annual Report is primarily October 1, 2023, through September 30, 2024.

Also included with this Annual Report are appendices that contain the required groundwater maps and hydrographs that must be submitted with each Annual Report. The following appendices are located at the end of this Annual Report:

- Appendix A. Contour Maps of the Different Aquifer Units.
- Appendix B. Hydrographs of Time-Series Groundwater Level Data for Groundwater Level RMS Wells.
- Appendix C. Maps of Change in Groundwater Levels and Change in Groundwater Storage in 2016 through 2024, Separated by Principal Aquifer.
- Appendix D. Maps of Annual and Cumulative Subsidence in 2015 through 2024.
- Appendix E. Status of Monitoring Efforts for RMS Wells in Chowchilla Subbasin.

Table ES-1. Chowchilla Subbasin GSAs and Water Budget Subregions.

<table>
<tr><th>GSA</th><th>Subregion</th><th>Subregion Abbreviation</th><th>Subregion Area, Acres[1]</th></tr>
<tr><td>Chowchilla Water District GSA</td><td>Chowchilla Water District GSA</td><td>CWD GSA</td><td>85,500</td></tr>
<tr><td rowspan="3">Madera County GSA</td><td>Madera County GSA – East</td><td>Madera County GSA – East</td><td>11,200</td></tr>
<tr><td>Madera County GSA – West</td><td>Madera County GSA – West</td><td>30,500</td></tr>
<tr><td rowspan="2">Sierra Vista Mutual Water Company</td><td rowspan="2">SVMWC</td><td rowspan="2">3,800</td></tr>
<tr><td>Merced County GSA</td></tr>
<tr><td>Triangle T Water District GSA</td><td>Triangle T Water District GSA</td><td>TTWD GSA</td><td>14,700</td></tr>
<tr><td colspan="3">Total</td><td>145,700</td></tr>
</table>

[1] Subregion areas do not include TTWD annexations or associated Subbasin boundary changes since 2022. Changes that impact the Subbasin boundaries will be accounted in future Annual Reports following approval of the Subbasin boundary modifications.

Executive Summary (§356.2.a)

The Subbasin GSP covers the entire extent of the Subbasin (**Figures ES-1 and ES-2**). The four GSAs in the Subbasin collectively adopted and submitted the initial GSP in January 2020. As of January 2025, the Subbasin GSAs have revised the GSP on three occasions. The first revisions were completed in 2022, when the GSP was revised to resolve deficiencies identified by DWR in their January 2022 consultation letter. The second revisions were completed in 2023, when the Subbasin GSAs revised certain sections of the GSP to address remaining deficiencies identified by DWR in their March 2023 inadequate determination. The third revisions were completed in January 2025, when the Subbasin GSAs revised certain sections of the GSP to address review, comments, and guidance provided by State Water Resources Control Board (SWRCB) staff. The specific revisions completed during each of these three occasions are summarized below, and are discussed in further detail in the January 2025 Revised GSP[1]. Coordinated implementation of the GSP is currently underway to achieve sustainable management of the Subbasin by 2040, in compliance with the Sustainable Groundwater Management Act (SGMA).

In accordance with 23 CCR §356.2, GSAs must submit Annual Reports to DWR by April 1 each year following GSP adoption to document progress made toward GSP implementation. This Annual Report is the sixth Annual Report for the Subbasin GSP, which is required to be submitted to DWR by April 1, 2025. This Annual Report summarizes groundwater conditions and water use in the entire Subbasin, as well as the progress that has been made to implement projects and management actions (PMAs) and achieve interim milestones established in the GSP. Key data sources and findings of each section are summarized below for the current reporting year (water year 2024) and are described in further detail in the associated Annual Report section.

GSP Revisions Since the Previous Annual Report

In January 2022, DWR completed a review of the GSP and released an incomplete determination, initiating a 180-day consultation period between January 28, 2022, and July 27, 2022. In this determination, DWR identified three potential deficiencies that may preclude DWR's approval of the GSP: (1) insufficient information to support the selection of chronic lowering of groundwater levels sustainable management criteria, (2) insufficient information to support the selection of land subsidence sustainable management criteria, and (3) insufficient information to support the determination that interconnected surface water or undesirable results related to depletions of interconnected surface water are not present and are not likely to occur in the Subbasin. The four GSAs completed additional technical analyses and GSP revisions to address those deficiencies and developed two workplans to address remaining data gaps with regard to subsidence and interconnected surface water. The July 2022 Revised GSP was adopted and submitted to DWR for evaluation on July 27, 2022.

In March 2023, DWR completed its review of the July 2022 Revised GSP and released an inadequate determination. Following the determination, the Subbasin GSAs coordinated together

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[1] The January 2025 Revised GSP is available on the Madera County website: https://www.maderacountywater.com/chowchilla-subbasin/.

and worked cooperatively with staff at DWR and the State Water Resources Control Board (SWRCB) to review the reasons for this determination and expeditiously complete the additional revisions necessary to receive an adequate determination. Approximately two months after DWR issued its inadequate determination, the Subbasin GSAs submitted the May 2023 Revised GSP to SWRCB staff.

The GSAs have since continued their coordination with the SWRCB and DWR to identify a pathway back to DWR jurisdiction and local control of the Subbasin. Following numerous consultations between the GSAs and SWRCB staff in 2023-2025, a complete and thorough internal review by SWRCB staff, and subsequent guidance provided by the SWRCB, the GSAs acted swiftly and strategically to further revise the GSP. The January 2025 Revised GSP includes updates to amend the Subbasin Domestic Well Mitigation Program, refine the sustainable management criteria (SMC) for groundwater levels and subsidence, and update PMAs for subsidence mitigation and as backstops for avoiding undesirable results. The January 2025 Revised GSP was completed and distributed for public review in January 2025. The GSAs anticipate submittal of the January 2025 Revised GSP in March 2025 to SWRCB and subsequently to DWR.

The GSAs remain steadfast in their commitment and dedication to the long-term sustainability of the Subbasin. Additional information about the GSP revisions and the Subbasin GSAs' efforts to address data gaps is provided in **Section 7.1.1**.

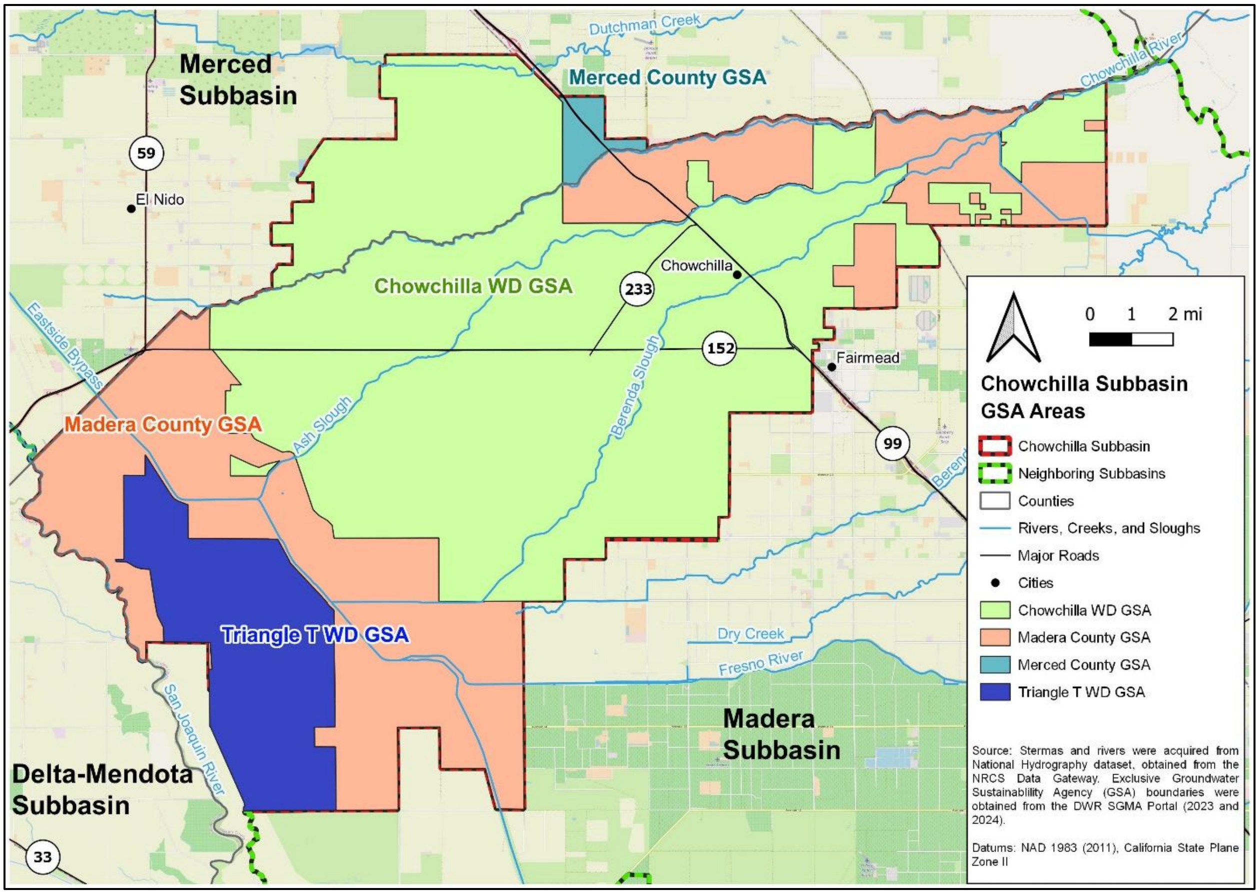

Figure ES-1. Chowchilla Subbasin GSAs Map.*

** Boundaries do not include TTWD annexations or associated Subbasin boundary changes since 2022. Changes that impact the Subbasin boundaries will be accounted in future Annual Reports following approval of the Subbasin boundary modifications.*

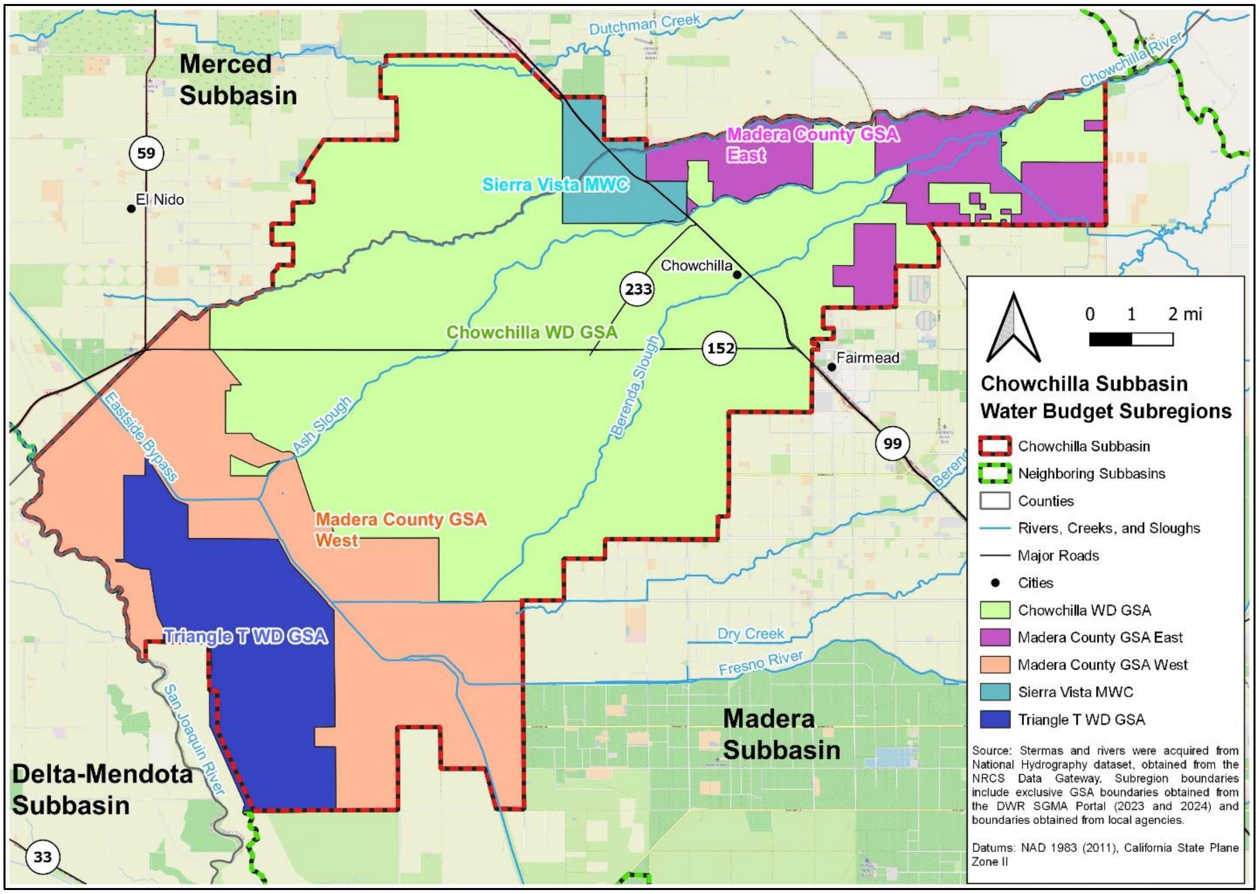

Figure ES-2. Chowchilla Subbasin Water Budget Subregions Map.*

**Boundaries do not include TTWD annexations or associated Subbasin boundary changes since 2022. Changes that impact the Subbasin boundaries will be accounted in future Annual Reports following approval of the Subbasin boundary modifications.*

Groundwater Elevations (§356.2.b.1)

Groundwater level monitoring and groundwater elevations are described in **Section 1.1** of this Annual Report. Groundwater level monitoring data was assembled from publicly available and GSA-related sources for the historical period through water year 2024 and for Fall 2024. Data was collected from various entities, including: CWD, Madera County, TTWD, DWR, USBR, and GeoTracker, with some historical data assembled from wells monitored as part of the California State Groundwater Elevation Monitoring (CASGEM) program (the Madera-Chowchilla Groundwater Monitoring Group).

The GSAs conducted groundwater level monitoring for available Representative Monitoring Site (RMS) wells in Spring 2024 and Fall 2024 to evaluate seasonal high and low groundwater level conditions, respectively. During Spring 2024, groundwater elevations at available RMS wells in the Subbasin ranged from -87 ft AMSL to 112 ft AMSL. During Fall 2024, groundwater elevations at available RMS wells in the Subbasin ranged from -103 ft AMSL to 108 ft AMSL. Despite attempts at measurement, some RMS water level data was not available in 2024 due to continued challenges encountered during implementation of the RMS monitoring program. Additional information on these challenges is provided in **Section 7.3** and **Appendix E** of this Annual Report.

Groundwater Elevation Contour Maps (§356.2.b.1.A)

Groundwater elevation contour maps are described in **Section 1.2** and shown in **Appendix A** of this Annual Report. Spring 2024 and Fall 2024 groundwater elevation contour maps were prepared. Spring contours are intended to generally represent seasonal high groundwater levels, while fall contours are intended to generally represent seasonal low groundwater levels. Data was assembled from all known and available groundwater level information in the Subbasin, including from public sources, local GSAs, and other local entities.

In summary, general patterns seen in the Spring 2024 and Fall 2024 groundwater elevation contour maps are similar to patterns observed in previous spring and fall time periods. In the unconfined Upper Aquifer above the Corcoran Clay in the western Subbasin, spring and fall contours generally show higher groundwater elevations near the San Joaquin River with groundwater flow away from the San Joaquin River to the east towards areas of lower groundwater elevations in the southwestern portion of Subbasin. In the Lower Aquifer (within the extent of the Corcoran Clay) and undifferentiated unconfined zone outside of the Corcoran Clay, spring and fall contours generally show higher groundwater elevations in the central portion of Subbasin and lower groundwater elevations in the western and eastern portions of the Subbasin.

Groundwater Hydrographs (§356.2.b.1.B)

Groundwater hydrographs are described in **Section 1.3** and shown in **Appendix B** of this Annual Report. All available groundwater level monitoring data was used to prepare groundwater hydrographs for all years spanning the period from January 1, 2015, through the end of 2024. Between 2015 and 2024, most of these hydrographs show generally stable trends with slightly increasing or declining levels depending on the specific RMS well.

Groundwater Extraction (§356.2.b.2)

Groundwater extraction is summarized in **Section 3** of this Annual Report. Groundwater extraction in the Subbasin was either measured directly from flowmeters or was estimated from a water budget developed using the Madera-Chowchilla Groundwater-Surface Water Simulation Model (MCSim[2]) (sources and methods are summarized in **Section 3**). It is noted that the use of MCSim is a refinement of the approach in prior Annual Reports, in which unmeasured groundwater extraction was estimated using a surface water system and root zone water budget separate from MCSim (see **Section 2**).

[2] Prior to the water year 2024 Annual Report, MCSim was updated, refined, and re-calibrated using the best available data sources and approaches. Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results. See Section 2 for additional information.

In total, an estimated 256,000 acre-feet (AF) of groundwater was extracted for use within the Subbasin during water year 2024. Of this total, the majority was extracted for agricultural use (approximately 250,500 AF), and the remaining groundwater was extracted for urban use (i.e., urban, industrial, rural residential, and semi-agricultural groundwater use; approximately 5,500 AF). Total groundwater recharge from the surface water system (combined infiltration of applied water, precipitation, and surface water) was estimated to be approximately 148,000 AF in water year 2024.

Surface Water Supplies (§356.2.b.3)

Surface water supplies used or available for use are summarized in **Section 4** of this Annual Report. Surface water supplies available in the Subbasin typically include: surface water deliveries (CVP supplies from Millerton Reservoir and Buchanan Dam); transfer water to CWD from LeGrand Athlone Water District or other districts; water purchased from the San Joaquin River Exchange Contractors, Madera Irrigation District (MID), and others; and riparian and water rights diversions. In this Annual Report, surface water supplies used or available for use are assumed to be the volume of surface water diverted by or supplied to agencies and water rights users in the Subbasin. It is noted that this is a refinement of the approach in prior Annual Reports, in which surface water supplies used or available for use were reported as the difference between surface water inflows and surface water outflows through the Subbasin.

During water year 2024, approximately 202,000 AF of surface water supplies were used or available for use in the Subbasin (combined diversions, irrigation deliveries, recharge, and infiltration of diversions).

Total Water Use (§356.2.b.4)

Total water use is summarized in **Section 5** of this Annual Report. In this Annual Report, total water use is assumed to equal the total combined groundwater extraction and surface water used or available for use in the Subbasin (i.e., the sum of water supplies reported in **Sections 3 and 4**). It is noted that this is a refinement of the approach in prior Annual Reports, in which total water use was reported as the applied water and precipitation from all sources in the Subbasin, including all consumptive water use (evapotranspiration) and non-consumptive water use (other water uses, e.g., deep percolation and runoff).

During water year 2024, total water use in the Subbasin is estimated to be approximately 458,000 AF. Of this total, approximately 44% is from surface water and the remaining use is from groundwater.

Change in Groundwater Storage (§356.2.b.5)

Change in groundwater storage is described in **Section 6** and shown in **Appendix C** of this Annual Report. Consistent with 23 CCR §354.18.b, annual changes in groundwater elevation were calculated for each of the principal aquifers between Spring 2023 and Spring 2024 based on the difference in annual spring groundwater elevation contours (representing seasonal high groundwater conditions). Outside of the delineated confined area, changes in groundwater levels (in both the Upper and Lower Aquifers) were multiplied by representative specific yield values to estimate change in groundwater storage. Within the delineated confined area in the Lower Aquifer, groundwater potentiometric surface changes in the Lower Aquifer were multiplied by a much smaller storage coefficient value to calculate annual changes in groundwater storage in the Lower Aquifer. The specific yield and storage coefficient values used in the analysis are derived from values in the calibrated integrated groundwater flow model (MCSim), which was updated and recalibrated in 2024.

In summary, the combined change in groundwater storage for the GSP area was approximately 120,900 AF from Spring 2023 to Spring 2024. Positive change in storage values indicate addition of groundwater storage, whereas negative change in storage values represent depletion of groundwater storage.

Implementation of Projects and Management Actions (§356.2.c)

GSP implementation activities, including projects and management actions (PMAs), are described in **Section 7** of this Annual Report.

Collectively, the GSAs have made significant progress revising the GSP to address DWR comments and filling data gaps (**Section 7.1.1**). The Subbasin GSAs have also continued to implement a Domestic Well Mitigation Program (DWMP) to mitigate undesirable results for domestic well users that are significantly and adversely impacted by groundwater conditions during the GSP implementation period while the GSAs implement other PMAs to achieve and maintain sustainability (**Section 7.1.2**). The DWMP was successfully launched in January 2023, and has since awarded mitigation to four applicants. Since its launch, the GSAs have discussed and agreed to implement several DWMP refinements, including: mitigation services for both domestic wells and shallow wells that supply drinking water (e.g., public water systems and state small water systems); mitigation of impacts resulting from degraded water quality; case-by-case review of eligible mitigation in excess of $30,000, with specific review criteria; temporary mitigation services for impacted wells; and coordination with the other programs related to monitoring groundwater quality with regard to nitrate levels, including mitigation services for residents in the Subbasin. It is expected that the DWMP will continue to be implemented as needed until groundwater sustainability is achieved.

In the year since the last Annual Report submittal, each GSA has also continued to make significant progress in implementing existing PMAs, as well as developing and implementing new PMAs (**Sections 7.1 and 7.2**).

CWD GSA has several recharge projects in various stages of implementation. In 2024, CWD ran surface water throughout its canals and sloughs, providing nearly 60,000 AF of direct recharge while also delivering large volumes of surface water for in-lieu recharge. CWD also delivered approximately 540 AF of surface water to recharge basins in 2024.

The Madera County GSA has continued work on various planning studies and has continued implementation of a substantial demand management program and recharge program that will collectively support achievement of the GSP sustainability goal. Continued implementation of demand management efforts has included tracking and enforcement of an allocation and associated penalties, and implementation of a demand measurement program and verification project to support enforcement of demand management efforts. The demand measurement program and verification project has included efforts to track evapotranspiration of applied water

(ETAW) against an ETAW allocation and efforts to analyze the consistency of applied water measurements from flow meters to the applied water estimates developed from remote sensing measurements. The Madera County GSA has also continued work toward planning, designing, and constructing several recharge projects in various stages of development.

SVMWC has continued its efforts to develop dedicated recharge basins. As of early 2025, SVMWC has completed the 100% design documents, plans, and specifications, as well as a topographic survey of the project site. A construction bid package was completed, the bid was awarded, and construction is anticipated to begin in 2025.

The TTWD GSA has several projects in various stages of implementation, including: (1) utilization of existing recharge basins and purchased surface water, (2) development of additional dedicated recharge basins (funded by a Proposition 68 grant and funding from the Natural Resource Conservation Service), (3) the Columbia Canal and Poso Canal pipelines, and (4) the Poso Canal pipeline extension project (also funded by Proposition 68). In 2024, approximately 7,000 AF of surface water was purchased and diverted for use in-lieu of groundwater.

Interim Milestone Status (§356.2.c)

The status of groundwater conditions relative to interim milestones (IMs) established in the Chowchilla Subbasin GSP is described in **Section 7.4** of this Annual Report. For the purpose of tracking sustainability indicators in relation to the Sustainable Management Criteria (SMC) in the GSP, the status of each indicator is presented in relation to the 2025 IMs, measurable objectives (MOs), and minimum thresholds (MTs) defined in the GSP.

For chronic lowering of groundwater levels, review of the Fall 2024 groundwater level measurements that are available for 21 RMS wells indicates that groundwater levels remain generally above the MTs, and all Fall 2024 RMS groundwater levels, with the exception of two wells, were above the 2025 IMs. For land subsidence, in both the Western Management Area (WMA) and Eastern Management Area (EMA), all RMS stations had an observed cumulative subsidence total that is less that the 2025 cumulative IM. For degraded groundwater quality, collection of sufficient groundwater quality data to establish baseline conditions is still in process and comparison to SMC is not available at this time. For depletion of Interconnected Surface Water (ISW), percent of time connected at all wells are below SMC. However, there is limited data available for some RMS wells with which to evaluate the ISW SMC.

1 Groundwater Elevations (§356.2.b.1)

1.1 GROUNDWATER LEVEL MONITORING

The groundwater level monitoring information presented in this Annual Report includes historical and recent monitoring conducted in the Subbasin by various entities, including local GSA-coordinated monitoring conducted as part of the GSP monitoring program and additional monitoring by non-GSA entities that provide useful information for interpreting groundwater conditions. Groundwater level data collected as part of GSP monitoring and additional groundwater level monitoring data available for the period through water year 2024 (plus Fall 2024) are summarized and presented in this Annual Report (**Table 1-1 and Appendices A and B)**. Formal GSP groundwater level monitoring conducted by the GSAs was initiated upon adoption and submittal of the GSP in January 2020.

Historically, groundwater level monitoring in the Subbasin has been conducted by a variety of entities including CWD, Madera County, DWR, USBR, landowners, and GeoTracker. The California State Groundwater Elevation Monitoring Program (CASGEM) was initiated in 2011, with the Madera-Chowchilla Groundwater Monitoring Group designated as the local monitoring entity. This group includes CWD and Madera County, along with entities in the Madera Subbasin. Groundwater levels have been collected and submitted each fall and spring as part of the CASGEM program, which also satisfies some of the GSP monitoring. The Chowchilla Subbasin GSAs also conducted groundwater level monitoring in select wells in advance of GSP adoption and submittal. Additional groundwater level data collection from newly installed nested monitoring wells (installed as part of a DWR grant) began in water year 2020. Groundwater level monitoring data available from the entities listed above and all GSAs were assembled for the period through the end of water year 2024 (plus Fall 2024) and are presented in this Annual Report. **Figure 1-1** includes a map presenting the well locations and most recent monitoring date for historical groundwater level monitoring conducted in the Subbasin. Semi-annual groundwater level measurements acquired for groundwater level RMS wells identified in the GSP are submitted through the Monitoring Network Module on the SGMA Portal twice a year. **Figure 1-2** illustrates the groundwater level RMS well network included in the GSP. A summary of RMS well information and recent groundwater level measurements is presented in **Table 1-1**. Despite attempts at measurement, some RMS water level data was not available in recent years due to continued challenges encountered during implementation of the RMS monitoring program or other access issues. Additional information on these monitoring challenges is provided in **Section 7.3** and **Appendix E** of this Annual Report.

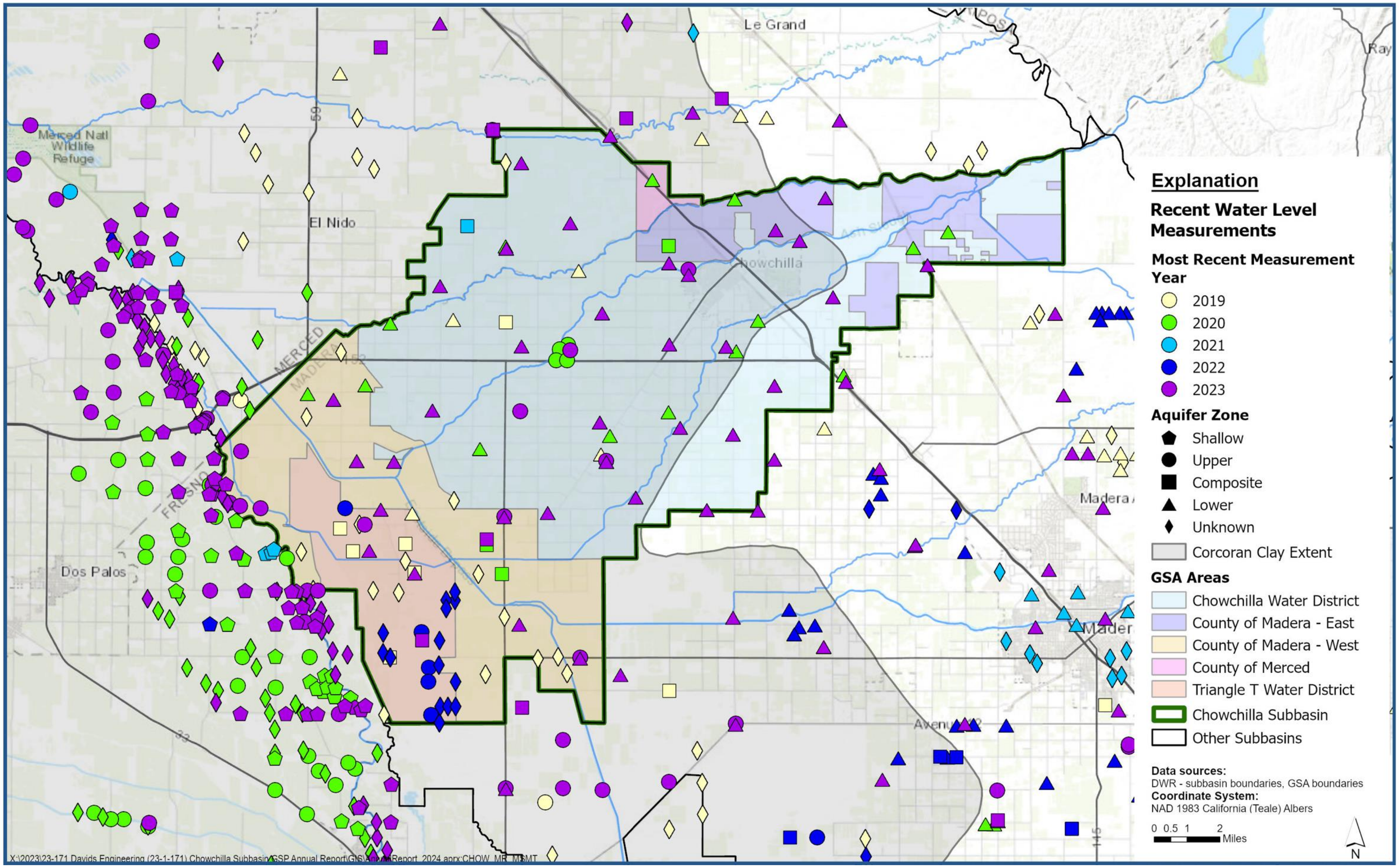

Figure 1-1. Most Recent Groundwater Level Measurement by Well.

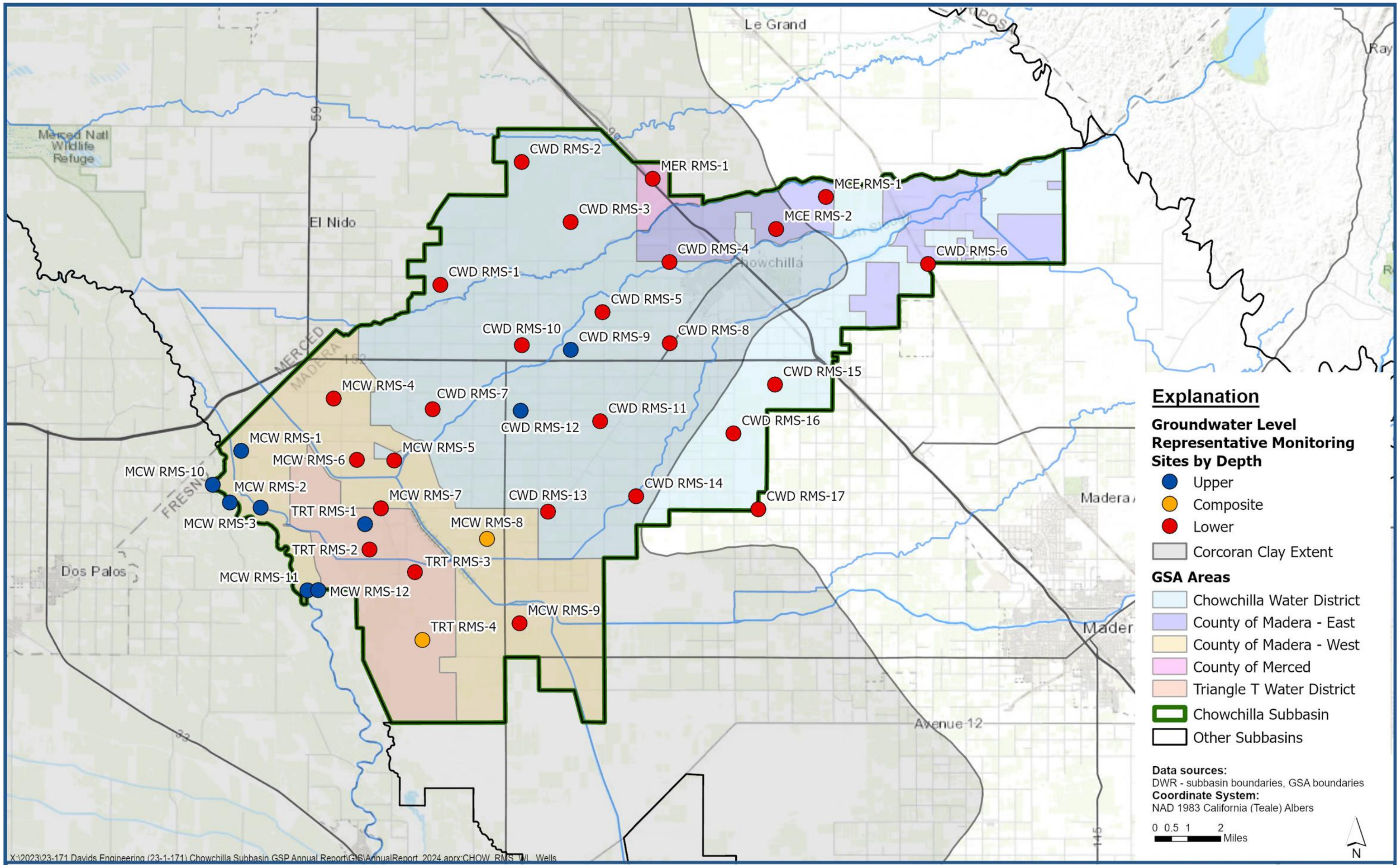

Figure 1-2. Groundwater Levels Sustainability Indicator Wells.

Table 1-1. Summary of Groundwater Level RMS Well Information and Measurements During Report Year (2024).

RMS Well I.D.	Estimated Ground Surface Elevation (feet msl)[1]	Well Depth	Screen Top-Bottom	Aquifer Designation	Spring 2024 GWE (feet msl)[1]	Date of Spring 2024 Measurement	Fall 2024 GWE (feet msl)[1]	Date of Fall 2024 Measurement	Subregion
CWD RMS-1	171	275	160-275	Lower[2]	-15.0	3/12/2024	QM[4]	10/14/2024	CWD GSA
CWD RMS-2	193	780	230-775	Lower[2]	-29.0	3/12/2024	QM[4]	10/14/2024	CWD GSA
CWD RMS-3	206	Unknown	Unknown	Lower[2]	-57.3	3/12/2024	-61.9	10/22/2024	CWD GSA
CWD RMS-4	225	800	320-800	Lower[2]	-68.3	3/13/2024	-74.0	10/14/2024	CWD GSA
CWD RMS-5	207	Unknown	Unknown	Lower[2]	63.2	3/12/2024	QM[4]	10/14/2024	CWD GSA
CWD RMS-6	275	820	257-726	Lower[3]	-59.1	3/12/2024	QM[4]	10/18/2024	CWD GSA
CWD RMS-7	169	330	135-288	Lower[2]	-6.5	3/12/2024	QM[4]	10/22/2024	CWD GSA
CWD RMS-8	219	Unknown	Unknown	Lower[2]	QM[4]	3/12/2024	-37.9	10/11/2024	CWD GSA
CWD RMS-9	164	97	82-97	Upper	88.0	3/12/2024	92.0	10/14/2024	CWD GSA
CWD RMS-10	182	Unknown	Unknown	Lower[2]	-43.3	3/14/2024	-60.3	10/14/2024	CWD GSA
CWD RMS-11	199	529	187-529	Lower[2]	83.7	3/13/2024	83.7	10/15/2024	CWD GSA
CWD RMS-12	176	Unknown	Unknown	Upper	67.2	3/13/2024	69.2	10/15/2024	CWD GSA
CWD RMS-13	167	Unknown	Unknown	Lower[2]	45.7	3/13/2024	39.7	10/15/2024	CWD GSA
CWD RMS-14	152	455	185-365	Lower[2]	-71.0	3/14/2024	-99.0	10/15/2024	CWD GSA
CWD RMS-15	213	955	290-935	Lower[3]	-83.1	3/14/2024	-102.7	10/16/2024	CWD GSA
CWD RMS-16	212	Unknown	Unknown	Lower[3]	-59.8	3/14/2024	-83.8	10/16/2024	CWD GSA
CWD RMS-17	203	624	278-588	Lower[3]	-64.9	3/14/2024	QM[4]	10/16/2024	CWD GSA
MCE RMS-1	276	Unknown	Unknown	Lower[3]	-60.0	3/4/2024	-84.2	10/14/2024	Madera County GSA – East
MCE RMS-2	272	466	218-464	Lower[2]	-87.4	3/5/2024	-94.9	10/14/2024	Madera County GSA – East
MCW RMS-1	120	186	Unknown	Upper	93.4	3/5/2024	92.9	10/15/2024	Madera County GSA – West
MCW RMS-2	123	Unknown	Unknown	Upper	111.5	3/5/2024	QM[4]	10/15/2024	Madera County GSA – West
MCW RMS-3	122	Unknown	Unknown	Upper	102.5	3/5/2024	97.6	10/15/2024	Madera County GSA – West
MCW RMS-4	138	Unknown	Unknown	Lower[2]	NM[3]	3/5/2024	NM[3]	10/14/2024	Madera County GSA – West

RMS Well I.D.	Estimated Ground Surface Elevation (feet msl)[1]	Well Depth	Screen Top-Bottom	Aquifer Designation	Spring 2024 GWE (feet msl)[1]	Date of Spring 2024 Measurement	Fall 2024 GWE (feet msl)[1]	Date of Fall 2024 Measurement	Subregion
MCW RMS-5	146	Unknown	Unknown	Lower[2]	-12.7	3/8/2024	NM[3]	10/14/2024	Madera County GSA – West
MCW RMS-6	139	Unknown	Unknown	Lower[2]	50.9	3/8/2024	NM[3]	10/14/2024	Madera County GSA – West
MCW RMS-7	138	800	290-400	Lower[2]	52.1	3/8/2024	NM[3]	10/14/2024	Madera County GSA – West
MCW RMS-8	142	480	160-475	Composite	40.6	3/7/2024	43.3	10/16/2024	Madera County GSA – West
MCW RMS-9	155	700	265-696	Lower[2]	3.5	3/7/2024	NM[3]	10/14/2024	Madera County GSA – West
MCW RMS-10	123	26	44129	Upper	110.4	3/8/2024	108.3	10/8/2024	Madera County GSA – West
MCW RMS-11	127	30	Unknown	Upper	103.8	2/14/2024			Madera County GSA – West
MCW RMS-12	127	29	Unknown	Upper	95.9	2/14/2024			Madera County GSA – West
MER RMS-1	225	Unknown	Unknown	Lower[2]					SVMWC
TRT RMS-1	134	196	158-192	Upper	64.2	2/19/2024	53.2	11/18/2024	TTWD GSA
TRT RMS-2	135	500	300-500	Lower[2]	64.5	2/19/2024	48.5	11/18/2024	TTWD GSA
TRT RMS-3	137	799	168-790	Lower[2]	23.4	2/19/2024	-5.6	11/18/2024	TTWD GSA
TRT RMS-4	141	840	190-260	Composite	23.5	2/14/2024	3.5	11/18/2024	TTWD GSA

[1] Estimated ground surface elevation and groundwater elevations (GWE) are expressed in feet above mean sea level (referenced to the NAVD88 vertical datum).

[2] Lower Aquifer wells within the Corcoran Clay extent.

[3] Lower Aquifer wells outside the Corcoran Clay extent; considered representative of undifferentiated unconfined groundwater zone.

[4] NM = No Measurement. Measurement attempted on date listed but was unsuccessful. See Appendix E for more information.

[5] QM = questionable measurement. Measurement reported but flagged as questionable. See Appendix E for more information.

1.2 GROUNDWATER ELEVATION CONTOUR MAPS (§356.2.B.1.A)

Groundwater elevation contours for Spring and Fall 2024 were developed from all known and available groundwater level information in the Subbasin, including data from public sources and from local GSAs and other local entities. All contours are presented as feet above mean sea level (referenced to the NAVD 88 vertical datum).

Annual spring and fall contour maps were prepared for each year and for each of the principal aquifers in the Chowchilla Subbasin: Upper Aquifer and Lower Aquifer/Undifferentiated Unconfined Zone. Annual spring contours are intended to represent seasonal high groundwater levels, while fall contours are intended to represent seasonal low groundwater levels. For the purpose of mapping groundwater elevations, the aquifer system in areas outside the extent of the Corcoran Clay was treated as a single undifferentiated unconfined aquifer system and interpretation of groundwater levels in these areas utilized data from wells assigned to both the Upper and Lower depth zones. In areas within the extent of the Corcoran Clay, the aquifer system was separated into an Upper Aquifer unconfined system above the Corcoran Clay and a Lower Aquifer below the Corcoran Clay. The Corcoran Clay hydraulically separates the Upper and Lower Aquifer where it is present, and in areas where the Corcoran Clay is shallow, there is perched water on top of the Corcoran Clay with an unsaturated zone directly below the Corcoran Clay. As a result, in the undifferentiated unconfined zone outside of the extent of the Corcoran Clay the groundwater surface represents a continuation of the Lower Aquifer groundwater surface within the Corcoran Clay area.

To evaluate recent groundwater level conditions in the Subbasin, separate groundwater elevation contour maps were prepared for spring and fall of each year for the unconfined Upper Aquifer, where substantial saturation exists, and separately for the Lower Aquifer (within the extent of the Corcoran Clay) and the undifferentiated unconfined zone (outside of the Corcoran Clay). The groundwater elevation contour maps for the Lower Aquifer represent a combination of potentiometric elevations where the aquifer is under confined conditions and water table surface elevations where the groundwater is unconfined. Contour maps of the different aquifer units are presented in **Figure 1-3 through 1-6**, and are discussed below. For comparison to these figures for Spring 2024 and Fall 2024, contour maps for Spring 2015-2023 and Fall 2015- 2023 are included in **Appendix A**.

It may be noted on some groundwater contour maps that wells relatively close together may show significant differences in groundwater elevations. This can occur for various reasons including: differences in well construction details relative to the depth, screen intervals, and seal depths; influences from nearby and/or recent pumping; and/or hydrogeologic characteristics that affect groundwater occurrence/movement (e.g., variations in stratigraphy). Groundwater elevations commonly vary at a given location at different depths within a single aquifer (whether it be unconfined, semi-confined, or confined) due to interbedding of fine- and coarse-grained layers and uneven vertical distribution of pumping stresses. For example, vertical gradients (meaning different groundwater elevations at different depths within an aquifer) often occur as a result of higher pumping stresses within a certain depth zone of the aquifer. Wells being monitored may have been measured for groundwater elevation shortly after the measured well or a nearby well has been turned off (or possibly even a nearby well is pumping at the time of measurement);

thereby resulting in a lower groundwater elevation at that location. In addition, stratigraphy (i.e., occurrence/sequence of fine- and coarse-grained layers) in the Chowchilla Subbasin has been observed to vary significantly from one well location to another due to layer discontinuity, which may impact groundwater elevations measured in nearby wells. Development of groundwater elevation contour maps for this Annual Report involved application of computerized spatial interpolation algorithms[3] in combination with some professional judgement, recognizing some of the issues described above that can impact groundwater elevations.

1.2.1 Upper Aquifer

A seasonal high groundwater elevation contour map for the Upper Aquifer within the Corcoran Clay area was generated for Spring 2024 (**Figure 1-3**). The Spring 2024 Groundwater Elevation Contour Map (**Figure 1-3**) generally shows higher groundwater elevations near the San Joaquin River with groundwater flow away from the San Joaquin River to the southeast towards areas of lower groundwater elevations in the southern portion of the Subbasin.

A seasonal low groundwater elevation contour map for the Upper Aquifer within the Corcoran Clay area was generated for Fall 2024 (**Figure 1-4**). The Fall 2024 Groundwater Elevation Contour Map (**Figure 1-4**) generally shows higher groundwater elevations near the San Joaquin River with prevailing groundwater flow directions away from the San Joaquin River to the east towards areas of lower groundwater elevation in the south-central portion of the Subbasin.

1.2.2 Lower Aquifer and Undifferentiated Unconfined Groundwater Zone

A seasonal high groundwater elevation contour map for the Lower Aquifer was generated for Spring 2024 (**Figure 1-5**). The Spring 2024 Groundwater Elevation Contour Map for the Lower Aquifer (**Figure 1-5**) generally shows higher groundwater elevations in the central portion of Subbasin and lower groundwater elevations in the western and eastern portions of the Lower Aquifer.

A seasonal low groundwater elevation contour map for the Lower Aquifer was generated for Fall 2024 (**Figure 1-6**). Similar to the spring contour map, the Fall 2024 Groundwater Elevation Contour Map (**Figure 1-6**) generally shows higher groundwater elevations in the central portion of Subbasin, and lower groundwater elevations in the western and eastern portions of the Lower Aquifer.

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[3] Spatial interpolation methods employed in the analysis involved use of the natural neighbor method with additional consideration of results from the inverse distance weighted method. Both methods interpolate values between points using weighting of nearby point values, beginning with a map of point values (e.g., groundwater elevations at individual wells) and resulting in a raster map of estimated values for the entire area of interest, including area between points (e.g., estimates of groundwater elevations across the entire subbasin, including between wells).

1.3 GROUNDWATER HYDROGRAPHS (§356.2.B.1.B)

Hydrographs of time-series groundwater level data for groundwater level RMS wells were prepared with all available groundwater level monitoring data through water year 2024 (plus Fall 2024) and are contained in **Appendix B**. CWD GSA RMS wells generally showed stable or increasing groundwater elevations during 2024. Madera County GSA – East RMS wells show slightly decreasing groundwater elevations in 2024. Madera County GSA – West RMS wells generally showed generally stable or increasing groundwater elevations in 2024. TTWD GSA RMS wells generally showed stable groundwater elevations in 2024.

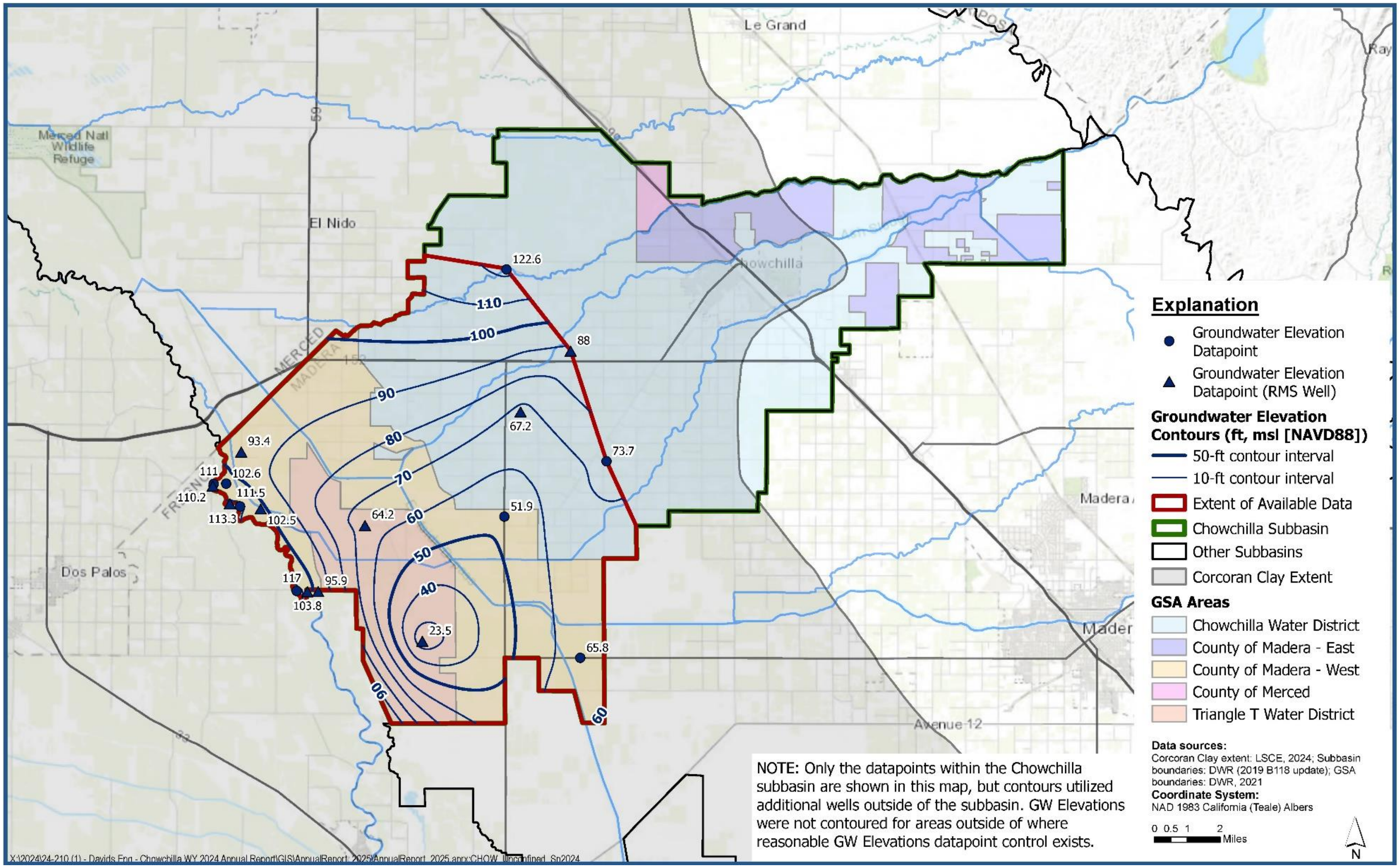


Figure 1-3. Contours of Equal Groundwater Elevation Upper Aquifer – Spring 2024.

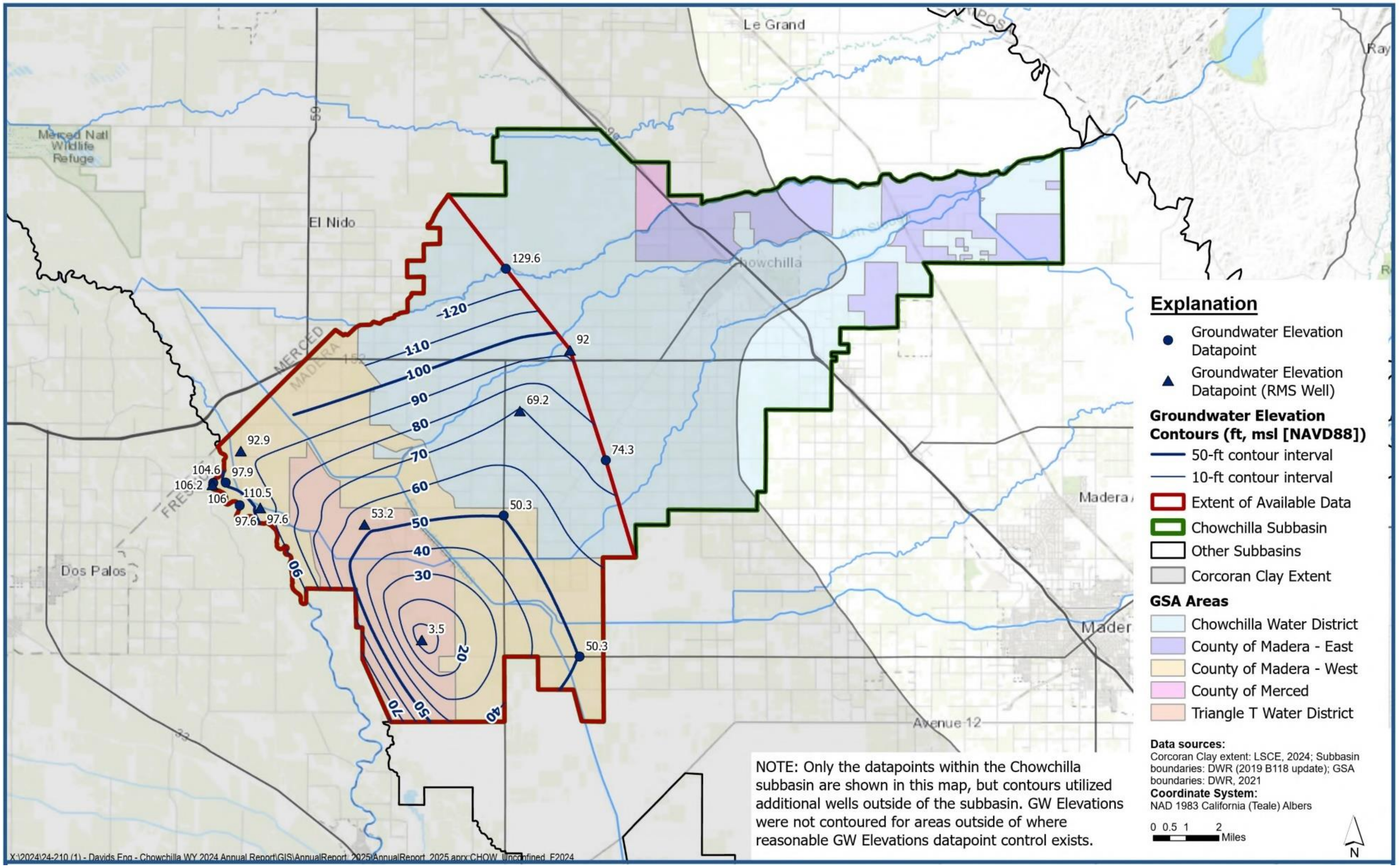


Figure 1-4. Contours of Equal Groundwater Elevation Upper Aquifer – Fall 2024.

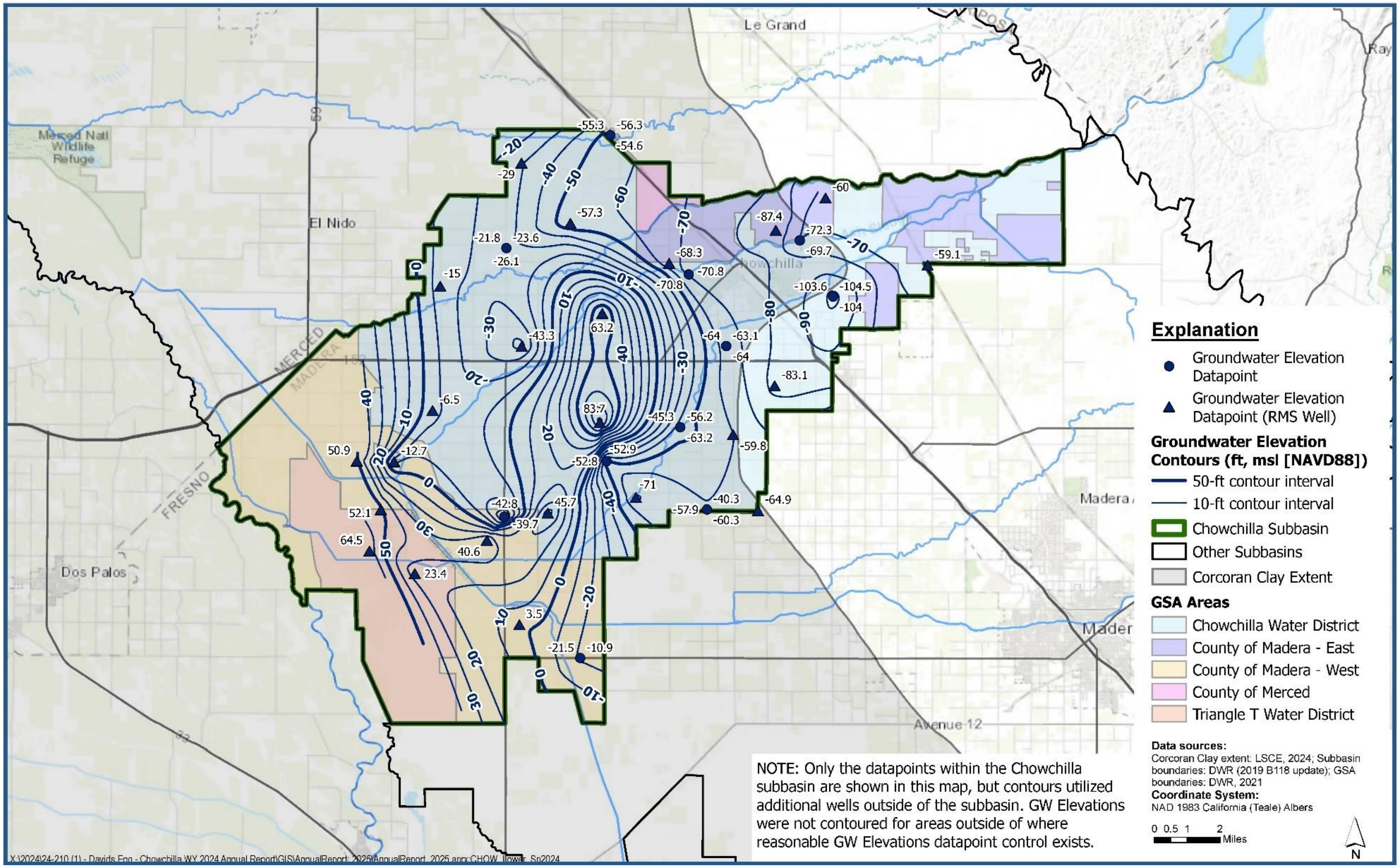


Figure 1-5. Contours of Equal Groundwater Elevation Lower Aquifer/Undifferentiated Unconfined Zone – Spring 2024.

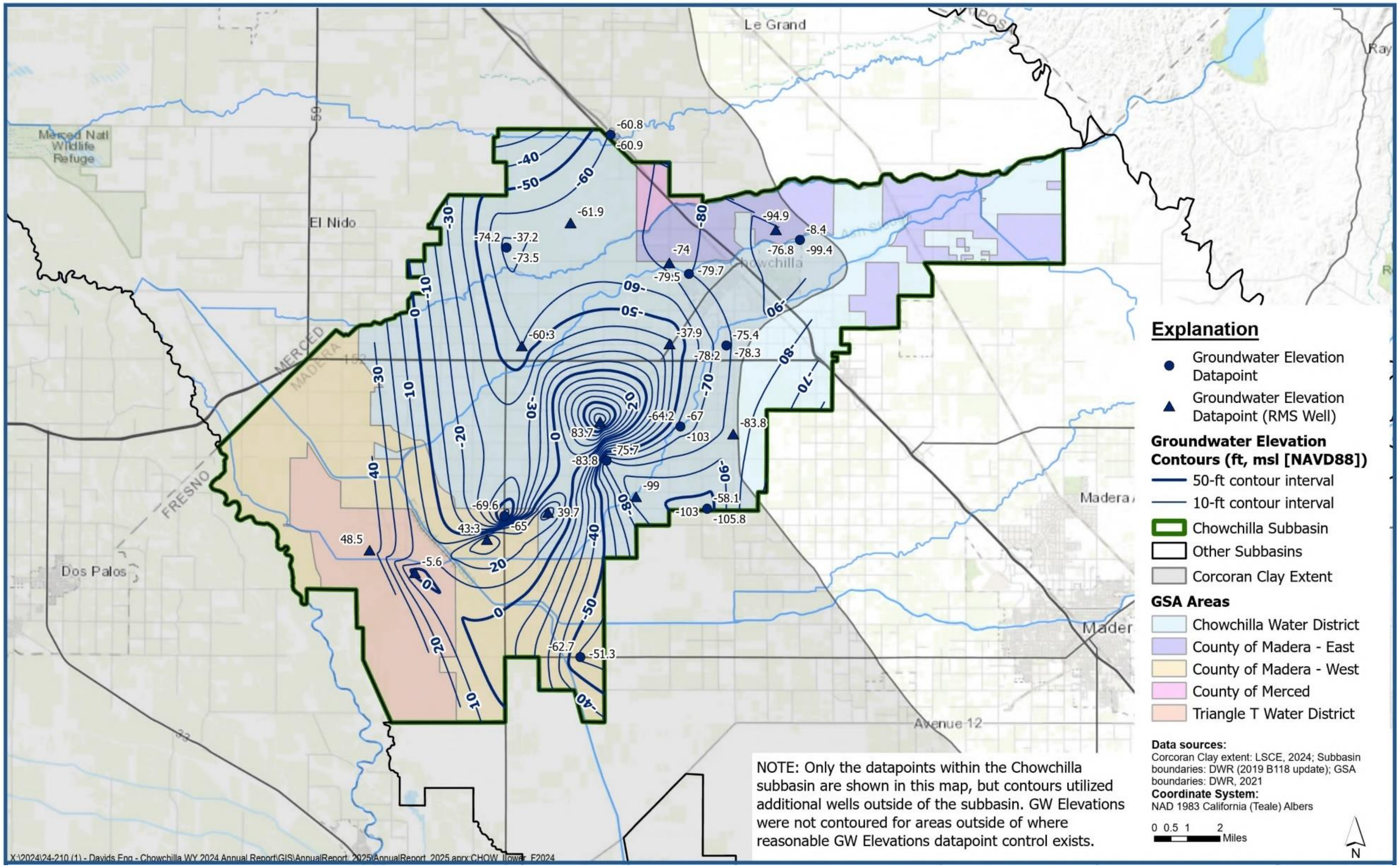


Figure 1-6. Contours of Equal Groundwater Elevation Lower Aquifer/Undifferentiated Unconfined Zone – Fall 2024.

2 Water Budget Approach for Quantifying Groundwater Extraction, Surface Water Supplies, and Total Water Use

In fulfillment of the Annual Report requirements, a water budget approach using MCSim has been used to quantify groundwater extraction, surface water supply availability, and total water use in the Subbasin. This section describes the structure and uncertainties of this approach.

2.1 WATER BUDGET STRUCTURE

A water budget is defined as a complete accounting of all water flowing into and out of a defined volume[4] over a specified period of time. A schematic of the general water budget accounting structure is provided in **Figure 2-1**.

Water budgets presented in the Subbasin GSP were prepared for the Surface Water System (SWS) and Groundwater System (GWS). The SWS represents the land surface down to the bottom of the plant root zone, within the lateral boundaries of the Subbasin. The GWS extends from the bottom of the root zone to the definable bottom of the Subbasin, within the lateral boundaries of the Subbasin. These systems are referred to as accounting centers. Flows between accounting centers and storage within each accounting center are water budget components. During initial GSP development, MCSim was used to develop water budgets for the Subbasin and to quantify water budget components for each accounting center.

The SWS water budget accounting center was further subdivided into detailed accounting centers to estimate the water budget components required by the GSP regulations. The detailed accounting centers in MCSim include water use sectors, which are identified in the GSP regulations as "categories of water demand based on the general land uses to which the water is applied, including urban, industrial, agricultural, managed wetlands, managed recharge, and native vegetation" (23 CCR §351(al)). Across the Subbasin and within each subregion, the water use sector accounting centers include Agricultural Land (AG), Urban Land (UR) (urban, industrial[5], rural residential, and semi-agricultural), and Native Vegetation Land (NV).

During GSP development, MCSim simulations were developed to prepare historical, current, and projected water budgets for all accounting centers in the Subbasin.

In 2024, the GSAs improved MCSim by updating, refining, and re-calibrating the model using the best available data sources and approaches. These changes were made to ensure closer consistency between simulated and observed groundwater levels, to simulate land subsidence, to extend the historical simulation through the most recent water year, and to incorporate improved data sources (e.g., OpenET spatial ET results) made available since initial GSP development. Updates, refinements, and re-calibration may have resulted in some changes to

[4] Where "volume" refers to a space with length, width, and depth properties, which for purposes of the GSP means the defined aquifer and associated surface water system.

[5] Industrial land covers only a small area of the Subbasin, so industrial water uses have been combined with urban and semi-agricultural uses in the Urban land use sector.

values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.

Information about the historical water budget development process is available in Section 2.2.3 and Appendix 6.D of the Subbasin GSP.

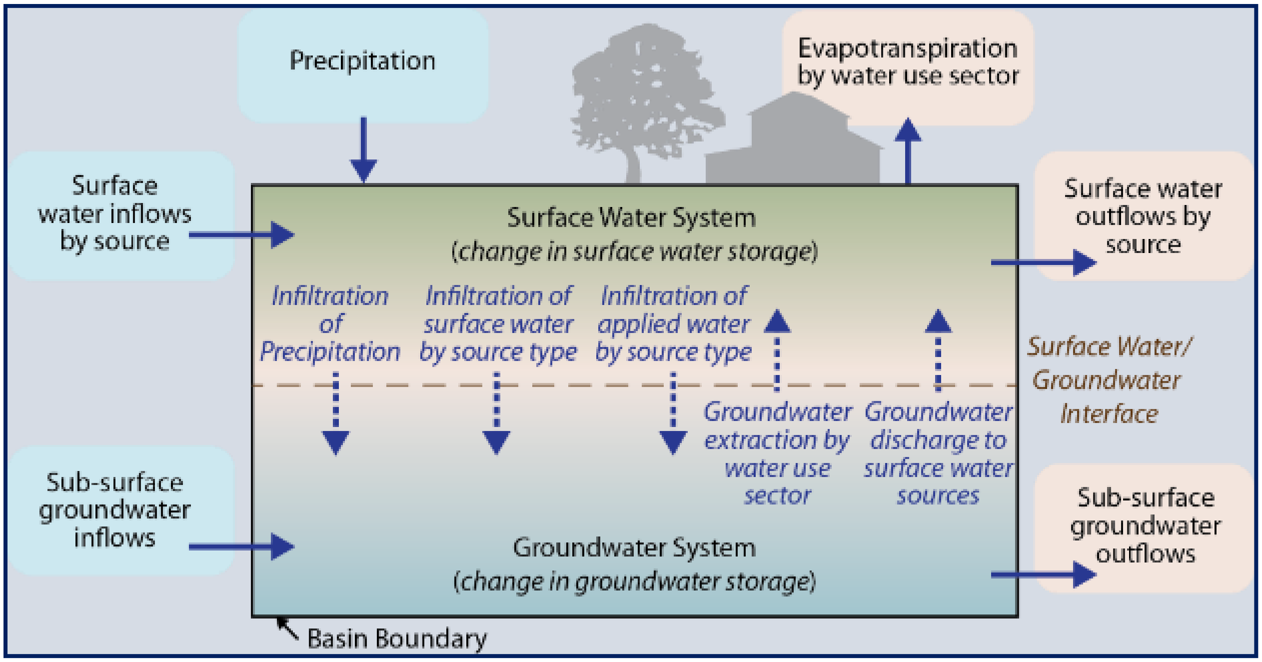


Figure 2-1. Water Budget Accounting Structure (Source: DWR, 2016).

To fulfill the Annual Report requirements, groundwater extraction, surface water supplies, and total water use have been quantified by water use sector and/or water source type as follows:

- **Groundwater Extraction (Section 3)**: Equal to the sum of measured and estimated groundwater extraction.
- **Surface Water Supplies Used or Available for Use (Section 4)**: Equal to the volume of surface water diverted by agencies and water rights users in the Subbasin.
- **Total Water Use (Section 5)**: Equal to the total combined groundwater and surface water used or available for use in the Subbasin (i.e., the sum of water supplies reported in **Sections 3 and 4**).

The data sources, calculation procedures, and results pertaining to these key water budget components are described in the sections below for the entire Subbasin.

2.2 UNCERTAINTIES IN WATER BUDGET COMPONENTS

Uncertainties associated with each water budget component have been estimated following the procedure described by Clemmens and Burt (1997), as described in the Subbasin GSP and previous annual reports.

3 Groundwater Extraction (§356.2.b.2)

This section summarizes the measurement methods, accuracy, and volumes of groundwater extraction in the Subbasin for the current reporting year (water year 2024).

3.1 QUANTIFICATION AND ACCURACY

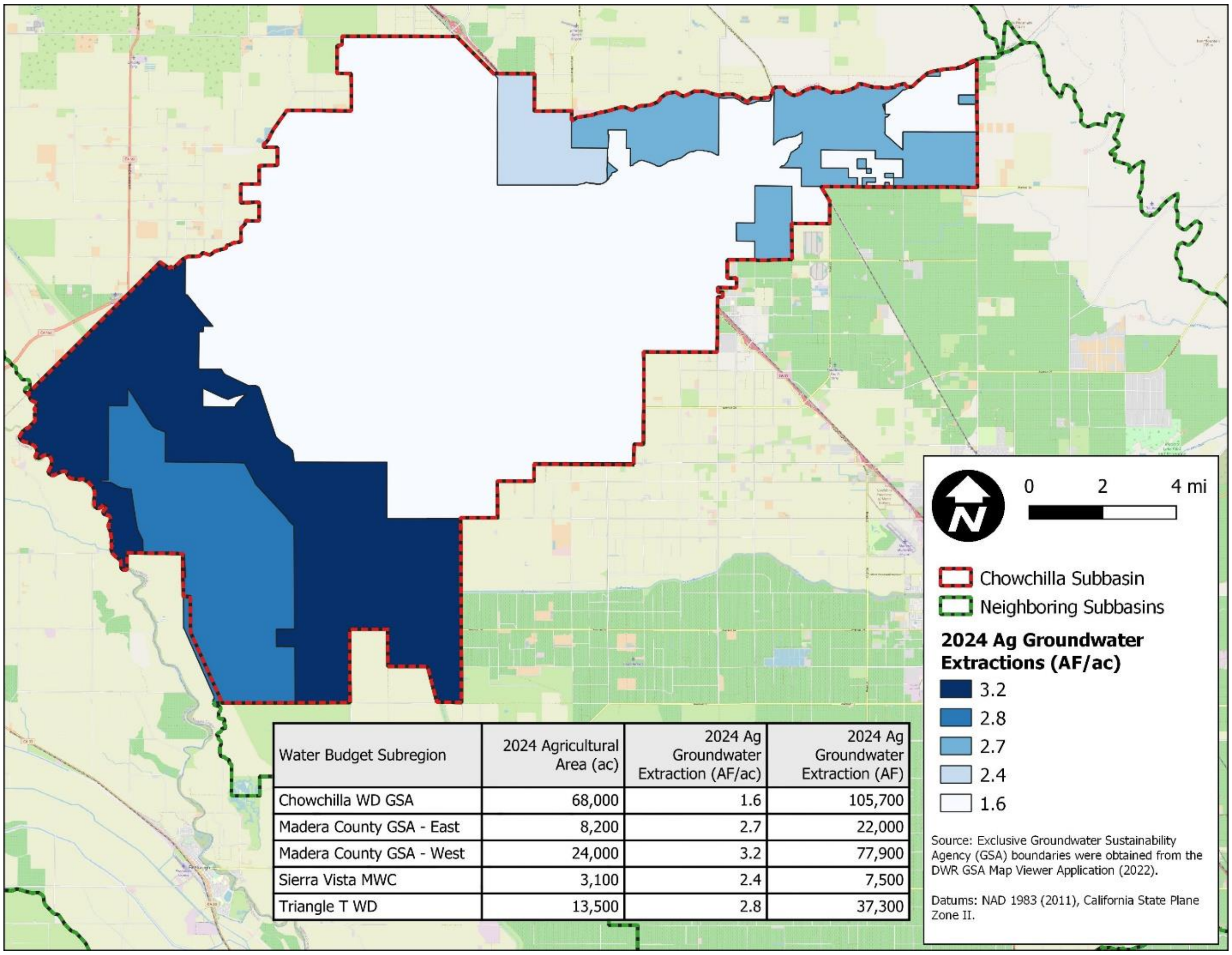
Groundwater extraction in the Subbasin was either measured directly from flowmeters or estimated using the best available information through the updated MCSim water budget approach for each water use sector (see **Section 2**). **Table 3-1** summarizes groundwater extraction in water year 2024 and the associated measurement methods, by subregion and water use sector.

Figure 3-1 provides a map of the 2024 agricultural groundwater extraction volumes and average depths across agricultural areas in the five subregions. Notably, **Figure 3-1** illustrates the average estimated depth of groundwater extraction for agriculture over only the total agricultural acreage in each subregion.

Table 3-2 further summarizes the total groundwater extraction by water use sector in the Subbasin during the historical water budget period in the initial Subbasin GSP (water year 1989 through 2014) and subsequent years through water year 2024 (the current reporting year).

Table 3-1. Groundwater Extraction Volumes and Measurement Methods by Water Use Sector, and Uncertainty (2024).

Water Use Sector	Groundwater Extraction, 2024 (acre-feet, rounded)	Measurement Method	Source
Agricultural	27,441	Measured	Flowmeter records from a subset of landowners in TTWD
	223,000	Estimated	Updated MCSim results, after accounting for measured groundwater extraction in TTWD
Managed Recharge	0		
Native Vegetation	0		
Urban	2,712	Measured	City of Chowchilla flowmeter records
	2,800	Estimated	Updated MCSim results, after accounting for measured groundwater extraction in City of Chowchilla
Chowchilla Subbasin	**Groundwater Extraction, 2024 (acre-feet, rounded)**	**Estimated Uncertainty**	**Description**
Total	**256,000**	20%	Typical uncertainty when estimated in MCSim Surface Water System water budget



Water Budget Subregion	2024 Agricultural Area (ac)	2024 Ag Groundwater Extraction (AF/ac)	2024 Ag Groundwater Extraction (AF)
Chowchilla WD GSA	68,000	1.6	105,700
Madera County GSA - East	8,200	2.7	22,000
Madera County GSA - West	24,000	3.2	77,900
Sierra Vista MWC	3,100	2.4	7,500
Triangle T WD	13,500	2.8	37,300

Figure 3-1. Agricultural Groundwater Extraction, by Subregion.*

**Area and volumes rounded.*

Table 3-2. Chowchilla Subbasin Groundwater Extraction, by Water Use Sector (acre-feet, rounded).

Water Use Sector	Groundwater Extraction, 2024[1] (acre-feet, rounded)	Average Groundwater Extraction, 1989-2024[1] (acre-feet, rounded)	Average Groundwater Extraction, 1989-2014[1] (acre-feet, rounded)
Agricultural	250,500	258,900	250,100
Managed Recharge[2]	0	0	0
Native Vegetation[2]	0	0	0
Urban	5,500	6,500	6,700
Total	**256,000**	**265,400**	**256,800**

[1] Volumes are summarized using updated, refined, and re-calibrated MCSim results (see Section 2). Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.

[2] No known groundwater extraction occurs for managed recharge or native vegetation, per available data and GSP analyses.

3.2 DATA SOURCES

3.2.1 Measured Groundwater Extraction

Direct groundwater pumping data is available from:

- Flowmeter records provided by a subset of landowners in the TTWD GSA for years 2021-2024, reported as part of the Subsidence Control Measures Agreement (see **Section 7.2.4**). These records represent agricultural groundwater extraction from the Upper and Lower Aquifer that is used to irrigate approximately 14,000 acres of agricultural land in the Subbasin.
- Flowmeter records provided by the City of Chowchilla for years 2003-2024, representing urban groundwater extraction within the City's boundaries in CWD GSA. Available pumping records are also used as a comparison for validating the groundwater extraction estimation procedures described below.

3.2.2 Estimated Groundwater Extraction

Estimated groundwater extraction was calculated in the MCSim water budget as the amount of water required to meet water use requirements (e.g., irrigation demand) after accounting for available surface water supplies. Groundwater extraction was calculated following this process for each water use sector. MCSim was developed based on DWR's fine-grid California Central Valley Groundwater-Surface Water Simulation Model (C2VSim-FG), and thus follows the same fundamental approaches described in DWR's C2VSim-FG technical documentation. Further details about the MCSim model are provided in Appendix 6.D of the January 2025 Revised GSP.

3.3 GROUNDWATER RECHARGE

As required by 23 CCR §354.24, the Subbasin GSAs have established a sustainability goal for the basin that culminates in the absence of undesirable results within 20 years of the applicable statutory deadline. The sustainability goal for the Subbasin is "to implement a package of PMAs that will, by 2040, balance long-term groundwater system inflows with outflows..." (Section 3.1.1 of the January 2025 Revised GSP). To track the GSAs' progress toward meeting this sustainability goal, both the GWS inflows and outflows must be quantified.

As shown in **Figure 2-1**, GWS outflows to the SWS include groundwater extraction (quantified above) and groundwater discharge (assumed to be negligible in the Subbasin, given the substantial depth to groundwater). GWS inflows from the SWS include infiltration of precipitation, infiltration of applied water, and infiltration of surface water. While these inflows are not required to be reported in this Annual Report, the Subbasin GSAs feel that they are necessary for understanding the total contribution of the SWS to groundwater sustainability.

Table 3-3 summarizes the total annual groundwater recharge from the SWS in the Subbasin. The components of recharge are useful for understanding and analyzing the combined effects of land surface processes on the underlying GWS. The data sources and calculations used to develop each recharge component are described in Section 2.2.3.3 of the January 2025 Revised GSP.

Table 3-3. Chowchilla Subbasin Groundwater Recharge (acre-feet, rounded).

Water Budget Component	Volume, 2024[1] (acre-feet, rounded)	Average Volume, 1989-2024[1] (acre-feet, rounded)	Average Volume, 1989-2014[1] (acre-feet, rounded)
Infiltration of Applied Water	59,000	86,000	86,000
Infiltration of Precipitation	17,000	37,000	38,000
Infiltration of Surface Water	72,000	59,000	54,000
Total	**148,000**	**182,000**	**178,000**

[1] Volumes are summarized using updated, refined, and re-calibrated MCSim results (see Section 2). Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.

[2] Infiltration of Surface Water includes infiltration of surface water in the rivers, streams, and canals within the Chowchilla Subbasin, plus boundary seepage from the San Joaquin River.

4 Surface Water Supplies (§356.2.b.3)

This section summarizes the annual volumes and data sources for surface water supplies used or available for use within the Subbasin through the current reporting year (water year 2024).

4.1 QUANTIFICATION BY WATER SOURCE TYPE

In this Annual Report, surface water supplies used or available for use in the Subbasin are assumed to be the volume of surface water supplies diverted by or supplied to agencies and water rights users within the Subbasin. It is noted that this is a refinement of the approach in prior Annual Reports, in which surface water supplies used or available for use were reported as the difference between surface water inflows and surface water outflows through the Subbasin.

Per the GSP regulations, surface water supplies must be reported by water source type. According to the regulations:

> *"Water source type" represents the source from which water is derived to meet the applied beneficial uses, including groundwater, recycled water, reused water, and surface water sources identified as Central Valley Project, the State Water Project, the Colorado River Project, local supplies, and local imported supplies.*

Table 4-1 summarizes the total surface water supplies used or available for use in Subbasin, by water source type. The supplies included in these totals are described below.

4.1.1 Local Supplies

Local supplies historically available to water users in the Subbasin include: surface water diversions of non-CVP supplies via pre-1914, riparian, and prescriptive water rights; and non-CVP water received from LeGrand Athlone Water District or other local districts.

4.1.2 CVP Supplies

Agencies with CVP contracts can receive CVP supplies in the Subbasin. CVP supplies include water received from Millerton Reservoir via irrigation and flood releases in the Madera Canal and water received from Buchanan Dam via irrigation and flood releases in the Chowchilla River. Finally, a small amount of CVP supply is also delivered to individual irrigators in CWD from MID.

4.1.3 Local Imported Supplies

Local imported supplies delivered to water users in the Subbasin include water purchased by TTWD from San Joaquin River Exchange Contractors, CWD, MID, and others.

4.1.4 Recycling and Reuse

Recycling and reuse are not currently a significant source of supply within the Subbasin. However, urban wastewater treated by the City of Chowchilla, as well as water associated with private septic systems, generally returns to the GWS within the Subbasin.

Table 4-1. Surface Water Supplies Used or Available for Use, by Water Source Type (acre-feet, rounded).

Surface Water Source Type	Volume, 2024 (AF)	Source Information
Local Supplies	8,500	Non-CVP diversions/deliveries (e.g., riparian and prescriptive water rights); non-CVP water received from LeGrand Athlone Water District
CVP Supplies	186,900	CVP supplies from Millerton Reservoir (via Madera Canal) and Buchanan Dam
Local Imported Supplies	7,000	TTWD surface water purchases
Total	**202,400**	

4.2 DATA SOURCES

Table 4-2 summarizes the data sources and estimation procedures used to quantify surface water supplies used or available for use in the Subbasin.

Table 4-2. Data Sources for Surface Water Supplies Used or Available for Use.

Data	Water Source Type	Calculation/Estimation Technique and Information Sources
Water Rights Diversions of Non-CVP Supplies	Local supplies	Summarized from SWRCB reports and local records from CWD, SVMWC, TTWD, and Madera County, as available.
LeGrand Athlone WD Supplies to CWD	Local Supplies	Summarized from CWD monthly water supply reports
Chowchilla River Supplies	CVP Supplies	Reported Buchanan Dam flood and irrigation releases, summarized from USACE records
Madera Canal Supplies	CVP Supplies	Reported Madera Canal flood and irrigation releases, summarized from USBR records for Madera Canal Miles 33.6 and 35.6
MID Deliveries to CWD	CVP Supplies	Reported deliveries to turnouts in CWD, summarized from MID STORM[1] delivery database records
TTWD Purchased Water	Local Imported Supplies	Reported purchased water volume delivered via the Poso Canal Pipeline and Columbia Canal Company Pipeline, summarized from TTWD annual purchased water records

[1] The water ordering and delivery management software used by MID.

5 Total Water Use (§356.2.b.4)

This section summarizes the annual volumes and data sources for total water use in the Subbasin through the current reporting year (water year 2024).

5.1 QUANTIFICATION BY WATER USE SECTOR AND WATER SOURCE TYPE

In this Annual Report, total water use is assumed to equal the total combined groundwater extraction and surface water used or available for use in the Subbasin (i.e., the sum of water supplies reported in **Sections 3 and 4**). It is noted that this is a refinement of the approach in prior Annual Reports, in which total water use was reported as the applied water and precipitation from all sources in the Subbasin, including all consumptive water use (evapotranspiration) and non-consumptive water use (other water uses, e.g., deep percolation and runoff).

Tables 5-1 and 5-2 summarize the total water use in the Subbasin by water use sector and water source type in water year 2024 (the current reporting year).

Table 5-1. Chowchilla Subbasin Total Water Use, by Water Source Type (acre-feet, rounded).

Water Source Type	Water Use (acre-feet)	Methods Used to Determine
Groundwater[1]	256,000	Combined measured and estimated groundwater extraction (see Section 3).
Surface Water	202,400	Measured surface water supplies diverted by or supplied to agencies and water rights users within the Subbasin (see Section 4).
Recycled Water	0	No quantified recycled water use in the Subbasin.
Reused Water	0	No quantified reused water use in the Subbasin.
Total	**458,400**	

[1] Volumes are summarized using updated, refined, and re-calibrated MCSim results (see Section 2). Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.

Table 5-2. Chowchilla Subbasin Total Water Use, by Water Use Sector (acre-feet, rounded).

Water Use Sector	Water Use[1] (acre-feet)	Methods Used to Determine
Agricultural	392,900	Combined groundwater extraction and surface water diversions for agricultural use (see Sections 3-4), excluding benefits of projects and management actions.
Urban[2]	5,500	Groundwater for urban use (see Section 3).
Managed Recharge	60,000	Benefits of projects and management actions (Section 7)
Native Vegetation	0	No noted groundwater extraction or surface water diversions for native vegetation, per GSP analyses.
Total	**458,400**	

[1] Volumes are summarized using updated, refined, and re-calibrated MCSim results (see Section 2). Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.
[2] The Urban water use sector includes urban, industrial, rural residential, and semi-agricultural areas in the Subbasin.

5.2 DATA SOURCES

Total water use in **Tables 5-1 and 5-2** are summarized from the data sources used to quantify groundwater extraction and surface water supplies used or available for use, as described in **Sections 3 and 4** of this Annual Report.

6 Change in Groundwater Storage (§356.2.b.5)

6.1 CHANGE IN GROUNDWATER STORAGE MAPS

Consistent with 23 CCR §354.18.b, based on a comparison of the annual spring groundwater elevation contour maps representing seasonal high groundwater conditions, changes in groundwater elevation were calculated between Spring 2023 and Spring 2024. To calculate annual change in groundwater storage from the groundwater level contour maps, the difference in groundwater elevation between annual spring contour maps was calculated for each of the principal aquifers (Upper and Lower Aquifers). Both confined and unconfined groundwater conditions occur within the Chowchilla Subbasin. To accurately estimate change in groundwater storage from changes in groundwater levels, it is important to differentiate areas of confined groundwater conditions from unconfined conditions. Accordingly, the groundwater elevation data was reviewed to estimate an area over which the Lower Aquifer exhibits confined conditions and where the groundwater levels are representative of a potentiometric surface. This was done by comparing groundwater elevations to the elevation of the bottom of the Corcoran Clay confining geologic unit. The extent of the area where groundwater elevations in the Lower Aquifer occur above the bottom of the Corcoran Clay was delineated as the area of confined groundwater conditions for the purpose of calculating change in groundwater storage.

Outside of the delineated confined area, changes in groundwater levels (in both the Upper and Lower Aquifers) were multiplied by representative specific yield values to estimate change in groundwater storage. Within the delineated area of confinement in the Lower Aquifer, groundwater potentiometric surface changes in the Lower Aquifer were multiplied by a much smaller storage coefficient value to calculate annual changes in groundwater storage in the Lower Aquifer. The specific yield and storage coefficient values used in the analysis are derived from values in the calibrated integrated groundwater flow model (MCSim), which was updated and recalibrated in 2024. The specific yield values in MCSim are lower than some previous values estimated for the Chowchilla Subbasin; however, recent test hole drilling and associated subsurface geologic and geophysical logging conducted at 11 nested monitoring well sites across the Chowchilla Subbasin indicate a high fraction of fine-grained sediments in many parts of the Chowchilla Subbasin, which is consistent with the relatively lower specific yield values in MCSim, especially for deeper materials within the Lower Aquifer.

Figures 6-1 and 6-2 show the spatial distribution of calculated annual change in groundwater level for the most recent reporting year between Spring 2023 and Spring 2024 for the Upper Aquifer unconfined groundwater zone and also for the Lower Aquifer. Because there was incomplete spatial coverage of groundwater elevation data within the Chowchilla Subbasin, it was not deemed appropriate to extend groundwater elevation contours into some parts of the Chowchilla Subbasin. In these areas without contour data, the average change in groundwater elevation value calculated for the area with data was applied to areas without data to estimate change in storage amounts for the Lower Aquifer. However, the portion of the Upper unconfined aquifer without groundwater contour data was assumed to have no net storage change because it is an area comprised primarily of thin saturation and perched groundwater conditions. **Tables 6-1 through 6-3** summarize the calculated annual change in groundwater storage volumes for each year and by principal aquifer for the Chowchilla Subbasin. The discussion of estimated change in storage values presented below is based on the aquifer parameter values derived from MCSim as presented in **Tables 6-1 through 6-3**. Change in storage values for both the unconfined Upper Aquifer and Lower Aquifer zones for representative specific yield and storativity values are presented in **Table 6-1**. Maps of the spatial distribution of change in storage in the principal aquifers for the most recent period from Spring 2023 to Spring 2024 are presented in **Figures 6-3 and 6-4**. All maps of change in groundwater storage utilize specific yield and storage coefficient values derived from MCSim. Maps of change in groundwater levels and change in groundwater storage for each of the years between Spring 2016 and 2023, separated by aquifer, are presented in **Appendix C**.

Using representative aquifer parameter values derived from the calibrated groundwater flow model MCSim, the calculated changes in groundwater levels in the Upper Aquifer translate to annual changes in groundwater storage of about 108,500 AF from Spring 2023 to 2024 (**Table 6-1**). Negative change in storage values indicate depletion of groundwater storage, whereas positive change in storage values represent addition of groundwater in storage.

Between Spring 2023 and Spring 2024, the change in groundwater storage in the combined Lower Aquifer and Undifferentiated Unconfined Zone was about 12,400 AF (**Table 6-2**). Of this total, approximately 1 AF occurred in the confined zone. Since GSP implementation, groundwater extraction from the Lower Aquifer confined zone has generally declined, coinciding with implementation of the Subsidence Control Measures Agreement (Agreement). Under the Agreement, participating landowners – who collectively manage more than 14,000 acres in the Western Management Area of the Chowchilla Subbasin – have reduced their pumping from the Lower Aquifer with the goal of mitigating subsidence and preventing adverse impacts to surrounding critical infrastructure. At the same time, participants are implementing projects that increase surface water use for irrigation and groundwater recharge in the Upper Aquifer. These measures have reduced groundwater demand and allowed participating landowners to shift pumping from the Lower Aquifer to the Upper Aquifer, where recharge projects can effectively replenish groundwater storage during wetter years. Thus, some increase in groundwater usage from the Upper Aquifer, especially in dry years, may be attributable to successful implementation of these subsidence control measures, which have already successfully reduced subsidence rates in the TTWD area of the Western Management Area. Additional information about the Agreement is provided in **Section 7.2.4**, below, and in Section 3.3.3.7 of the Chowchilla Subbasin Revised GSP.

The combined change in groundwater storage for the entire Subbasin was about 120,900 AF from Spring 2023 to 2024, indicating a net increase in groundwater storage (**Table 6-3**). Notably, there is uncertainty in this estimate, and there are also other processes that contribute to the net change in groundwater storage besides groundwater pumping (e.g., subsurface inflows and outflows). These contributing factors were considered in the MCSim groundwater model used in development of the Chowchilla Subbasin GSP and will be further evaluated in future updates to the MCSim model.

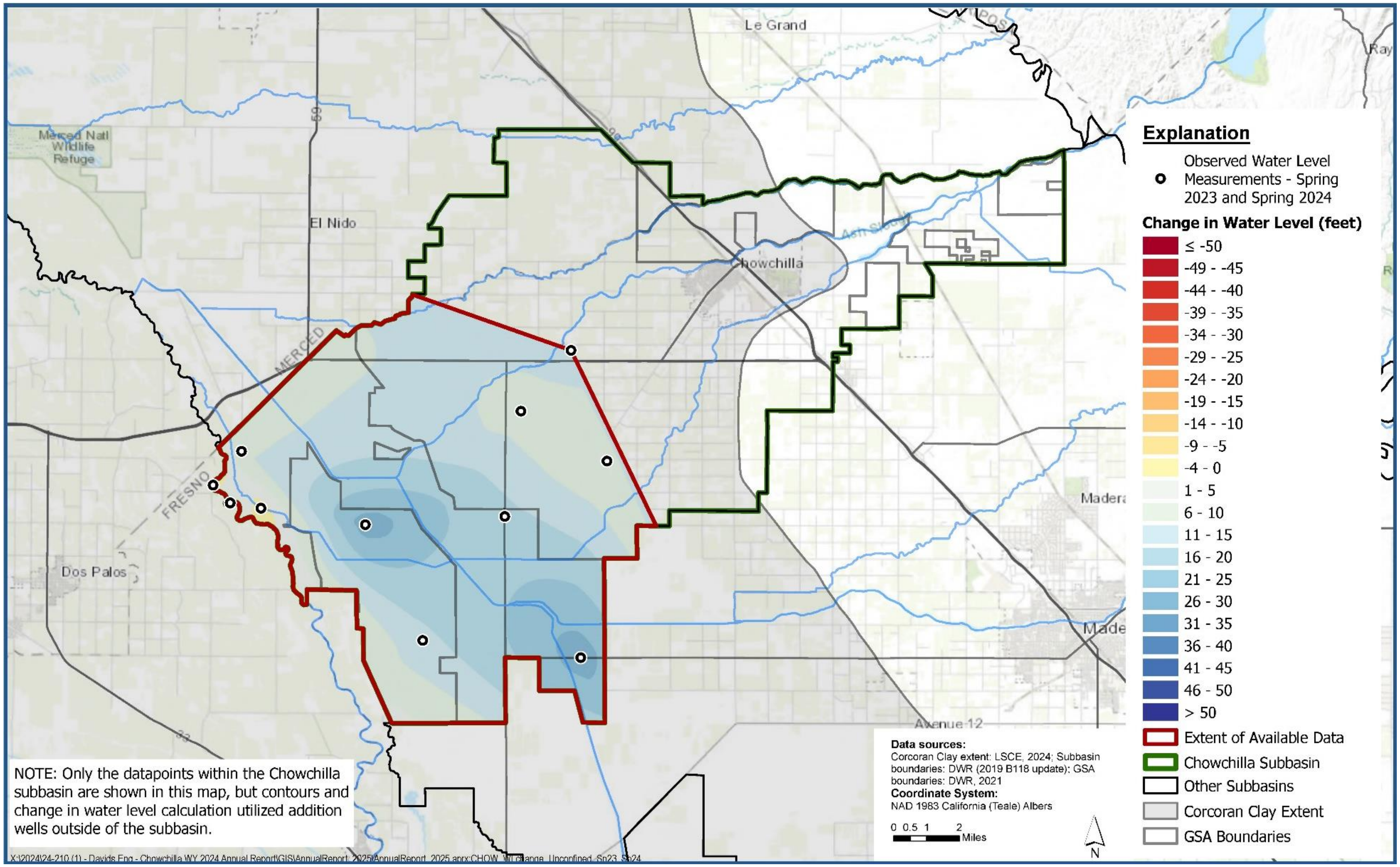


Figure 6-1. Change in Groundwater Level in the Upper Aquifer – Spring 2023 through Spring 2024.

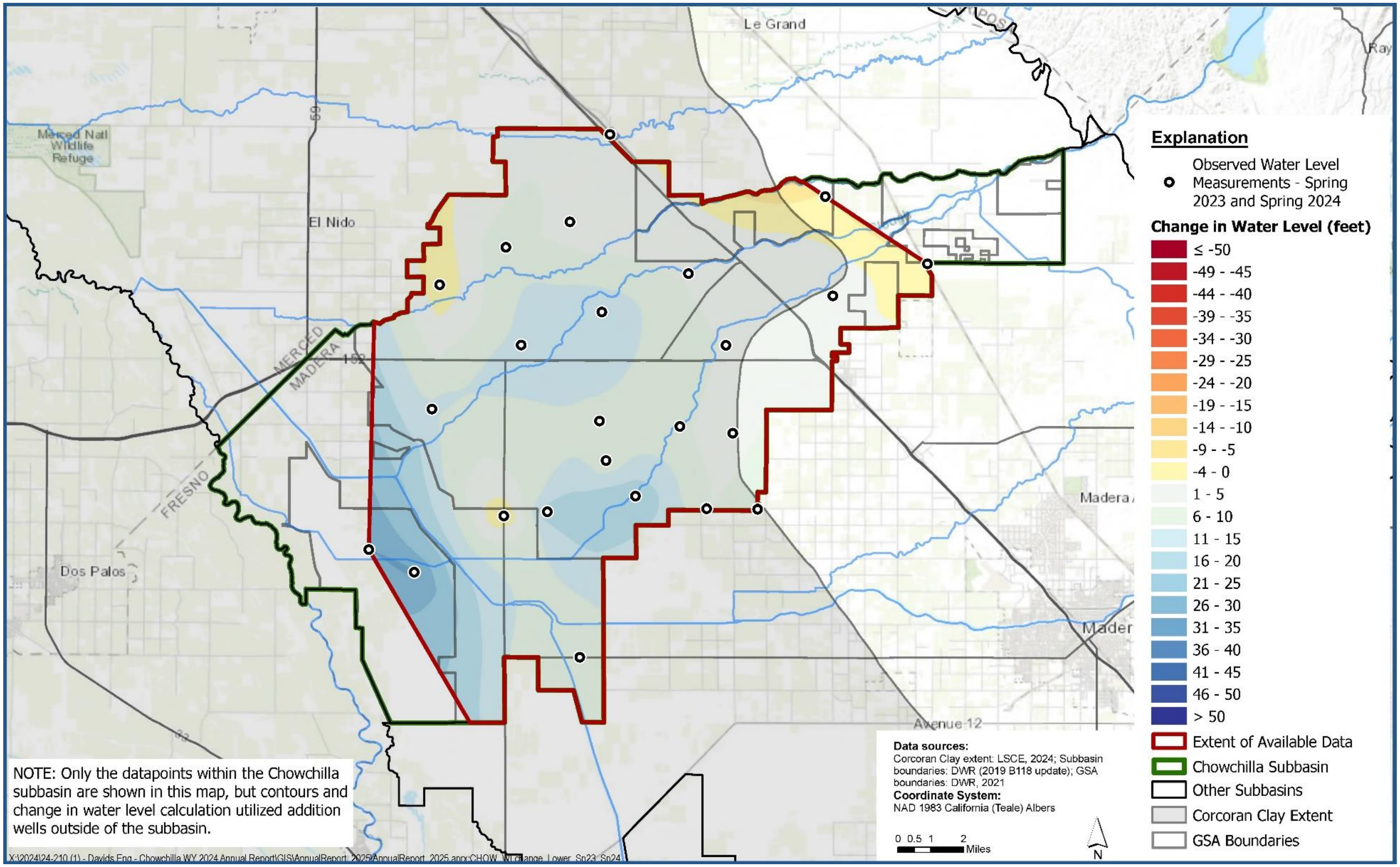


Figure 6-2. Change in Groundwater Level in the Lower Aquifer/Undifferentiated Unconfined Zone – Spring 2023 through Spring 2024.

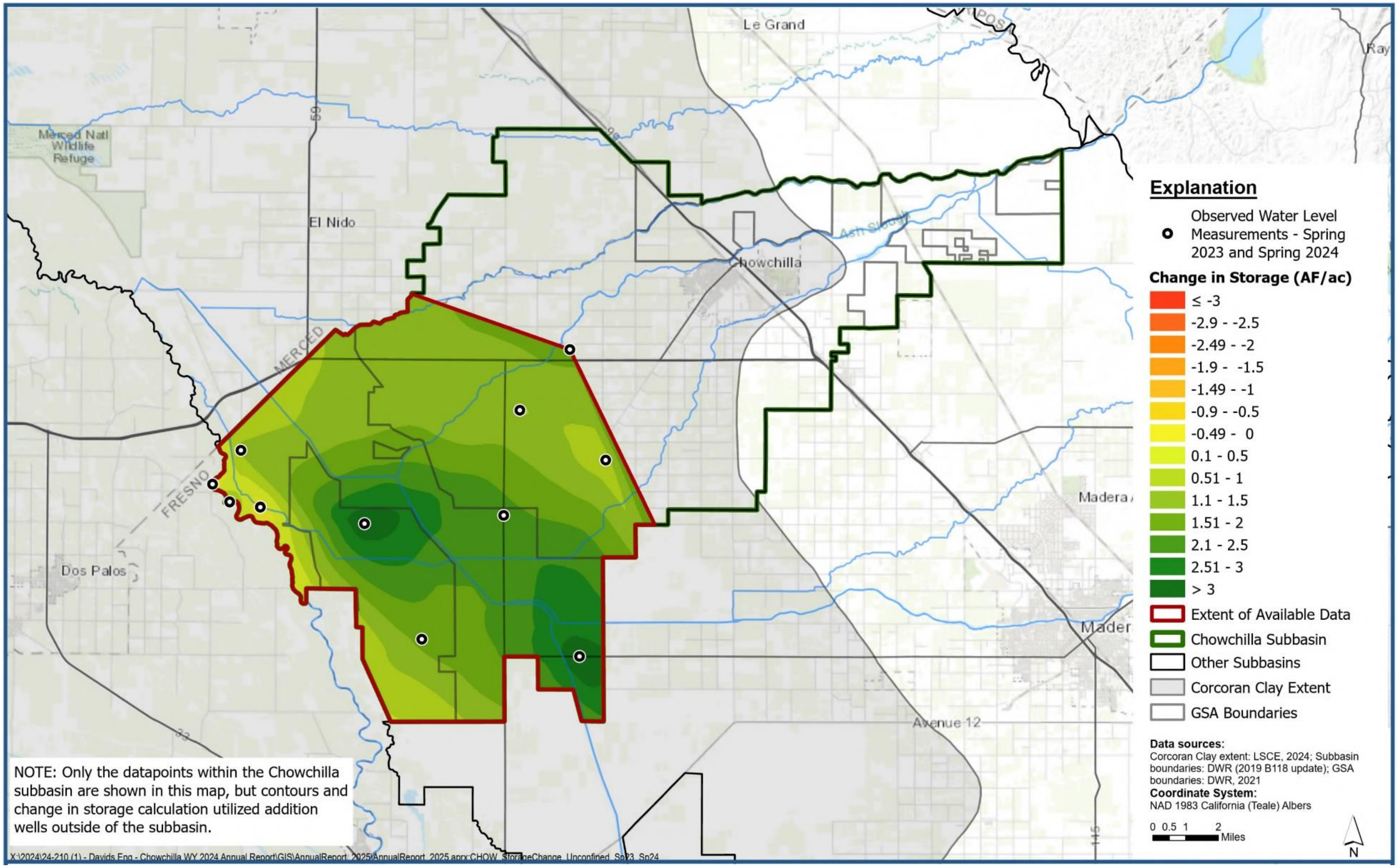


Figure 6-3. Change in Groundwater Storage in the Upper Aquifer – Spring 2023 through Spring 2024.

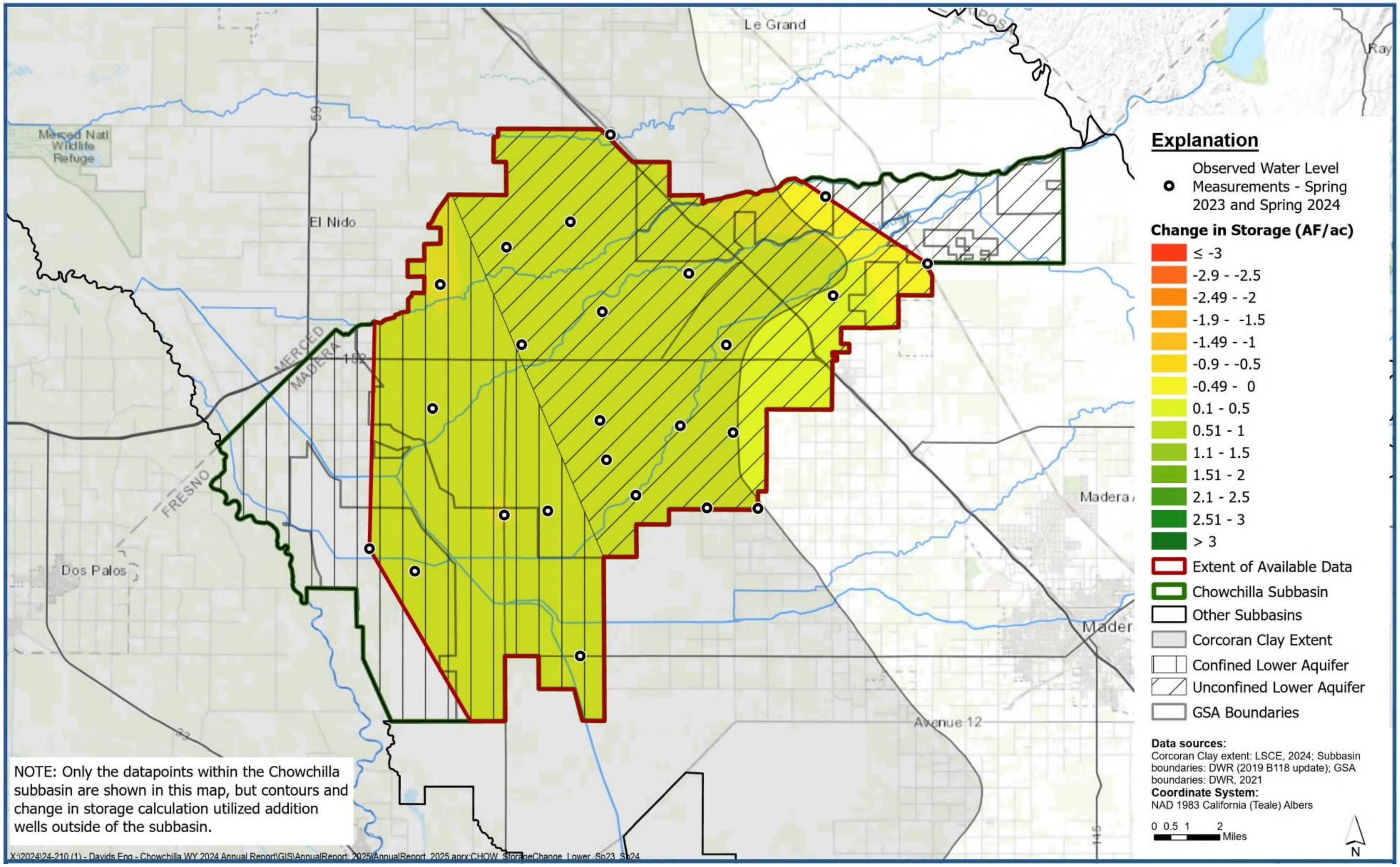


Figure 6-4. Change in Groundwater Storage in the Lower Aquifer/Undifferentiated Unconfined Zone – Spring 2023 through Spring 2024.

Table 6-1. Calculated Change in Groundwater Storage in the Upper Aquifer Zone.

Analysis Time Period	Specific Yield	Average Groundwater Elevation Change (ft)	Average Groundwater Storage Change Per Acre (AF/acre)	Area Used for Estimating Groundwater Storage Change (acres)	Total Unconfined Groundwater Storage Change in Chowchilla Subbasin (AF)	Notes on Specific Yield Basis
Spring 2023-2024	0.126	13.44	1.69	64,155	108,516	Representative value from MCSim model

Table 6-2. Calculated Change in Groundwater Storage in the Combined Lower Aquifer and Undifferentiated Unconfined Zone.

Analysis Time Period	Lower Aquifer Zone	Storage Coefficient[1]	Specific Yield[2]	Average Change in Groundwater Potentiometric Surface (ft)	Average Confined Groundwater Storage Change Per Acre (AF/acre)	Area Used for Estimating Confined Groundwater Storage Change (acres)	Total Groundwater Storage Change[3] (AF)	Notes on Storage Coefficient Basis
Spring 2023-2024	Confined	1.06×10^{-6}		11.24	1.19×10^{-5}	57,999	1	Representative value from MCSim model
	Unconfined		0.024	5.57	0.14	87,575	12,361	
	TOTAL					145,574	12,362	

[1] Storage Coefficient value applies to those areas below the Corcoran Clay interpreted to be confined (57,999 acres).

[2] Specific Yield value applies to those areas below the Corcoran Clay and east of Corcoran Clay extent interpreted to be unconfined (87,575 acres).

[3] Total area of the Lower Aquifer within the Chowchilla Subbasin is 145,574 acres.

Table 6-3. Total Calculated Change in Groundwater Storage in the GSP Area.

Analysis Time Period	Average Groundwater Storage Change Per Acre (AF/acre)	Total GSP Area (acres)	Total GSP Area Groundwater Storage Change (AF)
Spring 2023-2024	0.83	145,574	120,878

6.2 GROUNDWATER USE AND CHANGE IN GROUNDWATER STORAGE

Annual groundwater extraction and change in groundwater storage in the Subbasin are shown in **Figure 6-5** for water years 2015 to 2024. Groundwater extraction is estimated or directly measured following the procedures described in the corresponding section above. Change in groundwater storage is estimated based on an annual comparison of spring groundwater elevations. Change in groundwater storage is not provided for water years 2015 and 2016, as there was insufficient historical data to accurately calculate change in storage those years. Historical groundwater extraction in water years 1989 through 2014 are shown in Figure 2-89 of the Chowchilla Subbasin Revised GSP. Historical annual changes in groundwater storage and cumulative changes in storage are also shown in the Chowchilla Subbasin Revised GSP (Appendix 6.D). Historical changes in groundwater storage between 1989 and 2014 were calculated based on a water balance of the Subbasin groundwater system using the MCSim numerical groundwater flow model (described in the Chowchilla Subbasin GSP). Total annual groundwater extraction decreases in wetter years and increases in drier years, while the annual change in groundwater storage has fluctuated between approximately 279,000 AF and -150,000 AF since water year 2017 (**Figure 6-5**).

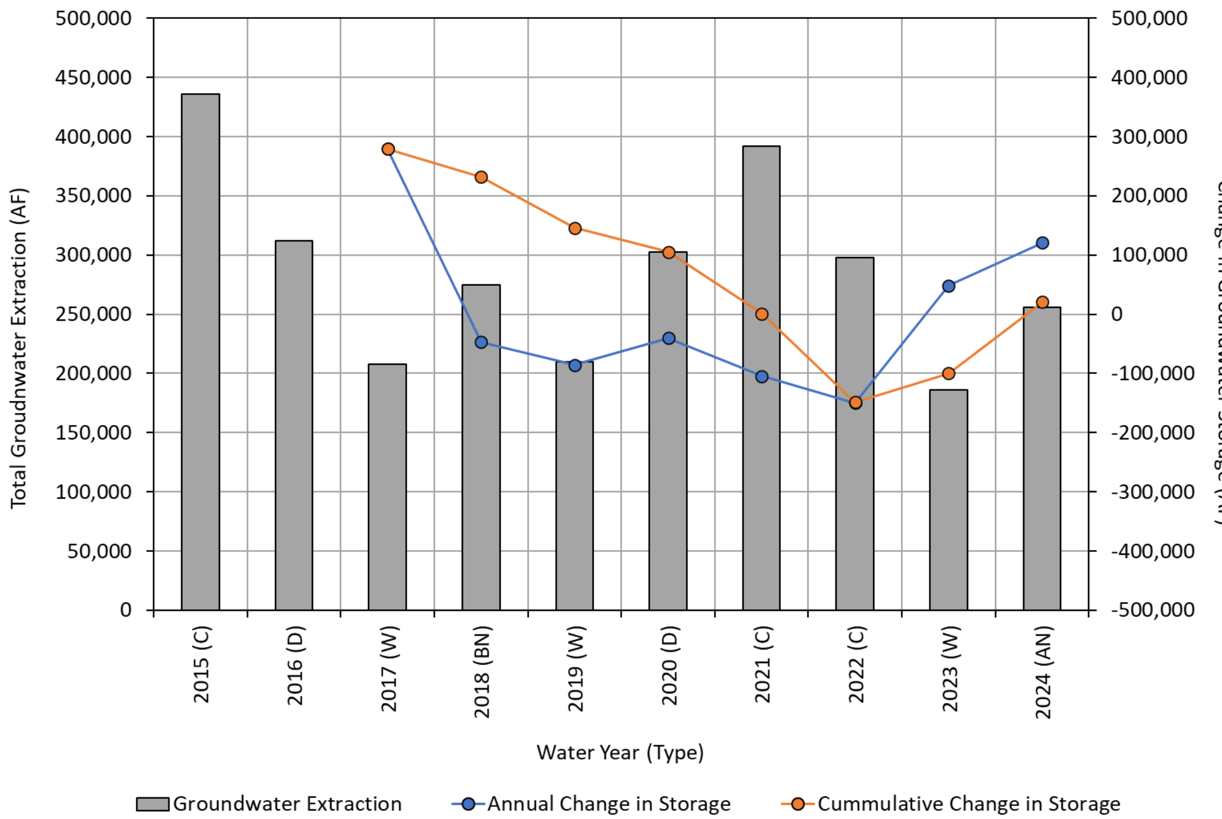


Figure 6-5. Annual Groundwater Storage Changes and Extraction.*

** Groundwater extraction volumes are summarized from Section 3 using the updated, refined, and re-calibrated MCSim results (see Section 2). Updates, refinements, and re-calibration may have resulted in some changes to values in the Subbasin water budget compared to prior water budgets, although the general magnitudes and trends remain generally the same as prior Subbasin water budget results.*

6.3 SUBSIDENCE DATA AND MAPS

The GSP notes that while SJRRP benchmark survey points will be used to evaluate land subsidence SMC, additional subsidence data will be reviewed annually to assess subsidence within the Subbasin. The amount and rate of subsidence in the Subbasin and surrounding areas is being tracked by various agencies using different methods. Interferometric synthetic aperture radar (InSAR) measurements from satellite data and released by DWR have been collected for the time period from 2015 to 2024. Maps of annual subsidence for the most recent nine years and cumulative for 2015 to 2024 are included in **Appendix D**.

6.3.1 Western Management Area

Review of the cumulative subsidence map over the nine-year period indicates a range of total subsidence from approximately 2.0 to 4.5 feet over this time span in the Western Management Area of Chowchilla Subbasin. However, review of the maps for individual years generally indicates more of this subsidence occurred in the early portion of the 2015 to 2024 time period than in the later portion of the time period. Notably, March 2023 to March 2024 showed the lowest annual rate of subsidence over the nine-year period. While there are substantial areas of missing data on these maps (indicated by white areas), it appears that much of the western portion of Chowchilla Subbasin experienced 0.6 to 1.0 feet of subsidence from March 2015 to March 2016, while most of this same area showed 0.1 to 0.4 feet of subsidence from March 2023 to March 2024. **Appendix D** Figure D-22 shows a comparison of water levels and subsidence rates. Across the Western Management Area, groundwater levels have begun to stabilize in recent years, but subsidence continues to occur This gradual decrease in (but ongoing) subsidence over time may reflect the lag time often associated with subsidence; in this case, a lag from low groundwater elevations experienced in 2015 at the end of the previous drought. It is noted that data is missing in some key areas where the greatest subsidence prior to 2016 was evident, and understanding changes in the spatial distribution of subsidence will require further review as more data becomes available.

Additional subsidence data is also available for ongoing benchmark surveys performed for the San Joaquin River Restoration Project, with data now available through December 2024 (**Appendix D**). These benchmark subsidence data also indicate decreasing rates of subsidence in western Chowchilla Subbasin from 2015-2016 to 2023-2024.

6.3.2 Eastern Management Area

Review of the cumulative subsidence map over the nine-year period indicates a range of total subsidence from approximately 0 to 4 feet over this time span in the Eastern Management Area of Chowchilla Subbasin. The InSAR maps also indicate the area of greatest subsidence appears to have shifted slightly into the Eastern Management Area in recent years. However, subsidence rates during the March 2023 to March 2024 period are the lowest of the nine-year period.

Additionally, the San Joaquin River Restoration Project benchmark subsidence data also indicates a shift in the area of greatest subsidence to the Eastern Management Area in the southern portion of the Subbasin.

7 Groundwater Sustainability Plan Implementation Progress (§356.2.c)

7.1 IMPLEMENTATION OF PROJECTS AND MANAGEMENT ACTIONS (§356.2.C)

Implementation of projects and management actions (PMAs) is critical for achieving and maintaining groundwater sustainability in the Subbasin, as described in the GSP. PMAs are scheduled for implementation throughout the 2020 through 2040 GSP implementation period, with different timelines anticipated for each PMA. The estimated annual costs and benefits (i.e., increased groundwater recharge or reduced groundwater use) of PMAs also vary across the GSP implementation period, as described in the January 2025 Revised GSP.

This section describes progress that has been made toward implementation of the GSP and specific PMAs since the previous Annual Report. First, a brief overview is given regarding the GSAs' efforts since 2022 to revise the GSP and to develop work plans and monitoring network improvements to fill data gaps. Next, a summary is given regarding the successful development and recent implementation of the Domestic Well Mitigation Program. The remainder of this section describes progress made by the GSAs in implementing their proposed PMAs.

7.1.1 GSP Revisions and Efforts to Address Data Gaps

7.1.1.1 GSP Revisions

As of January 2025, the Subbasin GSAs have revised the GSP on three occasions.

The first revisions were completed in 2022, when the GSP was revised to resolve deficiencies identified by DWR in their January 2022 incomplete determination for the Subbasin GSP. During the 180-day consultation period between January 2022 and July 2022, the four GSAs cooperatively completed additional technical analyses and GSP revisions to address the identified deficiencies and developed two workplans to address remaining data gaps with regard to subsidence and interconnected surface water. The July 2022 Revised GSP was adopted and submitted to DWR for evaluation on July 27, 2022.

The second revisions were completed in 2023, when the Subbasin GSAs further revised certain sections of the GSP to address remaining deficiencies identified by DWR in their March 2023 inadequate determination for the Subbasin GSP. Following the determination, the GSAs quickly coordinated together and worked cooperatively with staff at DWR and the SWRCB to review the reasons for this determination and expeditiously completed additional revisions necessary to receive an adequate determination. Approximately two months after DWR issued its inadequate determination, the Subbasin GSAs submitted the May 2023 Revised GSP to SWRCB staff.

The third revisions were completed in early 2025, following numerous consultations between the GSAs and SWRCB staff in 2023-2025, a complete and thorough internal review by SWRCB staff, and subsequent guidance provided by the SWRCB. The January 2025 Revised GSP includes, among other changes:

- Amendments to the Subbasin Domestic Well Mitigation Program (described further in **Section 7.1.2**). The GSAs have made amendments to allow for: mitigation of both domestic wells and shallow wells that supply drinking water (e.g., public water systems and state small water systems); mitigation of impacts resulting from degraded water quality; case-by-case review of eligible mitigation in excess of $30,000, with specific review criteria; temporary mitigation services for impacted wells; and coordination with the Chowchilla Management Zone (CMZ) program related to monitoring groundwater quality with regard to nitrate levels, including mitigation services for residents in the Subbasin.

- Refinements to the SMC for groundwater levels and subsidence. The GSAs have also updated their assessments of groundwater level and land subsidence SMC, including interim milestones.
- Updates to PMAs for subsidence mitigation and as backstops for avoiding undesirable results. This includes development of a Demand Management Programs and Subsidence Mitigation Measures MOU to provide a backstop with specific triggers and a financial mechanism to mitigate for impacts stemming from continued subsidence, which will be implementable no later than January 1, 2026.

The January 2025 Revised GSP was completed and distributed for public review in January 2025. The GSAs anticipate submittal of the January 2025 Revised GSP in March 2025 to SWRCB and subsequently to DWR.

Throughout these revisions processes, the GSAs have continued their coordination with the SWRCB and DWR to identify a pathway back to DWR jurisdiction and local control of the Subbasin. The GSAs remain steadfast in their commitment and dedication to the long-term sustainability of the Subbasin, and will continue their ongoing efforts to implement the Revised GSP and initiate work on the workplans and monitoring network enhancements. Coordinated implementation of the GSP remains underway to achieve sustainable management of the Subbasin by 2040, in compliance with SGMA.

7.1.1.2 Efforts to Address Data Gaps

As part of the GSP revision processes, the GSAs have developed and updated two workplans to address remaining data gaps related to subsidence and interconnected surface water. The GSAs also developed and are carrying out a plan for enhancing the monitoring network and improving data collection by incorporating existing wells into the monitoring network, installing new multi-completion monitoring wells to fill key data gaps, and installing automated continuous monitoring equipment at key locations to improve monitoring frequency and data accessibility. Implementation of these monitoring network enhancements are already improving understanding of groundwater conditions in the Subbasin, filling key data gaps, and replacing monitoring network sites that have become inaccessible or have been found otherwise unsuitable for monitoring conditions in the Subbasin. The workplans and monitoring network enhancements have been incorporated, as applicable, into the Subbasin GSP revisions and will continue to be incorporated in future Periodic Evaluations and Plan Amendments, following DWR approval of the GSP.

7.1.2 Domestic Well Mitigation Program

Since its launch in January 2023, the Subbasin GSAs have continued to implement a Domestic Well Mitigation Program (DWMP) to mitigate undesirable results for domestic well users that are significantly and adversely impacted by groundwater conditions during the GSP implementation period while the GSAs implement other PMAs to achieve and maintain sustainability.

Early development of the DWMP began in 2019-2022, when the Subbasin GSAs successfully completed a domestic well inventory for the Subbasin. The GSAs were awarded grant funding from DWR to conduct the inventory and to install nine new monitoring wells at three sites in the Subbasin, all with the goal of improving understanding and management of groundwater in the Subbasin. The inventory was completed in April 2022 (January 2025 Revised GSP Appendix 2.G), and the new nested monitoring wells were installed in 2022. The inventory provided a foundational understanding of the potential impacts to domestic wells during the GSP implementation period under a range of projected scenarios, which has since been used to inform DWMP planning, funding, and financing discussions. The new nested monitoring wells have also provided valuable information from drilling, geologic and geophysical logging, groundwater quality sampling, and automated groundwater level monitoring that continues to aid the GSAs in filling data gaps in the monitoring and conceptualization of the Subbasin hydrogeology.

In summer 2022, the GSAs completed and fully executed a DWMP Memorandum of Understanding (MOU) that clearly articulated the DWMP starting date, proportionate responsibilities, funding limits, organizational structure, eligibility criteria, staffing responsibilities, and principles for implementing the DWMP, among other topics. The GSAs have since developed two amendments to the MOU that, among other refinements, allow for: mitigation of both domestic wells and shallow wells that supply drinking water (e.g., public water systems and state small water systems); mitigation of impacts resulting from degraded water quality; case-by-case review of eligible mitigation in excess of $30,000, with specific review criteria; temporary mitigation services for impacted wells; and coordination with the CMZ program related to monitoring groundwater quality with regard to nitrate levels, including mitigation services for residents in the Subbasin.

In accordance with the MOU, the DWMP was developed and funded by the GSAs and initiated in January 2023. The CWD GSA is administering the DWMP on behalf of all the Subbasin GSAs. The CWD GSA has augmented their organizational structure to add a new position, the Domestic Well Mitigation Program Coordinator, and has hired a dedicated staff member to actively administer the DWMP. The GSAs have also developed a new DWMP-specific website (https://chowchillasubbasin.com/) and associated informational items intended to reach the target audience and further spread the word about DWMP availability and eligibility.

The GSAs are currently proceeding with DWMP implementation. As of early March 2025, the DWMP has received 26 applications and awarded mitigation funding for nine wells. The average cost for mitigation services through the DWMP is approximately $55 per foot for well drilling, with approximate total costs ranging from under $30,000 up to $50,000, depending on the well depth. Applications for an additional 17 wells are currently pending as they undergo review and as mitigation efforts are coordinated between the DWMP, the CMZ program, and county programs, as applicable. Based on data extracted from DWR's dry well reporting system in March 2025, two wells in the Subbasin had a reported outage since October 2023[6]. Both wells have engaged with

[6] Three well outages were reported, although two reports were made with identical well coordinates, depth, and outage information. A fourth well had an outage reported since October 2023, although the outage occurred prior to water year 2024.

the DWMP as of March 2025 (one has applied and is awaiting funding approval, and one has initiated an application). Impacts to both wells are currently resolved with an interim solution based on reported information.

In 2025, the GSAs will continue their outreach efforts to all beneficial users of groundwater in the Subbasin and will continue reviewing and responding to requests from well owners requesting services as part of the DWMP. As evidenced by the GSAs' ongoing implementation of the DWMP, the GSAs are committed to avoiding undesirable results for beneficial uses and users of groundwater in the Subbasin.

It is expected that the DWMP will continue to be implemented as needed until groundwater sustainability is achieved. By 2040 and during the sustainability period, groundwater levels are anticipated to stabilize at or above Fall 2015 historical levels, avoiding continued undesirable results for groundwater uses and users. Thus, the DWMP is not anticipated to be needed beyond the GSP implementation period. Nevertheless, as stated in the MOU, the DWMP is intended to remain in place until groundwater sustainability is achieved.

7.1.3 Summary of Projects and Management Actions

PMAs are listed and described in **Tables 7-1 through 7-4**, followed by a more detailed description of individual PMAs being implemented by each GSA. **Tables 7-1 and 7-2** provide an overview of each PMA from the GSP, its implementation status, planned activities, and updates regarding actual activities and actual benefits since implementation. The status of PMAs is generally defined as follows:

- **Implemented**: Active efforts to operate the PMA have begun, though benefits may or may not have been achieved to date.
- **In Progress**: Active efforts needed to initiate the PMA have begun (e.g., permitting), though development has not reached the point of operability.
- **Planned**: Early conceptual development is still in progress, though active efforts to initiate or operate the PMA have not begun.

Tables 7-3 and 7-4 summarize the actual PMA costs incurred through the current reporting year (water year 2024) and the estimated overall PMA costs from the initial GSP. All estimated benefits and costs are summarized from the GSP, while actual benefits and costs are presented only for those projects already implemented. These tables provide a comparison of the actual and estimated costs and benefits of PMAs, as well as a measure of the degree of implementation for PMAs that will take multiple years to fully implement. It is noted that the estimated benefits and costs were developed for full project implementation, not partial implementation.

The GSAs have continued to make significant progress in implementing existing PMAs, as well as developing and implementing new PMAs since the previous Annual Report. The GSAs remain committed to adaptive management of groundwater resources through these PMAs. As PMAs are implemented and monitored, the project timelines and volume of demand management necessary will be reviewed. If adjustments are needed to meet the sustainability goal for the Subbasin, PMA timelines will be evaluated and adjusted. In addition to continuous monitoring and review of PMA implementation, each Annual Report represents an important milestone and opportunity to review the status of GSP implementation efforts.

Table 7-1. Project and Management Action Implementation Summary.

Subregion	Project[a]	Project Mechanism	First Year Implemented	Status	Project Description
CWD GSA	Enhanced Management of Flood Releases for Recharge	Increase Recharge	2017	Implemented	Diverted water is spread throughout unlined portions of the distribution system and released into reaches of the Chowchilla River, Ash Slough and Berenda Slough that are not used for water distribution.
CWD GSA	Road 13 Groundwater Recharge Basin	Increase Recharge	2018	Implemented	Develop and utilize one 56[b]-acre groundwater recharge basin.
CWD GSA	City Groundwater Recharge Basin	Increase Recharge	2019	Implemented	Deliver water to a storm water retention pond owned by the City of Chowchilla for groundwater recharge. *CWD has delivered water to the City Groundwater Recharge Basin since 2005, but has considered this a GSP project since GSP development in 2019.*
CWD GSA	Additional Groundwater Recharge Basins	Increase Recharge	2021	In Progress	Develop an additional 1,000 acres of groundwater recharge basins by 2040.
CWD GSA	Flood-MAR (Winter Recharge)	Increase Recharge	2020	Implemented	Program with voluntary participation to divert surplus flows onto farms and fields for recharge using existing infrastructure.
CWD GSA	Merced-Chowchilla Intertie	Increase Recharge or Reduce Groundwater Pumping	2035	Planned	Construct water conveyance facilities and negotiate transfer agreement between Merced ID and Chowchilla WD.
CWD GSA	Buchanan Dam Capacity Increase	Increase Recharge or Reduce Groundwater Pumping	2040	Planned	Increase capacity of Buchanan Dam.
CWD GSA	Road 19 Groundwater Recharge Basin	Increase Recharge	2020	Implemented	Develop and utilize 38-acre groundwater recharge basin.
CWD GSA	Wood Groundwater Recharge Basin	Increase Recharge	2021	Implemented	Develop and utilize 67-acre groundwater recharge basin.
CWD GSA	Acconero Groundwater Recharge Basin	Increase Recharge	2021	Implemented	Develop and utilize 65-acre groundwater recharge basin.

Subregion	Project[a]	Project Mechanism	First Year Implemented	Status	Project Description
Madera County GSA	Madera County West: Recharge Basins	Increase Recharge	2020	In Progress	Divert water from Eastside Bypass and Ash Slough into basins or fields for recharge when possible. *Since GSP adoption, this project has been further refined and is now commonly referred to as part of the Chowchilla Bypass Flood Flow Recharge Phase 1/2 projects. Please see those project descriptions for more information.*
Madera County GSA	Madera County East: Water Purchase	Increase Recharge or Reduce Groundwater Pumping	2020	In Progress	Purchase surplus water (e.g., Section 215 flood flow from the CVP Friant Division) or other water that may be available.
Madera County GSA	Demand Management	Reduce Demand	2020	In Progress	Reduce consumptive water use through actions such as water-stressing crops, shifting to lower water-using crops, reducing evaporation losses, and reducing irrigated acreage.
Madera County GSA	Water Imports Purchase	Purchase water from willing partners outside of the basin to increase recharge or reduce GW pumping	2025	In Progress	Develop partnerships and import additional water into Madera County for direct or in-lieu recharge.
Madera County GSA	Millerton Flood Release Imports	Purchase water from willing partners outside of the basin to increase recharge or reduce GW pumping	2025	In Progress	Request CVP Section 215 flood water when available for recharge.
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 1	Increase Recharge	2025	In Progress	Construct and operate diversion and conveyance facilities and basins to recharge an average of 12,700 AF per year.
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 2	Increase Recharge	2040	Planned	Construct and operate diversion and conveyance facilities and basins to recharge an average of 25,000 AF per year.
SVMWC	Recharge Basins to Capture Floodwater	Increase Recharge	2020	In Progress	Develop up to 300 acres of groundwater recharge basins.

Subregion	Project[a]	Project Mechanism	First Year Implemented	Status	Project Description
TTWD GSA	Utilize Existing Recharge Basin	Increase Recharge	2017	Implemented	Program to divert surplus flows into existing recharge basin for recharge.
TTWD GSA	Additional Recharge Basins to Capture Floodwater	Increase Recharge	2019	Implemented	Develop up to 310 acres of groundwater recharge basins.
TTWD GSA	Poso Canal Pipeline and Columbia Canal Company Pipeline Projects	Increase Recharge or Reduce Groundwater Pumping	2013	Implemented	Construct water conveyance pipelines for delivery of water from San Joaquin River Exchange Contractors and others. The Poso Canal Pipeline and the Columbia Canal Pipeline projects are currently operational.

[a] Other projects proposed since initial GSP development are discussed in Section 7.2.
[b] The GSP describes development and operation of an 80-acre recharge basin. However, the most suitable available land was a 56-acre parcel.

Table 7-2. Project and Management Action Benefit Summary.

Subregion	Project[a]	First Year Implemented	Project Update	2024 Annual Benefit (acre-feet/year)	Total Benefit Since Initial GSP (acre-feet)	Estimated Average Annual Benefit at 2040[b] (acre-feet/year)
CWD GSA	Enhanced Management of Flood Releases for Recharge	2017	CWD canals and sloughs were used to convey and deliver substantial surface water to CWD customers and to the individual recharge basins reported below. The remaining water was used for enhanced recharge in CWD's canals and Flood-MAR. Reported benefits are the estimated canal and stream seepage resulting from CWD's enhanced management of surface water for recharge.	59,445	209,788	9,393
CWD GSA	Road 13 Groundwater Recharge Basin	2018	Water was delivered to the Road 13 Groundwater Recharge Basin (East and West) in May 2024.	109	4,804	1,359
CWD GSA	City Groundwater Recharge Basin	2019	Water was delivered to the City Groundwater Recharge Basin in May 2024.	35	2,847	1,661
CWD GSA	Additional Groundwater Recharge Basins	2021	*This project is being implemented through the individual groundwater recharge basins described below. Estimated benefits for those projects are listed below, and are subtracted from the estimated long-term average annual benefit of this project.* In 2024, CWD purchased a total of 300 acres to construct the Vista, Cornaggia, and Toku Beccio Ponds. Construction of each recharge basin is anticipated in 2025. The total associated capital costs in water year 2024 were approximately $4.85 million.	*(see below)*	*(see below)*	8,800
CWD GSA	Road 19 Groundwater Recharge Basin	2020	Water was delivered to the Road 19 Groundwater Recharge Basin in May 2024.	155	943	456
CWD GSA	Wood Groundwater Recharge Basin	2021	Water was delivered to the Wood Groundwater Recharge Basin (East and West) in May 2024. Associated capital costs in water year 2024 were approximately $87,000.	126	1,171	804
CWD GSA	Acconero Groundwater Recharge Basin	2021	Water was delivered to the Acconero Groundwater Recharge Basin in May 2024.	111	2,248	780

Subregion	Project[a]	First Year Implemented	Project Update	2024 Annual Benefit (acre-feet/year)	Total Benefit Since Initial GSP (acre-feet)	Estimated Average Annual Benefit at 2040[b] (acre-feet/year)
CWD GSA	Flood-MAR (Winter Recharge)	2020	There were no noted Flood-MAR activities in water year 2024.	0	14,149	5,836
Madera County GSA	Madera County East: Water Purchase	2020	Madera County requested a change in place of use in 2019 and has had multiple meetings with USBR. Madera County has written a separate letter requesting Section 215 water to be available. Discussions are ongoing.	0	0	3,015
Madera County GSA	Demand Management	2020	The Madera County GSA completed numerous actions toward implementation of demand management in 2024, including: tracking and enforcement of an allocation and associated penalties; implementation of a demand measurement program and verification project; and adoption of a recharge policy to credit water users for recharge of surface water derived from a water right/contract or from an approved diversion during a flood event. Initial data continues to show promising reductions in ETAW from demand management actions in 2023-2024. However, the precise costs and benefits of these demand management efforts are still being quantified and will be given in future reports.	*Not quantified directly at this time*	*Not quantified directly at this time*	27,550
Madera County GSA	Millerton Flood Release Imports	2025	Madera County requested a change in place of use in 2019 and has had multiple meetings with USBR. Discussions are ongoing.	0	0	7,060
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 1	2025	Grant-funded work continued in 2023 to support planning and design of infrastructure for diversions, deliveries, and recharge of flood water from the Chowchilla Bypass. Projects are in various stages of development, with construction of the first anticipated in in late 2024 or early 2025, following successful completion of all required permitting.	0	26,500[c]	13,500
SVMWC	Recharge Basins to Capture Floodwater	2020	SVMWC completed the 100% design documents, plans, and specifications in 2024, as well as a	0	0	4,344

Subregion	Project[a]	First Year Implemented	Project Update	2024 Annual Benefit (acre-feet/year)	Total Benefit Since Initial GSP (acre-feet)	Estimated Average Annual Benefit at 2040[b] (acre-feet/year)
			topographic survey of the project site. A construction bid package was completed, and the bid was awarded to Avid Water. Pre-construction photos are being completed, after which construction is anticipated to begin in 2025.			
TTWD GSA	Utilize Existing Recharge Basin	2017	The existing private 300-acre recharge basin is still being used during periods when flood water is available.	0	19,270	4,994
TTWD GSA	Additional Recharge Basins to Capture Floodwater	2019	TTWD completed the annexation of 3,062 acres into its boundary. Construction was completed for two recharge basins on the properties of two landowners in the annexed areas (Vlot and Haynes) using grant money from the Natural Resource Conservation Service. Both basins can be served through conveyance infrastructure owned and operated by TTWD. However, no water was available for recharge in 2024.	0	0	24,657
TTWD GSA	Poso Canal Pipeline and Columbia Canal Company Pipeline Projects	2013	Surface water was purchased and delivered in water year 2024.	7,038	39,040	7,647
			Total	**67,019**	**320,760**	**121,856**

[a] Other projects proposed since initial GSP development are discussed in Section 7.2.
[b] Estimates developed for full project implementation.
[c] Benefits in 2023 from Madera County GSA-reported diversions and recharge under EO N-4-23. Benefits were reported in the Subbasin water budget in water year 2023.

Table 7-3. Project and Management Action Cost Summary (2024).

Subregion	Project[a]	First Year Implemented	Status	2024 Capital Cost ($)	Capital Cost to Date ($)	2024 Annual Operating Cost ($)
CWD GSA	Enhanced Management of Flood Releases for Recharge	2017	Implemented	$0		$0
CWD GSA	Road 13 Groundwater Recharge Basin	2018	Implemented	$0	$168,699	$0
CWD GSA	City Groundwater Recharge Basin	2019	Implemented	$0		$0
CWD GSA	Additional Groundwater Recharge Basins[b]	2021	In Progress	$4,847,133	$4,847,133	
CWD GSA	Flood-MAR (Winter Recharge)	2020	Implemented	$0		$0
CWD GSA	Road 19 Groundwater Recharge Basin	2020	Implemented	$0	$1,037,136	$0
CWD GSA	Wood Groundwater Recharge Basin	2021	Implemented	$87,129	$2,039,842	$0
CWD GSA	Acconero Groundwater Recharge Basin	2021	Implemented	$0	$2,009,906	$0
Madera County GSA	Madera County East: Water Purchase	2020	In Progress			
Madera County GSA	Demand Management	2020	In Progress			
Madera County GSA	Millerton Flood Release Imports	2025	In Progress			
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 1	2025	In Progress		$308,000	
SVMWC	Recharge Basins to Capture Floodwater	2020	In Progress	$63,868	$108,668	
TTWD GSA	Utilize Existing Recharge Basin	2017	Implemented			
TTWD GSA	Additional Recharge Basins to Capture Floodwater	2019	Implemented		$273,770	
TTWD GSA	Poso Canal Pipeline and Columbia Canal Company Pipeline Projects	2013	Implemented		$6,000,000	

[a] Other projects proposed since initial GSP development are discussed in Section 7.2.

[b] CWD "Additional Groundwater Recharge Basins" capital costs are for Vista, Cornaggia, and Toku Beccio Ponds. Construction is anticipated in 2025. Future summaries of costs and benefits for each recharge basin will be reported separately for each as it becomes active.

Table 7-4. Project and Management Action Cost Summary, Estimated Average for All Projects and Management Actions.

Subregion	Project[a]	First Year Implemented	Status	Estimated Capital Cost[1] ($)	Estimated Average Annual Operating Cost[b] ($/year)
CWD GSA	Enhanced Management of Flood Releases for Recharge	2017	Implemented	$0	$0
CWD GSA	Road 13 Groundwater Recharge Basin	2018	Implemented	$168,699	$10,000
CWD GSA	City Groundwater Recharge Basin	2019	Implemented	$0	$10,000
CWD GSA	Additional Groundwater Recharge Basins	2021	In Progress	$38,600,000	$150,000
CWD GSA	Flood-MAR (Winter Recharge)	2020	Implemented	$0	$200,000
CWD GSA	Merced-Chowchilla Intertie	2035	Planned	$6,700,000	$1,500,000
CWD GSA	Buchanan Dam Capacity Increase	2040	Planned	$49,200,000	$200,000
CWD GSA	Road 19 Groundwater Recharge Basin	2020	Implemented	$1,037,136	$10,000
CWD GSA	Wood Groundwater Recharge Basin	2021	Implemented	$1,952,713	$10,000
CWD GSA	Acconero Groundwater Recharge Basin	2021	Implemented	$2,009,906	$10,000
Madera County GSA	Madera County East: Water Purchase	2020	In Progress	$1,000,000	$1,100,000
Madera County GSA	Demand Management	2020	In Progress	$0	$19,600,000
Madera County GSA	Water Imports Purchase	2025	In Progress	$300,000	$2,490,000
Madera County GSA	Millerton Flood Release Imports	2025	In Progress	$31,900,000	$450,000
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 1[c]	2025	In Progress	$38,290,000	$224,100
Madera County GSA	Chowchilla Bypass Flood Flow Recharge Phase 2[c]	2040	Planned	$37,190,000	$856,200
SVMWC	Recharge Basins to Capture Floodwater	2020	In Progress	$7,500,000	$200,000
TTWD GSA	Utilize Existing Recharge Basin	2017	Implemented	-	-
TTWD GSA	Additional Recharge Basins to Capture Floodwater	2019	Implemented	$24,500,000	$700,000
TTWD GSA	Poso Canal Pipeline and Columbia Canal Company Pipeline Projects	2013	Implemented	$5,200,000	$4,600,000
			Total	**$245,548,000**	**$32,320,000**

[a] Other projects proposed since initial GSP development are discussed in Section 7.2.

[b] Note: Estimates developed for full project implementation. Annual operating costs include the cost of purchasing water, as applicable. These totals do not equal the totals reported in the GSP, as certain projects have been added, revised, or removed from consideration since initial Subbasin GSP development. The GSAs remain committed to adaptive management of PMAs to ensure long-term sustainable management of the Subbasin.

[c] Since the Subbasin GSP was adopted, the Chowchilla Bypass Flood Flow Recharge Project Phases 1 and 2 have been reconfigured into a series of five recharge projects that are expected to undergo planning/design and construction between 2021 and 2030. Phase 1 now corresponds to Projects 1 through 3 with a revised total capital cost of $38,290,000. Phase 2 now corresponds to Projects 4 and 5, with a revised total capital cost of $37,190,000. The total combined capital cost of these projects is approximately $75 million, which is the cost that was considered during development of the Rate Study. These costs have been refined from the initial costs identified during GSP development.

7.1.4 Chowchilla Water District GSA Projects

Since GSP adoption, the CWD GSA has proceeded with multiple recharge projects, including development and operation of groundwater recharge basins. CWD has also begun implementing the Flood Managed Aquifer Recharge (Flood-MAR) program, as well as the new Enhanced Management of Flood Releases for Recharge project and a land fallowing program (see **Section 7.2**, below).

Above normal water year conditions facilitated groundwater recharge in CWD during 2024. CWD ran surface water throughout its canals and sloughs between February and September, providing nearly 60,000 AF of direct recharge while also delivering large volumes of surface water for in-lieu recharge. CWD also delivered approximately 540 AF of surface water to recharge basins in May 2024.

In 2024, CWD purchased an additional 300 acres of land within the District to construct the Vista, Cornaggia, and Toku Beccio Ponds. Construction of each recharge basin is anticipated in 2025. The total associated capital costs in water year 2024 were approximately $4.85 million. Operation of these recharge basins in future years will substantially increase CWD's groundwater recharge opportunities.

Other projects planned to increase surface water availability for the CWD GSA are planned for later implementation in 2035-2040.

7.1.5 Madera County GSA Projects

Since GSP adoption, Madera County GSA has completed multiple planning studies and a rate study intended to fund GSP implementation, initiated planning and design for a recharge program, and initiated work to support the implementation and enforcement of a substantial demand management program. Adaptive implementation of PMAs will collectively support achievement of the GSP sustainability goal over the GSP implementation period. Progress that has been made in each of these efforts is described below.

7.1.5.1 Funding for GSP Implementation

The Madera County GSA collects an administrative fee of $20-30 per acre for irrigated acres within the GSA that is used for SGMA-related administration and planning efforts. While the administrative fee is useful for supporting SGMA implementation, these funds cannot be used for implementation of GSP PMAs, including construction of recharge facilities, purchasing surface water for in-lieu recharge, voluntary land repurposing, or for domestic well mitigation efforts.

In 2022, the Madera County GSA completed a Proposition 218 process that was intended to result in an acreage-based rate for extraction of groundwater within the Madera County GSA. The rate was intended to fund implementation of PMAs. However, the Proposition 218 process resulted in a majority protest vote in the Subbasin, and thus the rates were not approved to fund implementation of the Subbasin GSP PMAs within the Madera County GSA and/or their portion of Subbasin-wide PMAs (e.g., the Domestic Well Mitigation Program).

Despite these setbacks, the Madera County GSA continues to recognize that implementation of PMAs in accordance with the GSP is vital to achieving the Subbasin sustainability goal during the implementation period. Accordingly, the Madera County GSA is continuing GSP implementation and is seeking ways to reduce the implementation costs (e.g., grants, refinements) with stakeholder input and discussion. Continued implementation of the allocation program, discussed below, is not delayed. Additionally, the Madera County GSA has been working with a group of local growers – the Chowchilla Subbasin Growers, Inc. – to explore alternative funding mechanisms for GSP implementation. The Chowchilla Subbasin Growers, Inc. was formally established with the expressed intent of implementing the GSP under their own authority through a Memorandum of Understanding (MOU) with the Madera County GSA to cover certain land within the Madera County GSA area. Additional MOUs were adopted to cover domestic well mitigation costs. Updates will be provided in subsequent Annual Reports.

In addition to these efforts, the Madera County GSA continues to utilize Proposition 68 funding for PMA implementation through two grants. This funding is currently being used to support design, permitting, and construction of a portion of the Chowchilla Bypass Flood Flow Recharge Program (described below). The Madera County GSA also approved a penalty for groundwater extraction above the allocation that is currently being imposed (described below). Funds generated from these penalties are available to support the DWMP as directed by the GSA Board. The 2023 penalties collected were used as funding for the DWMP.

7.1.5.2 Recharge Program

Since GSP adoption, Madera County has continued work on a recharge planning study to refine the costs, benefits, and schedule for recharge projects described in the GSP. The recharge planning study has refined the costs and schedule for constructing additional basins and to conduct additional Flood-MAR of winter floodwater diverted from the Chowchilla Bypass. This study has resulted in the development of the Chowchilla Bypass Flood Flow Recharge Program. A description of the recharge study and planned recharge efforts is available at: https://www.maderacountywater.com/recharge/. In 2024, the Madera County GSA continued public outreach and engagement for the recharge program, including outreach related to the Madera County GSA recharge policies (Resolution 2024-030; described further in the allocation program discussion below) and solicitation of stakeholders' interest in consideration for involvement in ongoing recharge project planning or future projects, as they arise. Planned recharge efforts are coordinated together with the emergency recharge plan (described in **Section 7.2**, below).

Since 2020, Madera County GSA has continued design efforts, permitting, and construction for portions of the Chowchilla Bypass Flood Flow Recharge Program. These efforts are being funded by two Proposition 68 grants from DWR, which were based on work developed through the recharge planning study.

In 2021, the first grant proposal was awarded $4,200,000 from Proposition 68 funds. As of early 2025, those funds are being used toward planning, design, and construction of diversion infrastructure on the Chowchilla Bypass and conveyance infrastructure outside the limits of the Chowchilla Bypass that will supply flood water to recharge areas. The Madera County GSA successfully pursued and received a CEQA exemption concurrence from DWR in accordance with EO N-7-22 Action 13. As of early 2025, the GSA has completed all required permitting processes except those for the Central Valley Flood Protection Board, pending completion of the 100% design documents. The 100% design documents were completed in late February 2025 and are being transmitted to DWR for review and approval. Following completion of the 100%

design documents, the GSA is preparing a construction bid package and anticipates initiating the construction bid process in 2025. This project has been developed in close coordination with TTWD GSA and Clayton Water District landowners in Madera County who offered to use their farmland for recharge.

In 2022, the second grant proposal was awarded an additional $3.2 million from Proposition 68 funds as part of Round 1 of the 2022 SGMA Implementation Grant program. Those funds are being used toward planning, design, and construction of additional recharge facilities along the Chowchilla Bypass, expanding on work being developed through the first grant. The Madera County GSA completed the 60% design process in early 2024 and subsequently revised the design to increase the recharge basin size from 40 acres to 80 acres, at the participating landowner's request. The GSA received a CEQA exemption concurrence from DWR in accordance with EO N-7-22 Action 13 in early 2024. As of early 2025, the GSA is in the process of preparing and submitting applications for all required permitting processes. The GSA has completed the majority of the required permitting efforts with the California Department of Fish and Wildlife (CDFW), the National Marine Fisheries Service (NMFS), the United States Fish and Wildlife Service (USFWS), the Lower San Joaquin Levee Control District (LSJLCD), and others as applicable. Remaining permitting efforts are still in progress, but are expected to be completed in summer 2025. The GSA expects to move forward with preparing the final designs and the construction bidding process following successful completion of CEQA and permitting. This project has been developed in close coordination with local landowners in the Madera County GSA who offered to use their farmland for recharge. TTWD is the grant administrator and has provided grant administration support.

The Rate Study that the Madera County GSA completed and approved in 2022 was intended to fund implementation of the recharge program, among other GSP PMAs over the GSP implementation period. Although the Rate Study failed in 2022 following a majority protest vote, the Madera County GSA is continuing GSP implementation and is seeking ways to reduce implementation costs (e.g., grants, refinements) and to secure alternate local funding to successfully implement PMAs, with stakeholder input and discussion (see **Section 7.1.5.1**).

7.1.5.3 Water Imports

In addition to the recharge efforts described above, the Madera County GSA is also in the process of developing partnerships to import additional water into Madera County and to acquire CVP Section 215 flood water when it is available for recharge. Madera County GSA requested a change in place of use in 2019 and has since had multiple meetings with USBR. Madera County GSA has written a separate letter requesting Section 215 water to be available. Discussions are ongoing.

7.1.5.4 Demand Management

As a primary element of its efforts to achieve groundwater sustainability, Madera County GSA has continued steps to implement a demand management program that will oversee a managed reduction in the volume of groundwater consumed by irrigated agriculture over the 20-year GSP implementation period. This program is expected to result in a total reduction in demand to approximately 22,500 AF by 2040 for the Madera County GSA in the Chowchilla Subbasin. The precise costs and benefits of these demand management efforts are still being quantified and are expected to be reported in the next GSP evaluation and updates, as well as future Annual Reports.

To implement this overall demand management program, Madera County GSA has:

- Conducted a water market study (completed in 2021),
- Planned a Voluntary Land Repurposing Program (VLRP),
- Developed an allocation program, which is now being tracked and enforced with associated penalties, and
- Continued implementing a demand measurement program and verification project to support decisions related to the allocation and demand management program.

The following sections briefly describe the VLRP, MLRP, the allocation program, and the demand measurement program and verification project.

Together with the other GSAs in the Subbasin, the Madera County GSA has also developed a Demand Management Programs and Subsidence Mitigation Measures MOU (see **Section 7.1.1**), with voluntary measures for immediate implementation and mandatory measures with trigger conditions to mitigate subsidence in the Subbasin.

Voluntary Land Repurposing Program (VLRP) and Multibenefit Land Repurposing Program (MLRP). Since initial Subbasin GSP development, the Madera County GSA received grant funding to explore the feasibility of adopting a sustainable agricultural land conservation (SALC) easement program within the Madera County GSA. The SALC program has since been referred to as the Voluntary Land Repurposing Program (VLRP). The VLRP aims to develop criteria for identifying and prioritizing agricultural land for protection, and to develop an incentive structure for agricultural landowners to rest, retire, restore, or permanently protect their land via various types of water-centric conservation easements.

Madera County GSA developed the VLRP through a stakeholder-driven process in 2020-2022, involving multiple public workshops and meetings, stakeholder interviews, and outreach with conservation groups. Details about this process are documented in previous Annual Reports. Rules and criteria for implementing the VLRP were approved by the Madera County GSA in December 2022. However, due to the failure of the Proposition 218 process, the Madera County GSA in the Subbasin is unable to fund the program at this time.

As of early 2025, stakeholders in the MC GSA in the Subbasin have the opportunity to participate in a grant-funded Multibenefit Land Repurposing Program (MLRP), which is receiving applications for projects in the Chowchilla, Madera, and Delta-Mendota Subbasins. The Multi-Benefit Agricultural Land Repurposing Plan (MALRP) was approved by the Board of Supervisors in October 2024. The Madera County GSA is continuing GSP implementation and is seeking ways to reduce implementation costs (e.g., grants, refinements) and to secure alternate local funding to successfully implement PMAs, with stakeholder input and discussion (see **Section 7.1.5.1**).

Allocation Program. Since initial Subbasin GSP development, the Madera County GSA has developed an allocation framework. The allocation framework was developed primarily by Madera County GSA staff through a series of public meetings with the Madera County GSA Advisory Committee. Following discussions in these meetings, the Madera County GSA Board of Directors adopted resolutions in December 2020, June 2021, and August 2021 that describe "per-acre" allocations and rules for credits. The Madera County GSA Board of Directors approved penalties for groundwater use in excess of these allocations in 2022. Links to the resolution documents are provided in previous Annual Reports.

Madera County GSA has been enforcing the approved allocations since 2022. In 2024, allocations were in place and were being tracked and enforced with associated penalties in the Madera County GSA (within the Chowchilla, Madera, and Delta-Mendota Subbasins) through measurements of groundwater use by approved measurement methods (described in the following section). Madera County GSA has included certain refinements to the framework, allowing “farm units” (i.e., fields irrigated from the same well that are grouped and considered together in enforcement of the allocation) to be changed at the end of the calendar year, and allowing never-irrigated lands to opt-in in November of each year.

Madera County GSA has also developed a recharge policy that would credit recharge benefits to the allocation of areas where recharge occurred. In March 2024, Madera County GSA approved recharge credit policies through Resolution 2024-030. One policy is related to recharge with surface water that is purchased, and one policy is related to recharge with water taken under Executive Order (EO) N-4-23, which was subsequently codified through California Water Code Section 1242.1 and that allows for flood waters to be used for groundwater recharge in certain circumstances. Both policies have a “floor” of a 75% recharge credit and a "ceiling" of 90% recharge credit depending on data specific to the land on which the recharge occurred. The recharge credit is limited to the aquifer in which recharge occurred.

Per Resolution 2022-143, the penalties for exceeding the allocation include $1,000 per farm unit for those that have exceeded the authorized amount, in addition to a $200 per AF penalty for water use over the allocation in 2024 (penalties started at $100 per AF in calendar year 2023, increasing by $100 per AF per calendar year to a maximum of $500 per AF for water use over the allocation).

Enforcement of the allocation is incorporating adjustments to account for recharge credits, land fallowing credits, and successful appeals in the future.

Additional information about the allocation enforcement process is described as part of the demand measurement program and verification project, below.

Demand Measurement Program and Verification Project. As reported in prior Annual Reports, Madera County GSA has continued to implement a demand measurement program and verification project to support implementation of the GSA’s allocation program.

The main objective of the demand measurement program is to use, evaluate, and establish rules and processes for demand measurement options that are permitted to track ETAW against an allocation established in the Madera County GSA area (described in the previous section).

Three approved demand measurement options are available to growers in the Madera County GSA for allocation enforcement:

- IrriWatch approach (remote sensing approach that quantifies ETAW from satellite imagery using the Surface Energy Balance Algorithm for Land (SEBAL) algorithm)

- Land IQ approach (remote sensing approach, similar to IrriWatch, that quantifies ETAW from land use and satellite imagery)
- Use of approved flowmeters that are installed correctly and calibrated regularly. Although Madera County GSA is not responsible for installing flowmeters, Madera County GSA has adopted pre-approval processes for the use of private meters as a means of allocation tracking and enforcement. The adopted processes are intended to ensure correct installation and maintenance of flowmeters and their accuracy.

The Madera County GSA has allowed and developed an appeals process for growers who have selected to use the IrriWatch and Land IQ approaches, although there is no appeals process for those using flowmeters. In 2023, Madera County GSA revised the rules for appealing the determination of use of the allocation through Resolution 2023-150. Madera County GSA expects to reevaluate measurement options for the program moving forward in 2025.

In early 2024, Madera County GSA also approved recharge credit policies that would credit recharge benefits to the allocation of areas where recharge occurred (described above). Enforcement of the allocation is incorporating adjustments to account for recharge credits, land fallowing credits, and successful appeals in the future.

Additional information regarding the demand measurement program is available on the Madera County website: https://www.maderacountywater.com/measurement/.

Since 2022, the Madera County GSA has also conducted the Madera Verification Project to analyze the consistency of measurements from flowmeters to the demand estimates developed from the IrriWatch and Land IQ remote sensing measurements. Through the Madera Verification Project, the Madera County GSA has conducted extensive outreach among growers in the Chowchilla, Madera, and Delta-Mendota Subbasins who will be directly impacted by the demand measurement efforts. Through these outreach efforts, the Madera County GSA has gained substantial feedback and made changes to the demand measurement program to ensure that it is locally accurate, effective, and equitable to growers. Additional information about the Madera Verification Project is provided in the previous Annual Report.

Demand Management. Through these many interrelated efforts, the Madera County GSA is in the process of implementing the planned demand management program described in the GSP. This management action is expected to result in a large reduction in groundwater pumping at the cost of reduced crop production and related economic activities in Madera County. Madera County GSA has observed landowner responses to the demand management program thus far, and initial data shows promising reductions in ETAW from actions in 2023-2024. However, the precise costs and benefits of these demand management efforts are still being quantified and are expected to be reported in future GSP evaluations and updates as well as future Annual Reports.

7.1.5.5 Additional Roles

Although neither projects nor management actions, there are number of actions that Madera County has taken towards sustainability of the Subbasin:

1. Madera County serves as the grantee and administrator for the current Proposition 1 and Proposition 68 grants (TTWD is serving as the grantee and administrator for the Proposition 68 grant awarded in early 2022); and

2. Madera County serves as the contractor with the consultant for the data management system.

7.1.6 Sierra Vista Mutual Water Company Projects

Sierra Vista Mutual Water Company (SVMWC), located in the Merced County GSA and Madera County GSA, is in the process of developing up to 300 acres of dedicated recharge basins.

In 2022, SVMWC applied for and was awarded Proposition 68 funding to support further development and construction of this project.

As of early 2025, SVMWC has completed the 100% design documents, plans, and specifications, as well as a topographic survey of the project site. A construction bid package was completed, and the bid was awarded to Avid Water. Pre-construction photos are being completed, after which construction is anticipated to begin in 2025. Capital costs reported in 2024 total approximately $64,000.

In 2024, landowners in SVMWC also diverted approximately 3,500 AF of surface water between April and August. This surface water provided recharge benefits to the Subbasin, offsetting groundwater extraction for irrigation. Benefits of these diversions are accounted in the Subbasin water budget.

7.1.7 Triangle T Water District GSA Projects

The TTWD GSA has several projects in various stages of implementation.

Since 2017, TTWD has implemented a program to divert surplus flows into existing recharge basins within the GSA. TTWD has continued to use the recharge basins during periods when flood water is available, although no flood water was available in 2024.

Since 2019, TTWD has also initiated work to develop additional dedicated recharge basins. This work was formerly supported under an Office of Emergency Services (OES) grant, and was formerly referred to as the OES ponds, but is now funded under Proposition 68. In 2020-2021, TTWD GSA collaborated with the Madera County GSA on the DWR Proposition 68 grant. Two recharge basins that are currently being designed and planned for construction using those grant funds will be constructed in TTWD.

As reported in the previous Annual Report, TTWD successfully annexed 3,062 acres into its boundary. Following annexation, construction was completed for two recharge basins on the properties of two landowners in the annexed areas (Vlot and Haynes). Construction of the Vlot and Haynes recharge basins was completed using grant money from the Natural Resource Conservation Service. Both basins can be served through conveyance infrastructure owned and operated by TTWD. However, no water was available for recharge in 2024.

TTWD is also continuing efforts to secure a permanent water rights permit on the Chowchilla Bypass. When water is available, TTWD plans to divert water to available recharge basins. Since GSP adoption, a temporary water rights permit has been granted and additional information in support of the permanent water right has been submitted to the SWRCB. However, following the issuance of EO N-4-23 in March 2023 (subsequently codified through California Water Code Section 1242.1), certain restrictions for diverting flood flows were waived, which opened the door to implementing recharge of flood waters in certain circumstances in absence of an approved water right. TTWD will continue to seek and exercise opportunities for diversion of surface water for groundwater recharge through available pathways.

Since 2013, TTWD has also constructed two water conveyance pipelines, the Columbia Canal pipeline and the Poso Canal pipeline, to import additional surface water supplies to the TTWD. Both pipelines are described in previous Annual Reports. An extension of the Poso Pipeline has been contemplated since the initial GSP (described in **Section 7.2)**. In 2024, more than 7,000 AF of surface water was purchased and diverted for use in-lieu of groundwater. Benefits of this surface water are accounted in the Subbasin water budget.

In addition to the recharge basins and pipeline projects, TTWD installed six nested monitoring wells within the district area in 2021. These wells continue to provide additional information about groundwater conditions in TTWD and the Western Management Area of the Subbasin.

7.2 ADDITIONAL PROJECTS IDENTIFIED SINCE GSP ADOPTION

Since GSP adoption, the GSAs and other proponents in the Subbasin have developed additional PMAs to support GSP implementation efforts.

7.2.1 Chowchilla Water District GSA Projects

Since GSP adoption, CWD GSA has adopted two additional projects.

Enhanced Management of Flood Releases for Recharge Project. In this project, CWD utilizes its existing distribution system – including district canals and sloughs – to supply recharge during periods when flood flows are available and when the distribution system is not at its operational capacity. Diverted water is spread throughout unlined portions of the distribution system, allowing for increased groundwater recharge. This project was initiated in 2017 and was conducted again in 2019, with an estimated annual recharge benefit of approximately 26,800 AF in wet years. Average annual benefits are estimated to be approximately 9,400 AF across all years, including drier years when flood flows are unavailable. More information about this project can be found in Appendix E of the GSP Annual Report submitted in 2020.

In 2024, CWD ran surface water throughout its canals and sloughs between February and September, providing nearly 60,000 AF of direct recharge while also delivering large volumes of surface water for in-lieu recharge (see **Section 7.1.4**).

Land Fallowing. CWD GSA has proposed a land fallowing program as one component of their overall efforts to achieve sustainable groundwater conditions in CWD's portion of the Subbasin. The land fallowing program would be implemented by growers on a voluntary basis. Benefits will be measured by the reduction in the total volume of groundwater previously used to irrigate the fallowed lands.

CWD planned a study in 2022 to identify landowners interested in participating in the land fallowing program. Land fallowing proposals will be created for all or a portion of a parcel, and can be implemented for one year, several years, or permanently. Proposals for land fallowing will be evaluated on an individual proposal basis. The target reduction in groundwater pumping from land fallowing is 5,000 to 10,000 AF per year. Program costs are estimated to be $1,000,000 to $2,000,000 per year. CWD may initially fund this program with general funds, although CWD may also conduct a Prop 218 election to approve assessments that would provide a funding stream for financing the program. CWD has conducted successful Prop 218 elections where stakeholders voted to approve assessments to fund programs.

Project development has continued in 2023-2024 through on-going discussion with the CWD Board of Directors and landowners. Implementation is anticipated to begin following finalization of a land fallowing program and adoption by the CWD Board.

7.2.2 Triangle T Water District GSA Projects

Building on the success of the Poso Canal Pipeline, TTWD has initiated work on an extension of the existing pipeline project to deliver more purchased water for irrigation and recharge within TTWD and in adjacent areas prioritized for subsidence mitigation. The extension is expected to add an additional 1.5 miles of 20-inch pipeline with two additional turnouts, and a 2-acre regulating reservoir. In early 2022, TTWD applied for and was awarded Proposition 68 funding to support further development and extension of the Poso Canal pipeline project. However, the "Road 4 Pipeline to the Haynes Recharge Basin Project" that was funded by the DWR Proposition 68 grant has been abandoned because of issues obtaining easements. Available grant funding has instead been shifted to the Talley recharge project.

7.2.3 Jointly Implemented Projects

In addition to the ongoing development of recharge projects proposed in the Subbasin GSP, the Madera County GSA has initiated work on an emergency recharge plan to achieve more immediate recharge benefits from flood flows available on the Chowchilla Bypass. Under this plan, Madera County GSA and TTWD GSA have worked collaboratively to secure temporary water rights and develop a plan for installation of temporary infrastructure to divert flood flows off the Chowchilla Bypass to the extent they are available ahead of construction of permanent infrastructure. Since 2021, Madera County has initiated environmental permitting and continued development of the plan, including development of a draft technical memorandum to provide guidance for landowners participating in groundwater recharge. TTWD also resubmitted the temporary water rights application used for this project in 2022. However, following the issuance of EO N-4-23 in March 2023 (subsequently codified through California Water Code Section 1242.1), certain restrictions for diverting flood flows were waived, which opened the door to implementing recharge of flood waters in certain circumstances in absence of an approved water right. The GSAs will continue to seek and exercise opportunities for diversion of surface water for groundwater recharge through available pathways.

In addition to these GSA-led efforts, multiple recharge efforts are being led in the Subbasin by private entities. The GSAs will continue collaborating and working with locals in the Subbasin to implement recharge efforts in the future.

7.2.4 Other Projects

7.2.4.1 Subsidence Control Measures Agreement

Since initial Subbasin GSP development, additional information has been provided regarding the Subsidence Control Measures Agreement (Agreement) between certain landowners in the Western Management Area of the Subbasin and agencies in the Delta-Mendota Subbasin. Landowners that have entered into the Agreement collectively manage more than 14,000 acres in the Western Management Area of the Subbasin. Information about the Agreement, including restrictions on groundwater pumping and required implementation of projects to increase use of surface water for irrigation, is provided in Section 3.3.3.7 of the Revised GSP.

Since the initial Agreement was signed in 2017, parties to the Agreement have successfully constructed facilities to supply and distribute surface water to users in the Subbasin. Participating landowners in the Subbasin have also reduced pumping from the Lower Aquifer to between 0.13 and 0.50 AF/ac (0.26 AF/ac in 2024), less than the specified limits in the initial Agreement. Use of surface water during years it has been available has also provided between 0.50 and 1.76 AF/ac of benefit to those irrigated lands, providing direct recharge to the Upper Aquifer and offsetting demand for groundwater. Efforts under the initial Agreement have already been successful for mitigating subsidence in the TTWD area of the Western Management Area. Annual vertical displacement rates in the Subbasin, as reported from InSAR data, indicate a relative decrease in the rate of subsidence within TTWD since approximately 2017, as compared with rates of subsidence in surrounding areas (see Revised GSP Section 2.2.2.4).

7.2.4.2 Other GSA Projects

Additional information about other GSA PMAs will be added to future Annual Reports as they are identified.

7.3 IMPLEMENTATION OF MONITORING AND ADDRESSING DATA GAPS

Since the GSP adoption and submittal in January 2020, the GSAs have been conducting monitoring of RMS wells (**Appendix E**), including coordination with well owners and other monitoring entities. Despite multiple attempts at measurement, some RMS water level data was not available in recent years due to continued challenges encountered during implementation of the RMS monitoring program. Loss of access to certain RMS sites has persisted for a variety of reasons, such as owners' unwillingness to participate in monitoring, or replacement of a site with another well having slightly different characteristics. The GSAs have worked to resolve these issues where possible, and have been working to install new dedicated nested monitoring wells that may be added to the monitoring network in place of lost sites. The GSAs may add those new dedicated nested monitoring wells to the Chowchilla Subbasin GSP monitoring network once more data is collected and site-specific sustainable management criteria can be appropriately established.

As part of a Proposition 1 DWR Sustainable Groundwater Management grant award to Madera County for the installation of dedicated monitoring wells in the Chowchilla Subbasin, a total of 25 new monitoring wells at nine different sites were constructed in 2019 and 2020. Information collected from the drilling, geologic and geophysical logging and ongoing groundwater quality sampling and automated groundwater level monitoring, will fill data gaps in the monitoring and conceptualization of the hydrogeology and improve understanding and management of groundwater in the Chowchilla Subbasin. As part of a Proposition 68 DWR Sustainable Groundwater Management grant award to Madera County for a domestic well inventory project, nine additional new monitoring wells at three different sites were also installed in 2022 and will provide additional information on hydrogeologic conditions and trends in areas of domestic wells within the Chowchilla Subbasin.

7.4 INTERIM MILESTONE STATUS (§356.2.C)

7.4.1 Chronic Lowering of Groundwater Levels

Sustainable management criteria for groundwater level RMS wells were updated in the Chowchilla Subbasin Revised GSP released for public review in January 2025. In the Revised GSP, interim milestones (IMs) for chronic lowering of groundwater levels were also reviewed and updated at five-year intervals over the Implementation Period from 2020 to 2040, at years 2025, 2030, 2035, and 2040. IMs were established through review and evaluation of measured groundwater elevation data, to the extent available, and simulated historical groundwater elevations, as well as consideration of the SMCs (e.g., MOs and MTs) defined for the Sustainability Period (starting in 2040). IMs were developed specifically for each individual RMS based on a range of historically measured or simulated conditions at the RMS through the process described in Appendix 3.J of the GSP.

Measurable objectives (MOs) for groundwater levels were established in accordance with the sustainability goal through review and evaluation of measured historical groundwater elevation data, to the extent available, and simulated historical groundwater levels derived from MCSim. MOs for groundwater levels were set at Fall 2011 groundwater elevations, which represent Subbasin conditions prior to the drought period from 2012 to 2015, and are a target average condition for long-term sustainable groundwater management in the Subbasin.

The GSP regulations define undesirable results as occurring when significant and unreasonable effects are caused by groundwater conditions occurring throughout the Subbasin for a given sustainability indicator during the sustainability period (after 2040), not the GSP implementation period (i.e., 2020-2040). The GSP regulations provide that the “minimum thresholds for chronic lowering of groundwater levels shall be the groundwater level indicating a depletion of supply at a given location that may lead to undesirable results” (354.28.c.1). The cause of Subbasin groundwater conditions that would result in significant and unreasonable lowering of groundwater levels is excessive average annual groundwater pumping and other outflows from the Subbasin that continue to exceed average annual inflows, thus continuing the long-term trend of declining groundwater levels.

Table 7-5 and **Figures 7-1 and 7-2** present the status of groundwater level RMS wells in relation to the 2025 IMs, MOs, and MTs defined in the GSP. Note that there are some RMS wells that do not have Fall 2024 measurements to compare with IMs, MOs, and MTs (see **Appendix E**). Review of the Fall 2024 groundwater level measurements that are available for 21 RMS wells (measurements were available for 33 RMS wells, but 7 were flagged as questionable and 5 were attempted but unsuccessful measurements) indicates that a majority of groundwater levels remain above MTs, and all, with the exception of two, of groundwater levels are above the 2025 IMs.

Table 7-5. Summary of RMS Well Groundwater Levels Relative to Interim Milestones, Minimum Thresholds, and Measurable Objectives.

RMS Well I.D.	Estimated Surface Elevation[1] (msl, feet)	Aquifer Designation	MO GWEL (feet msl)[1]	MT GWEL (feet msl)[1]	2025 IM GWEL (feet msl)[1]	Date of Fall Measurement	Fall 2024 GWEL (feet msl)[1]	2025 IM Status (feet)	MT Status (feet)
CWD RMS-1	169	Lower[2]	27	-41	-98	10/14/2024	QM[3]		
CWD RMS-2	191	Lower[2]	0	-71	-107	10/14/2024	QM[3]		
CWD RMS-3	206	Lower[2]	29	-67	-139	10/22/2024	-61.9	+77.1	+5.1
CWD RMS-4	225	Lower[2]	24	-35	-125	10/14/2024	-74.0	+51.1	-39.0
CWD RMS-5	207	Lower[2]	59	-25	-82	10/14/2024	QM[3]		
CWD RMS-6	275	Lower[3]	12	-34	-105	10/18/2024	QM[3]		
CWD RMS-7	162	Composite	49	-16	-72	10/22/2024	QM[3]		
CWD RMS-8	219	Lower[2]	36	-73	-127	10/11/2024	-37.9	+89.2	+35.2
CWD RMS-9	164	Upper	78	71	73	10/14/2024	92.0	+19	+21
CWD RMS-10	183	Lower[2]	29	-89	-151	10/14/2024	-60.3	+90.7	+28.7
CWD RMS-11	192	Lower[2]	90	85	76	10/15/2024	83.7	+7.7	-1.3
CWD RMS-12	176	Upper	74	38	35	10/15/2024	69.2	+34.2	+31.2
CWD RMS-13	168	Lower[2]	47	-58	-77	10/15/2024	39.7	+116.7	+97.7
CWD RMS-14	152	Lower[2]	37	-68	-179	10/15/2024	-99.0	+80	-31.0
CWD RMS-15	213	Lower[3]	31	-56	-157	10/16/2024	-102.7	+54.3	-46.7
CWD RMS-16	213	Lower[3]	44	-68	-148	10/16/2024	-83.8	+64.2	-15.8
CWD RMS-17	203	Lower[3]	47	-51	-166	10/16/2024	QM[3]		
MCE RMS-1	277	Lower[3]	21	-24	-84	10/14/2024	-84.2	-0.2	-60.2
MCE RMS-2	254	Lower[2]	-2	-33	-91	10/14/2024	-94.9	-3.9	-61.9
MCW RMS-1	121	Upper	89	61	19	10/15/2024	92.9	+73.9	+31.9
MCW RMS-2	123	Upper	102	86	76	10/15/2024	QM[3]		

RMS Well I.D.	Estimated Surface Elevation[1] (msl, feet)	Aquifer Designation	MO GWEL (feet msl)[1]	MT GWEL (feet msl)[1]	2025 IM GWEL (feet msl)[1]	Date of Fall Measurement	Fall 2024 GWEL (feet msl)[1]	2025 IM Status (feet)	MT Status (feet)
MCW RMS-3	124	Upper	100	67	67	10/15/2024	97.6	+30.6	+30.6
MCW RMS-4	137	Lower[2]	29	-38	-90	10/14/2024	NM[2]		
MCW RMS-5	146	Lower[2]	17	-68	-110	10/14/2024	NM[2]		
MCW RMS-6	139	Lower[2]	39	-34	-84	10/14/2024	NM[2]		
MCW RMS-7	138	Lower[2]	61	28	-12	10/14/2024	NM[2]		
MCW RMS-8	142	Composite	43	-29	-36	10/16/2024	43.3	+79.3	+72.3
MCW RMS-9	155	Lower[2]	11	-69	-122	10/14/2024	NM[2]		
MCW RMS-10	124	Upper	112	102	94	10/8/2024	108.3	+14.3	+6.3
MCW RMS-11	127	Upper	120	102	88				
MCW RMS-12	127	Upper	116	93	78				
MER RMS-1	225	Lower[2]	26	-65	-129				
TRT RMS-1	134	Upper	74	32	14	11/18/2024	53.2	+39.2	+21.2
TRT RMS-2	135	Lower[2]	87	38	-3	11/18/2024	48.5	+51.5	+10.5
TRT RMS-3	137	Composite	12	-52	-63	11/18/2024	-5.6	+57.4	+46.4
TRT RMS-4	141	Upper	25	0	-14	11/18/2024	3.5	+17.5	+3.5

[1] Estimated surface elevation and groundwater elevations (GWE) are expressed in feet above mean sea level.
[2] Lower Aquifer wells within the Corcoran Clay extent.
[3] Lower Aquifer wells outside the Corcoran Clay extent; considered representative of undifferentiated unconfined groundwater zone.
[4] NM = no measurement. Measurement attempted but was unsuccessful.
[5] QM = questionable measurement. Measurement reported but flagged as questionable.

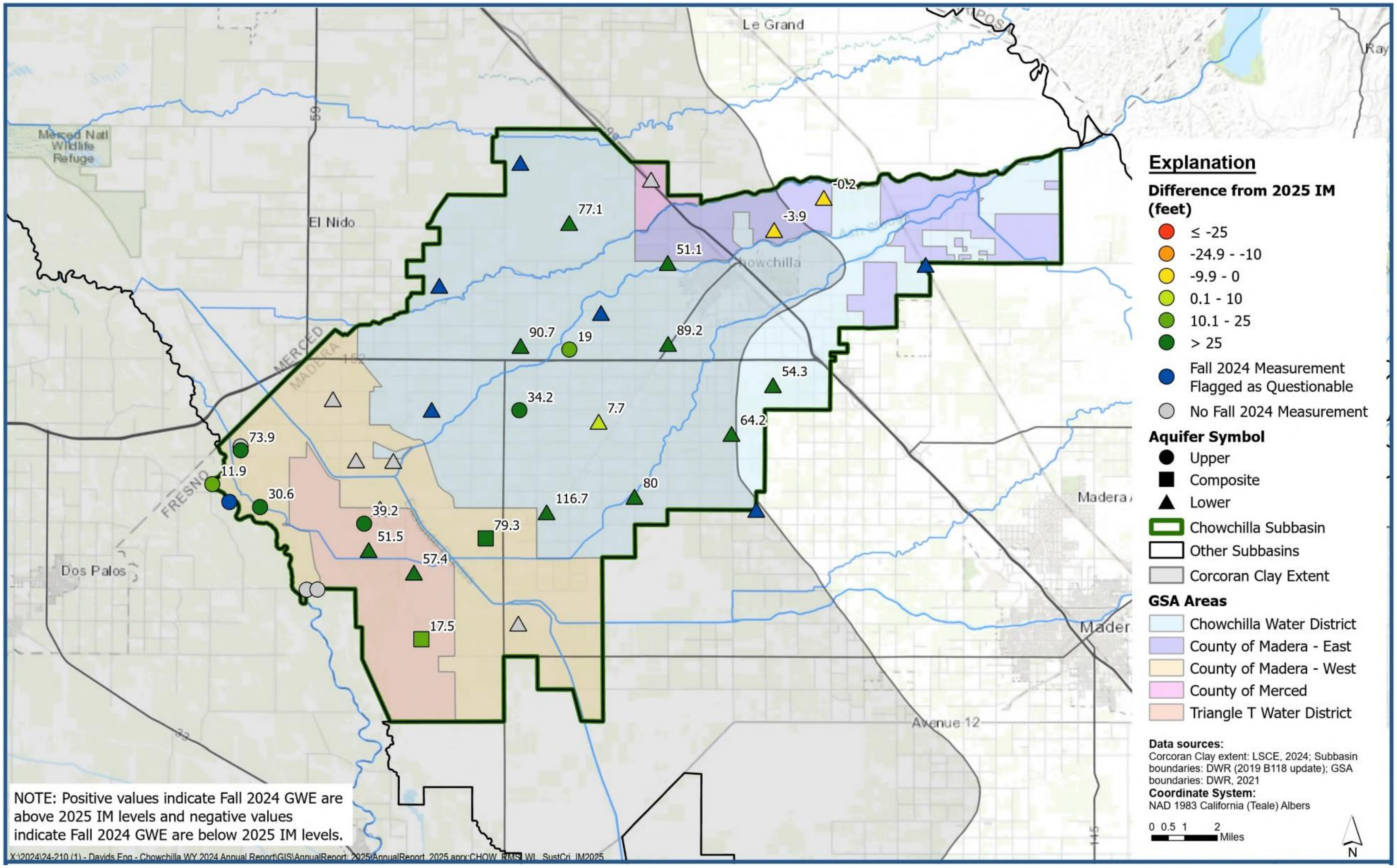


Figure 7-1. Fall 2024 Water Level Measurements at RMS Wells compared to 2025 Interim Milestone.

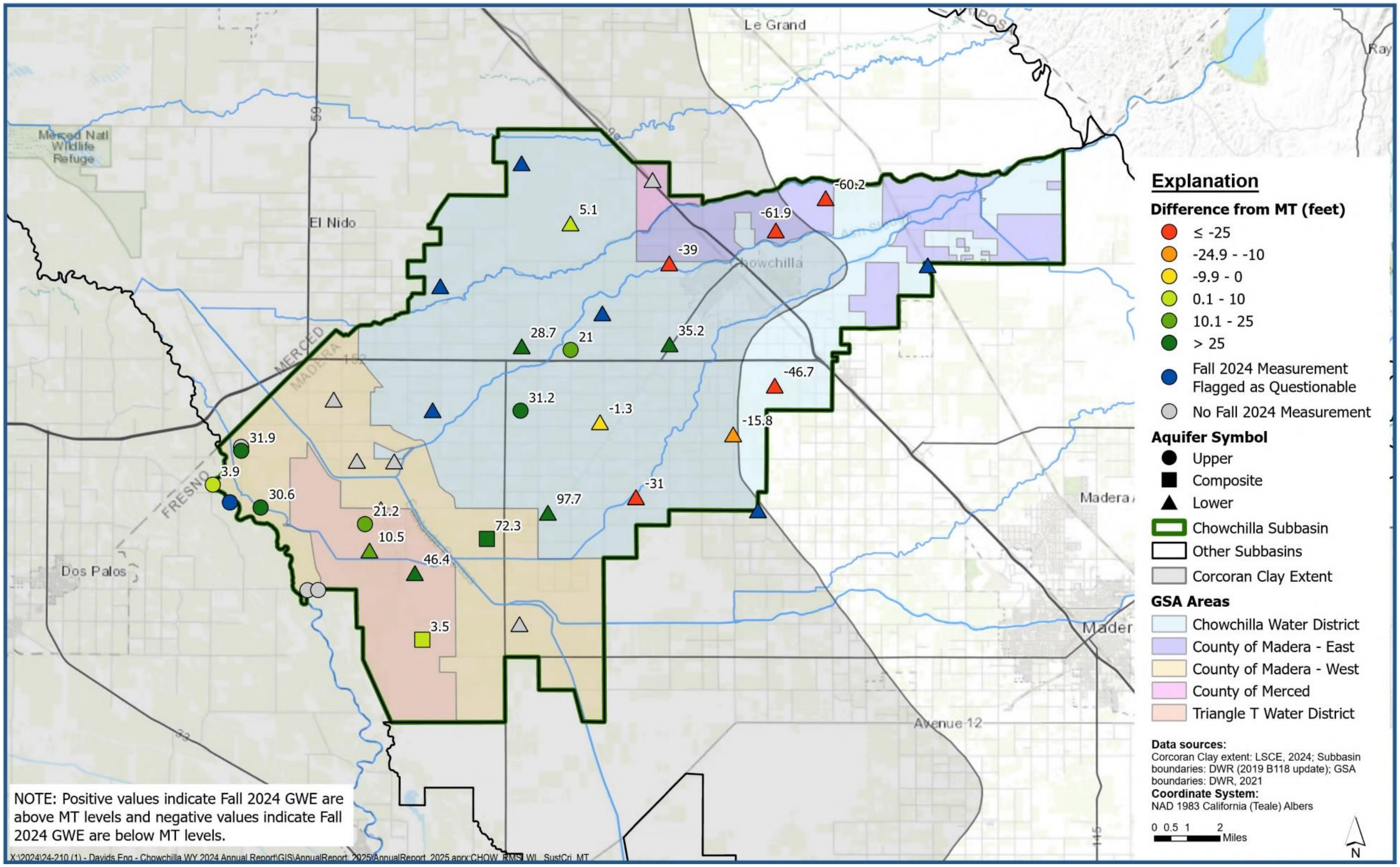


Figure 7-2. Fall 2024 Water Level Measurements at RMS Wells compared to Minimum Threshold.

7.4.2 Land Subsidence

Sustainable management criteria for land subsidence were developed related to management areas within the Chowchilla Subbasin and have been developed to avoid significant and unreasonable impacts from occurring in the future. The Western Management Area (WMA) has experienced significant subsidence and damage to infrastructure since 2005, while land subsidence has not resulted in significant and unreasonable impacts to infrastructure in the Eastern Management Area (EMA).

Measurable objectives (MOs) for land subsidence were established to avoid significant and unreasonable impacts from occurring in the future. A MO for subsidence of 0.00 feet/year of was established for both the WMA and EMA with the goal of long-term avoidance of land subsidence in the Subbasin.

IMs for land subsidence were established at five-year intervals over the Implementation Period from 2020 to 2040, at years 2025, 2030, and 2035. IMs were set recognizing the subsidence that may continue to occur during the Implementation Period due to historical low groundwater elevations and to provide adequate time for GSAs to implement projects and management actions. Based on a detailed Infrastructure Assessment, it has been determined that the maximum allowable additional cumulative subsidence within both the WMA and EMA should be set at two feet between now (December 2023) and January 2040 in order to be further protective of critical infrastructure. IMs were established for additional cumulative subsidence between now (December 2023) and January 2025, and at five-year intervals for 2025 to 2030, 2030 to 2035, and 2035 to 2040 to ensure a ramp down to the zero subsidence MT by 2040. An IM for average annual rate of subsidence has also been set for each five-year interval in order to evaluate annual progress toward meeting the cumulative subsidence IMs.

The cause of basin groundwater conditions that would result in significant and unreasonable land subsidence is excessive overall average annual groundwater pumping and other outflows from the Subbasin that exceed average annual inflows and result in groundwater levels that decline to a level that, combined with clay layers having certain properties conducive to compaction, result in significant land subsidence in areas that have already experienced significant impacts to critical infrastructure (i.e., the WMA) and areas where significant impacts to critical infrastructure are possible (i.e., the EMA). Undesirable results for land subsidence are significant and unreasonable adverse impacts from land subsidence on critical surface infrastructure that impair the operation and function of the infrastructure.

Table 7-6 and **Figure 7-3** present the status of land subsidence RMS stations in relation to the 2025 IMs, MOs, and MTs defined in the GSP. All RMS stations had an observed cumulative subsidence total that is less that the 2025 cumulative IM. Additional annual and cumulative subsidence maps are presented in **Appendix D**.

Table 7-6. Summary of RMS Stations Land Subsidence Rates Relative to Interim Milestones, Minimum Thresholds, and Measurable Objectives.

RMS ID	Management Area[1]	MO (feet/year)	2020 to 2025 IM - Annual Rate of Subsidence (feet/year)	2020 to 2025 IM - Cumulative Subsidence (feet)	Observed Annual Rate (feet/year)[2]	Observed Cumulative Total (feet)[2]	2020 to 2025 IM - Cumulative Subsidence Status (feet)[3]
SJRRP_123	WMA	0.0	-	-2.25	-0.23	-1.74	0.51
SJRRP_1053R	WMA	0.0	-	-2.25	-0.38	-1.79	0.46
SJRRP_1054R	WMA	0.0	-	-2.25	-0.36	-1.90	0.35
SJRRP_1055R	WMA	0.0	-	-2.25	-0.4	-2.05	0.20
SJRRP_2062	WMA	0.0	-	-2.25			
SJRRP_2362	WMA	0.0	-	-2.25	-0.14	-1.20	1.05
SJRRP_124	EMA	0.0	-	-2.25	-0.26	-1.56	0.69
SJRRP_135	EMA	0.0	-	-2.25	-0.22	-1.41	0.84
SJRRP_2076	EMA	0.0	-	-2.25	-0.29	-1.65	0.60
SJRRP_2378	EMA	0.0	-	-2.25	-0.19	-1.85	0.40

[1] WMA = Western Management Area; EMA = Eastern Management Area

[2] Observed annual rate is calculated between December 2023 and December 2024. Observed cumulative total is calculated December 2019 through December 2024.

[3] A positive value in the IM Status column indicates the RMS station has not exceeded the cumulative subsidence IM.

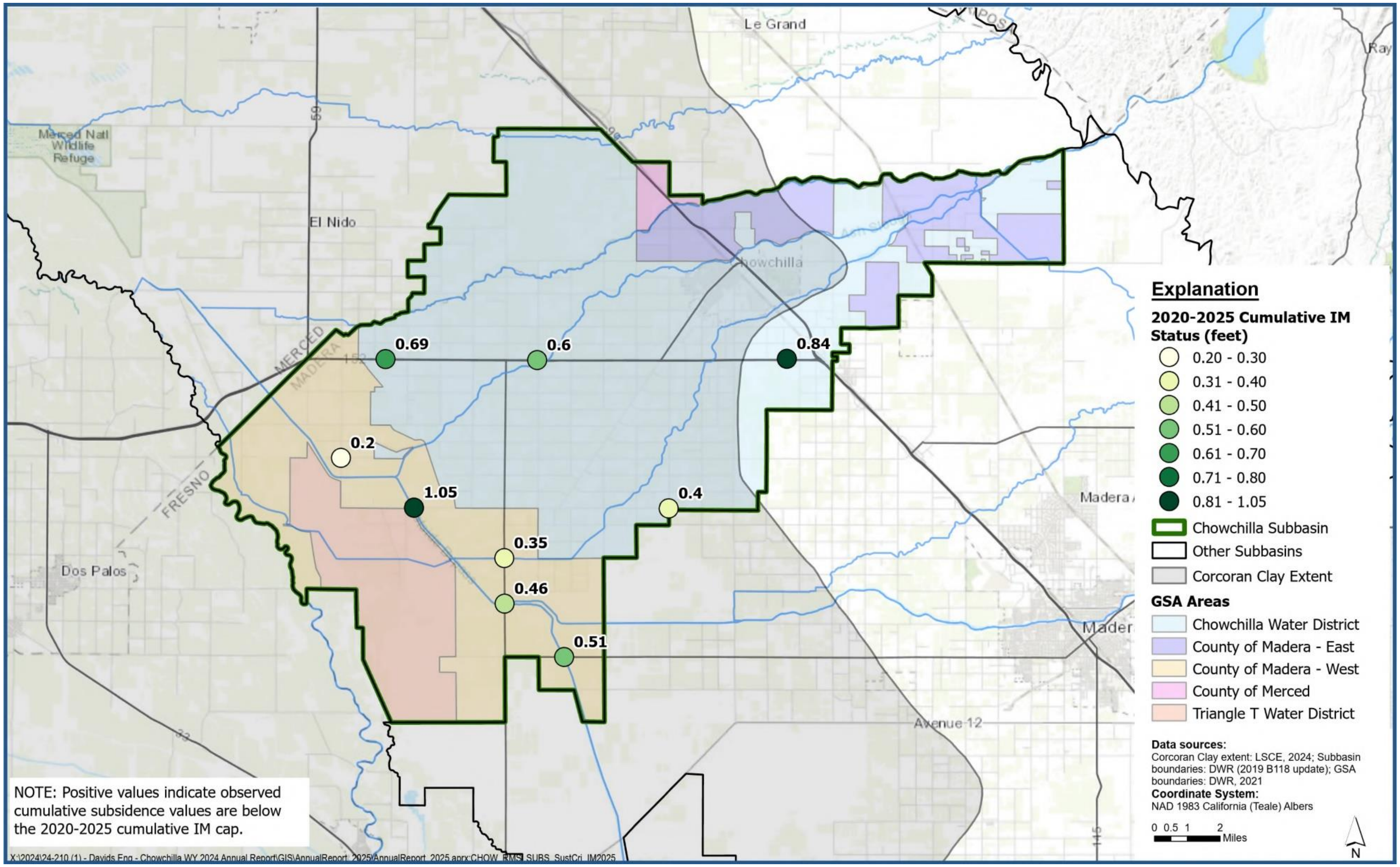


Figure 7-3. Observed Cumulative Subsidence Rates at Land Subsidence RMS Stations compared to 2025 Cumulative Interim Milestone Cap.

7.4.3 Degraded Groundwater Quality

In the Revised GSP, interim milestones (IMs) for degraded groundwater quality were established at five-year intervals over the Implementation Period from 2020 to 2040, at years 2025, 2030, 2035, and 2040, and are the same as the MOs. IMs and MOs for groundwater quality were established to not exacerbate adverse impacts on all beneficial uses of groundwater, especially municipal and domestic supply uses since these are the most restrictive from a water quality standpoint, resulting from implementation of GSP projects or management actions.

The groundwater quality IMs and MOs are defined for individual representative groundwater quality indicator wells (RMS) for the key water quality constituents arsenic, nitrate, and TDS based on consideration of existing or historical groundwater quality conditions and the drinking water MCLs for each of the key constituents. These key constituents were selected because they currently exist at elevated concentrations in the Subbasin or reflect a range of potential groundwater quality impacts related to implementation of GSP PMAs. For all groundwater quality RMS, the IM and MO concentrations for arsenic, nitrate, and TDS are set at levels representative of recent concentrations observed in the well with the intent to ensure that activities related to GSP projects or management actions do not significantly adversely impact groundwater quality conditions.

The cause of basin groundwater conditions that would result in significant and unreasonable degraded water quality is implementation of a GSP project or management action or overall groundwater extraction that causes concentrations of key groundwater quality constituents to increase to concentrations exceeding the MCLs for drinking water for identified key constituents. Municipal and domestic supply (MUN) is a designated beneficial use for groundwater in the Subbasin; therefore, groundwater quality degradation is considered significant and unreasonable based on adverse impacts to this beneficial use. Significant and unreasonable degradation of water quality occurs when beneficial uses for groundwater are adversely impacted by constituent concentrations increasing to levels above the drinking water MCLs for one of the key constituents (nitrate, arsenic, TDS) previously identified in Section 2 of the Revised GSP at indicator wells in the representative groundwater quality monitoring network due to implementation of a GSP project or management action. When existing or historical concentrations for the key constituents already exceed the MCL, the minimum threshold is set at the recent concentration plus 20 percent.

Table 7-7 presents a summary of groundwater quality monitoring activities to date. Sampling is currently being conducted to establish a baseline concentration to confirm and/or adjust SMC that were presented in the Revised GSP, and will be discussed in greater detail in the first Periodic Evaluation for the Subbasin. GSA efforts to bring in the remaining RMS wells listed in the GSP are ongoing; the status of monitoring efforts to date is provided in **Appendix E**.

Table 7-7. Summary of RMS Well Groundwater Quality Monitoring Activities.

		Arsenic (ug/L)						Nitrate (as N) (mg/L)						Total Dissolved Solids (mg/L)					
RMS Well ID	Aquifer Designation	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result
Wells Monitored by GSAs																			
CWD RMS-1	Lower	10/20/2021	3/12/2024	2	2.1	3.6	2.9	10/20/2021	3/12/2024	2	12.0	12.0	12.0	10/20/2021	3/12/2024	2	420	460	440
CWD RMS-2	Lower	10/20/2021	3/12/2024	2	4.1	6.3	5.2	10/20/2021	3/12/2024	2	2.0	9.2	5.6	10/20/2021	3/12/2024	2	240	420	330
CWD RMS-4	Lower	10/21/2021	5/16/2024	2	ND	2.8	1.9	10/21/2021	5/16/2024	2	0.8	4.8	2.8	10/21/2021	5/16/2024	2	190	350	270
CWD RMS-5	Lower	10/20/2021	4/23/2024	2	ND	ND	ND	10/20/2021	4/23/2024	2	2.9	4.3	3.6	10/20/2021	4/23/2024	2	310	460	385
CWD RMS-6	Lower	3/12/2024	3/12/2024	1	ND	ND	ND	3/12/2024	3/12/2024	1	ND	ND	ND	3/12/2024	3/12/2024	1	240	240	240
CWD RMS-7	Lower	3/13/2024	3/13/2024	1	3.2	3.2	3.2	3/13/2024	3/13/2024	1	1.7	1.7	1.7	3/13/2024	3/13/2024	1	260	260	260
CWD RMS-9	Upper	3/15/2024	3/15/2024	1	ND	ND	ND	3/15/2024	3/15/2024	1	2.1	2.1	2.1	3/15/2024	3/15/2024	1	250	250	250
CWD RMS-10	Lower	10/20/2021	4/25/2024	2	6.1	6.5	6.3	10/20/2021	4/25/2024	2	0.8	0.9	0.8	10/20/2021	4/25/2024	2	180	210	195
CWD RMS-11	Lower	10/21/2021	3/11/2024	2	ND	3.6	2.3	10/21/2021	3/11/2024	2	0.8	1.5	1.1	10/21/2021	3/11/2024	2	210	210	210
CWD RMS-12	Upper	11/5/2021	3/18/2024	2	ND	ND	ND	11/5/2021	3/18/2024	2	2.0	12.0	7.0	11/5/2021	3/18/2024	2	210	810	510
CWD RMS-13	Lower	10/21/2021	3/18/2024	2	ND	ND	ND	10/21/2021	3/18/2024	2	3.0	4.7	3.9	10/21/2021	3/18/2024	2	220	280	250
CWD RMS-15	Lower	3/21/2024	3/21/2024	1	3.2	3.2	3.2	3/21/2024	3/21/2024	1	0.4	0.4	0.4	3/21/2024	3/21/2024	1	240	240	240
MCE RMS-1	Lower	7/12/2022	7/12/2022	1	11.0	11.0	11.0	7/12/2022	7/12/2022	1	0.3	0.3	0.3	7/12/2022	7/12/2022	1	190	190	190
MCW RMS-1	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-4	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-7	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-9	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-1	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-3	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-4	Composite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clayton Ag Well #2	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSB01A	Lower	2/13/2020	7/26/2024	6	ND	6.1	1.9	6/16/2021	7/26/2024	4	9.3	10.0	9.7	2/13/2020	7/26/2024	9	460	620	560
CSB01B	Lower	2/13/2020	7/26/2024	6	3.1	14.0	9.0	6/16/2021	7/26/2024	4	ND	5.6	1.5	2/13/2020	7/26/2024	5	190	510	314
CSB01C	Lower	6/16/2021	7/26/2024	4	5.0	5.7	5.4	6/16/2021	7/26/2024	3	ND	ND	ND	6/16/2021	7/26/2024	3	210	250	230
CSB02A	Lower	2/13/2020	7/27/2021	3	13.0	28.0	21.3	-	-	-	-	-	-	2/13/2020	8/5/2020	2	650	800	725
CSB02B	Lower	2/13/2020	7/26/2024	6	4.1	9.6	8.0	6/16/2021	7/26/2024	4	2.7	3.5	3.1	2/13/2020	7/26/2024	6	240	530	312
CSB02C	Lower	2/13/2020	7/26/2024	6	7.5	8.7	8.1	6/16/2021	7/26/2024	4	0.8	1.0	0.9	2/13/2020	7/26/2024	5	250	270	256
CSB03A	Lower	2/14/2020	7/27/2021	5	3.4	5.6	4.1	6/16/2021	6/16/2021	1	7.2	7.2	7.2	2/14/2020	6/16/2021	4	280	310	293
CSB03B	Lower	2/14/2020	7/25/2024	6	3.3	7.3	4.3	6/16/2021	7/25/2024	4	ND	0.6	0.4	2/14/2020	7/25/2024	5	170	320	216
CSB03C	Lower	2/14/2020	7/25/2024	4	ND	6.1	2.3	6/21/2022	7/25/2024	3	ND	ND	ND	2/14/2020	7/25/2024	4	220	820	373
CSB05A	Lower	8/4/2020	7/30/2024	7	ND	4.5	2.2	6/16/2021	7/30/2024	4	1.6	2.5	1.9	8/4/2020	7/30/2024	10	170	220	182
CSB05B	Lower	2/13/2020	7/31/2024	6	ND	3.4	1.8	6/16/2021	7/31/2024	4	0.6	0.8	0.6	2/13/2020	7/31/2024	5	170	210	180
CSB05C	Lower	2/13/2020	7/30/2024	6	18.0	22.0	19.7	6/16/2021	7/30/2024	4	ND	ND	ND	2/13/2020	7/30/2024	5	1,100	1,500	1,360
CSB06A	Upper	2/12/2020	7/23/2024	5	ND	9.4	3.4	6/22/2022	7/23/2024	3	2.6	15.0	10.9	2/12/2020	7/23/2024	12	480	1,500	1,123

		Arsenic (ug/L)						Nitrate (as N) (mg/L)						Total Dissolved Solids (mg/L)					
RMS Well ID	Aquifer Designation	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result
Wells Monitored by GSAs																			
CSB06B	Lower	2/12/2020	7/23/2024	4	2.4	3.7	3.2	6/22/2022	7/23/2024	3	0.8	3.4	2.5	2/12/2020	7/23/2024	4	140	650	438
CSB06C	Lower	2/12/2020	7/23/2024	4	ND	5.2	3.1	6/22/2022	7/23/2024	3	0.8	12.0	4.5	2/12/2020	7/23/2024	4	140	960	360
CSB07A	Upper	2/12/2020	7/23/2024	7	3.0	4.2	3.5	6/28/2022	7/23/2024	4	8.7	13.0	10.5	2/12/2020	7/23/2024	10	480	670	569
CSB07B	Lower	2/12/2020	7/23/2024	4	3.4	4.2	3.7	6/13/2023	7/23/2024	3	3.7	7.5	5.0	2/12/2020	7/23/2024	4	240	440	333
CSB07C	Lower	2/12/2020	7/23/2024	5	ND	2.1	1.3	6/28/2022	7/23/2024	4	ND	0.4	0.2	2/12/2020	7/23/2024	5	580	3,300	2,476
CSB09A	Lower	8/4/2020	7/31/2024	7	ND	4.0	1.4	6/16/2021	7/31/2024	4	6.1	7.1	6.7	8/4/2020	7/31/2024	9	300	520	341
CSB09B	Lower	10/27/2020	8/1/2024	5	ND	1.0	1.0	6/16/2021	8/1/2024	4	5.3	7.0	6.3	10/27/2020	8/1/2024	5	280	310	300
CSB09C	Lower	10/27/2020	7/31/2024	6	ND	2.8	1.7	6/16/2021	7/31/2024	4	0.9	1.5	1.2	10/27/2020	7/31/2024	5	240	290	268
Wells Monitored by Non-GSA Entities																			
2000511-001	Unknown	5/27/2008	2/21/2024	6	1.1	2.0	1.5	2/22/2006	7/22/2024	79	3.8	58.5	24.2	5/27/2008	2/21/2024	7	150	450	310
2000597-001	Lower	2/14/2000	6/10/2021	4	ND	3.0	2.3	2/18/2003	7/17/2024	44	2.9	31.0	8.6	2/18/2003	12/17/2009	3	154	190	171
2000681-002	Unknown	1/23/2012	12/13/2017	3	ND	ND	ND	3/3/2009	4/9/2024	10	1.5	10.0	5.0	1/23/2012	5/7/2013	2	180	190	185
2010001-008	Lower	10/10/1991	7/29/2015	8	ND	10.0	2.9	10/10/1991	10/23/2017	26	ND	10.0	5.1	10/10/1991	7/27/2016	16	108	190	169
2010001-010	Lower	12/1/1994	6/2/2021	6	ND	3.0	1.8	12/1/1994	7/3/2024	69	0.6	30.2	16.0	12/1/1994	6/2/2021	17	160	440	340
2010001-011	Lower	8/19/1996	2/8/2022	6	ND	3.0	1.9	8/19/1996	7/3/2024	32	0.5	7.6	2.7	8/19/1996	2/8/2022	16	120	190	174
2400216-001	Lower	8/10/2010	10/14/2019	4	3.9	5.3	4.5	3/20/2003	7/17/2024	20	1.6	8.1	4.5	8/10/2010	8/22/2013	2	160	180	170
ESJ11	Unknown	7/27/2021	7/27/2021	1	2.7	2.7	2.7	-	-	-	-	-	-	-	-	-	-	-	-

ND = Non-detect

ND measurements included in average concentration calculation as half of reporting limit.

7.4.4 Depletion of Interconnected Surface Water

In the Revised GSP, interim SMC for the depletion of interconnected surface water (ISW) were established due to limited data available to quantify the relationship between groundwater and the San Joaquin River. A workplan was developed to improve understanding of ISW in the Subbasin (**Appendix F**), but in the meantime the interim SMC will be used to evaluate this sustainability indicator.

For the purposes of establishing interim SMC for ISW along the San Joaquin River, six groundwater level RMS wells screened in the Upper Aquifer in close proximity to the San Joaquin River were evaluated by comparing modeled groundwater elevations to adjacent stream thalweg elevations in order to calculate the percent of time over the historical time period from 1989 to 2015 that ISW exists at that given location. The IMs and MOs for ISW along the San Joaquin River are the same, and are to maintain the percent of time the San Joaquin River is connected to shallow groundwater levels equal to or greater than existing and historical conditions at RMS wells screened in the Upper Aquifer in close proximity to the San Joaquin River. In order to create SMC that can be evaluated using this metric on an annual basis, a rolling average for the past five years will be used as the current conditions for percent of time connected. The five-year current rolling average will be compared to the historical base period percent of time connected to determine if MOs are being achieved.

Table 7-8 presents the status of ISW RMS wells in relation to the SMC defined in the GSP. Review of the 5-year rolling average over the WY 2020-2024 time period for ISW RMS wells indicates that percent of time connected is less than the SMC for all wells. It should be noted that MCW RMS-10 is the only ISW well currently recording measurements with a transducer, and as a result provides the most comprehensive dataset for evaluating ISW. The other ISW RMS wells have much more limited data with which to evaluate the ISW SMC. Additionally, the SMC were based on GSP analyses using a projected hydrologic sequence over the implementation period that was approximately representative of the long-term average hydrology in the area. During the initial years of the GSP implementation, the hydrology has been much drier than average. This has limited the effectiveness of recharge projects in the Chowchilla Subbasin and has also reduced the availability of natural recharge and water supply from precipitation.

Table 7-8. Summary of ISW RMS Wells Relative to Sustainable Management Criteria.

RMS Well I.D.	Estimated Surface Elevation[1] (msl, feet)	Aquifer Designation	SMC[2]	Time Period	Count of GW Elevation Measurements	Count of GW Elevation Measurements that are greater than Streambed Elevation	Percent of Time that GW Elevation Measurements are greater than Streambed Elevation	SMC Status
MCW RMS-1	120	Upper	3%	2020-2024	6	0	0%	-3%
MCW RMS-2	123	Upper	21%	2020-2024	8	1	13%	-9%
MCW RMS-3	122	Upper	3%	2020-2024	9	0	0%	-3%
MCW RMS-10	123	Upper	78%	2020-2024	1,069	692	65%	-13%
MCW RMS-11	127	Upper	26%	2020-2024	23	0	0%	-26%
MCW RMS-12	127	Upper	11%	2020-2024	24	0	0%	-11%

[1] Estimated surface elevation and groundwater elevations (GWE) are expressed in feet above mean sea level.
[2] The SMC are established as the percent of time connected over the historical base period (1989 to 2015). For comparison to future five-year rolling average, baseline MTs may need to be updated to reflect climatic/hydrologic conditions represented in five-year rolling average.

8 References

American Society of Civil Engineers (ASCE). 2016 Evaporation, Evapotranspiration and Irrigation Water Requirements. Manual 70. Second Edition. M. E. Jensen and R. G. Allen (eds). Am. Soc. Civ. Engrs.

California Department of Water Resources (DWR). 2016. Best Management Practices for Sustainable Management of Groundwater, Water Budget, BMP.

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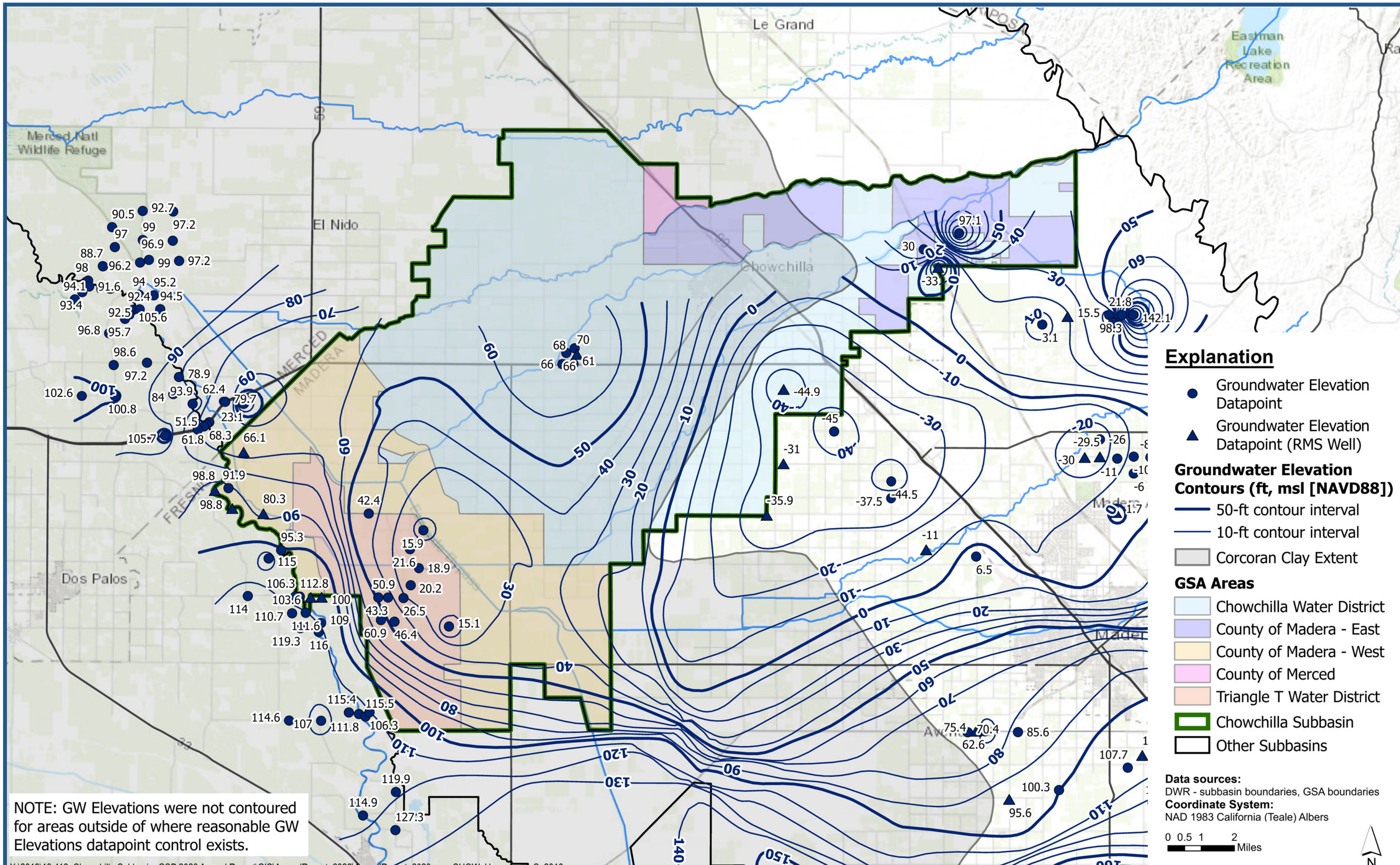
Appendix A. Contour Maps of the Different Aquifer Units.



Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2016

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-1

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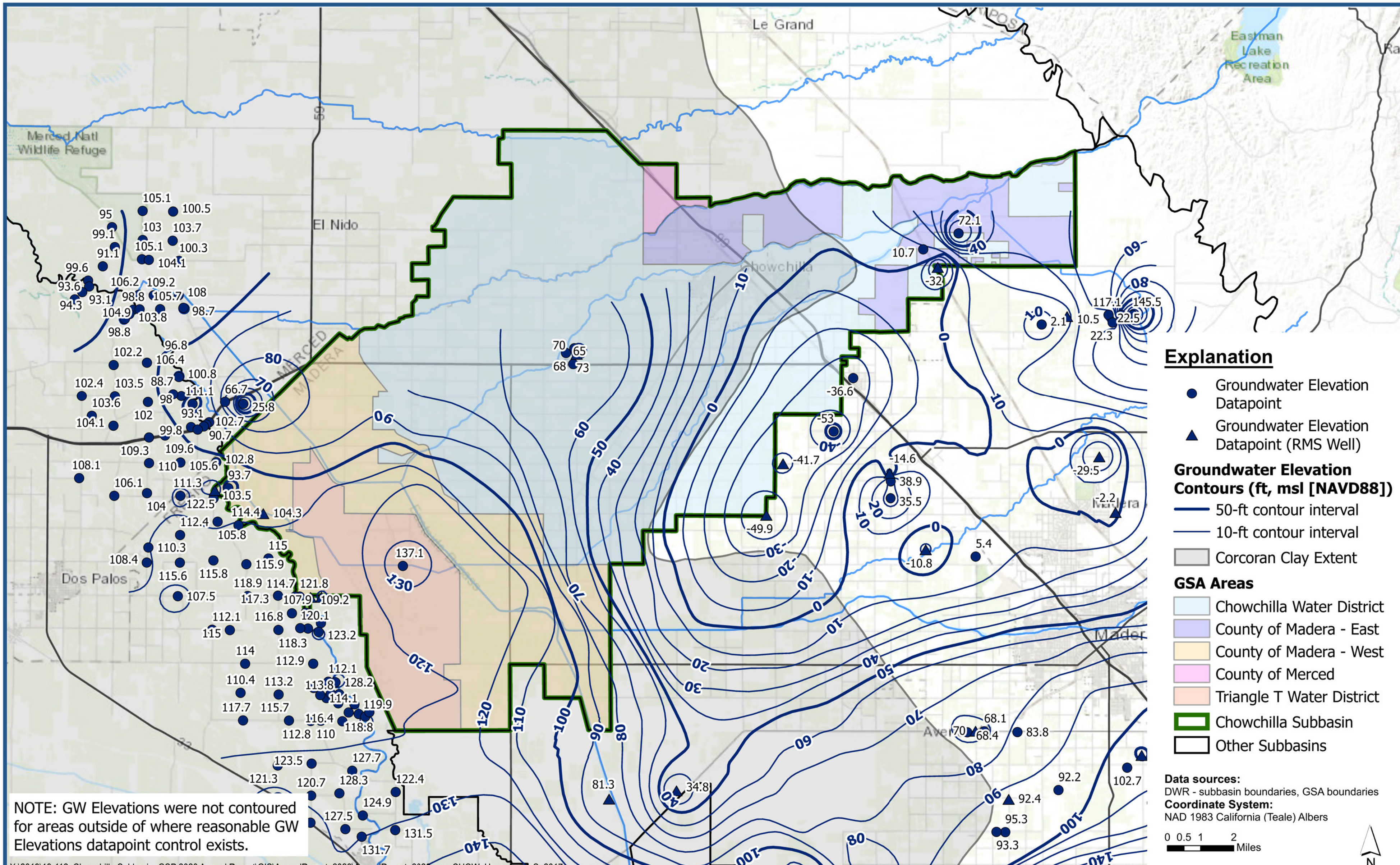

Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2017

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Groundwater Sustainability Plan 2020 Annual Report

Figure A-2

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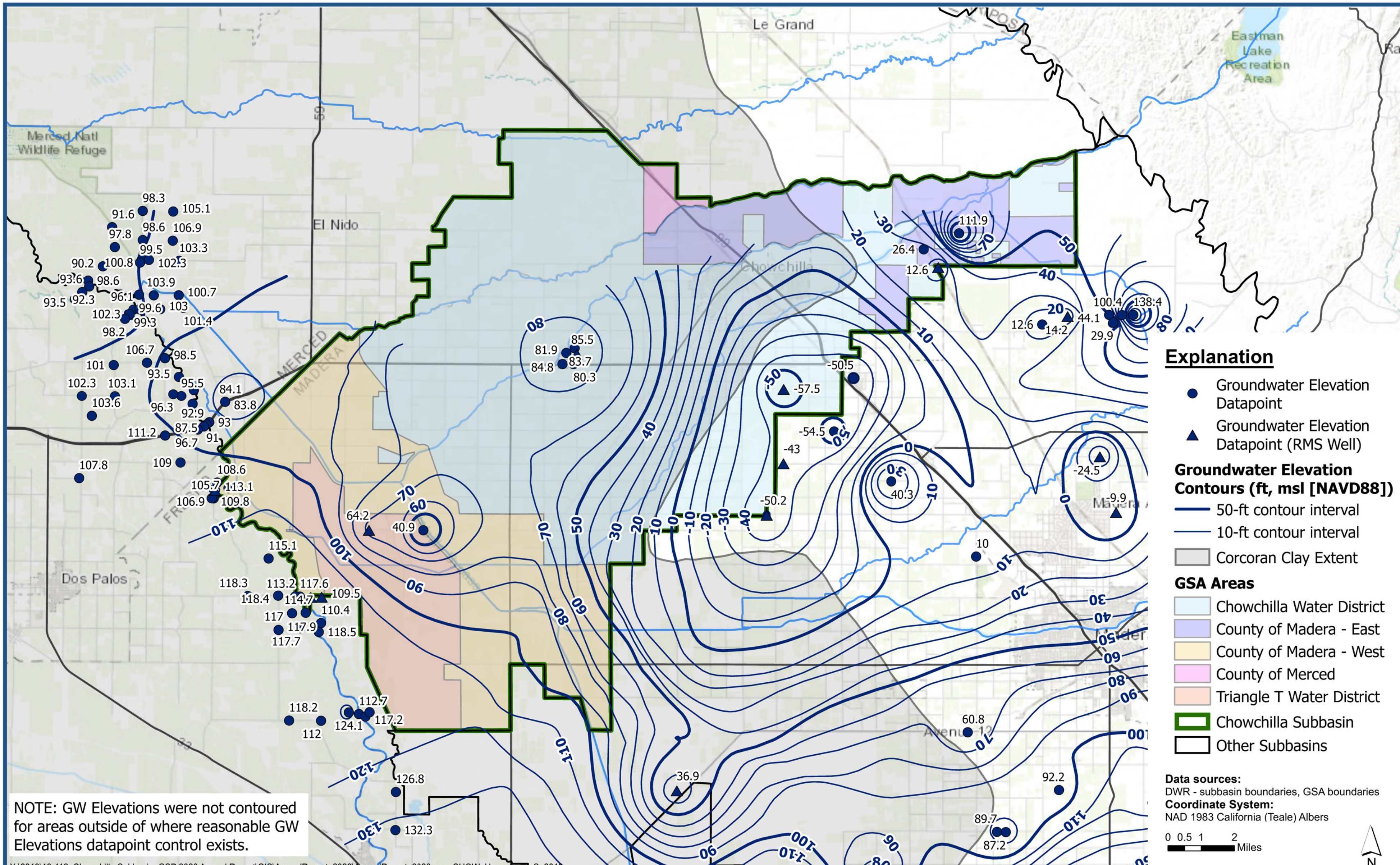

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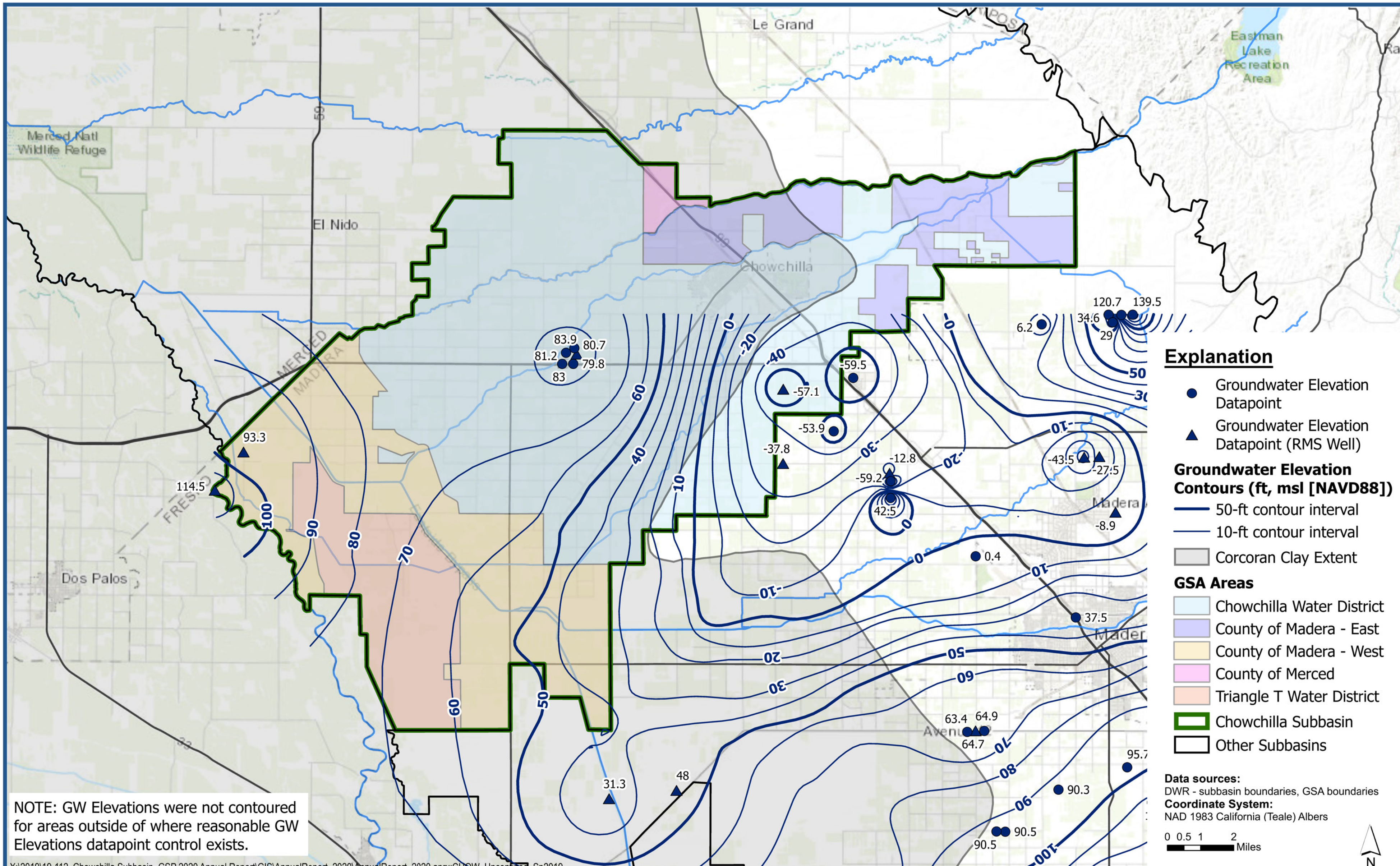
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-3



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Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2019

Chowchilla Subbasin
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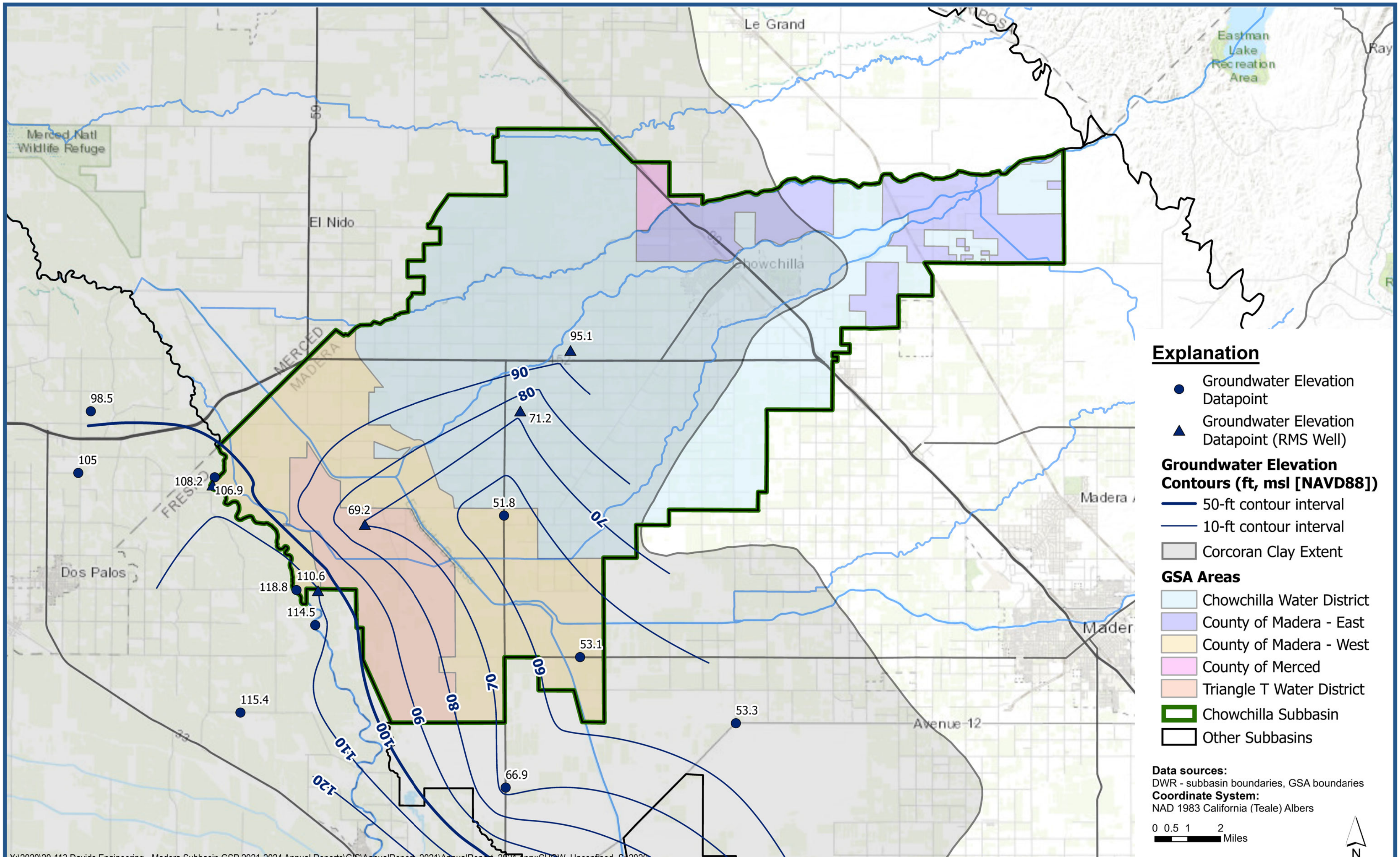
Figure 1-3



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Contours of Equal Groundwater Elevation: Upper Aquifer - Spring 2020

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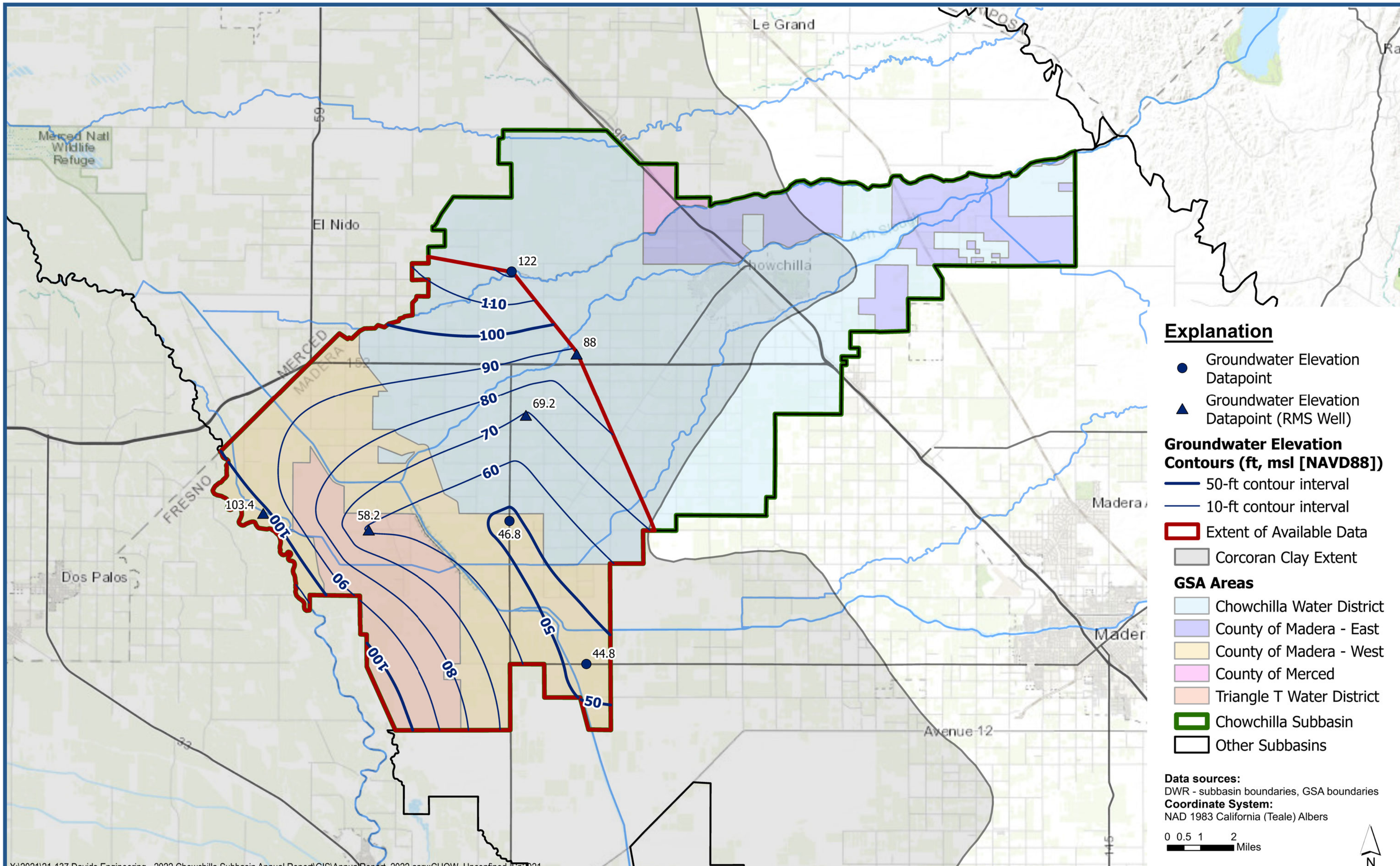
Figure 1-3



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Contours of Equal Groundwater Elevation: Upper Aquifer - Spring 2021

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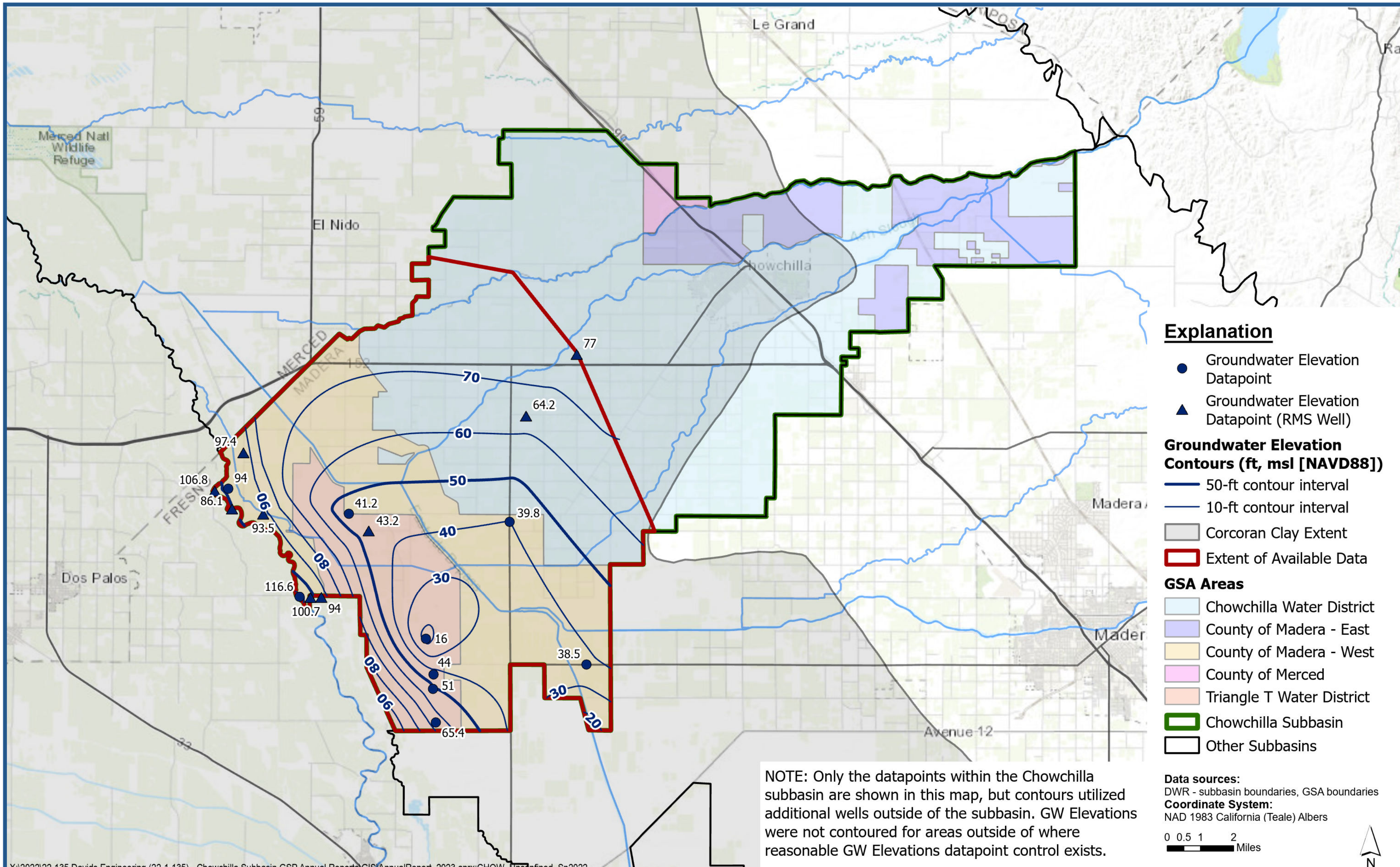
Groundwater Sustainability Plan 2022 Annual Report

Figure 1-3



Contours of Equal Groundwater Elevation: Upper Aquifer - Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 1-3

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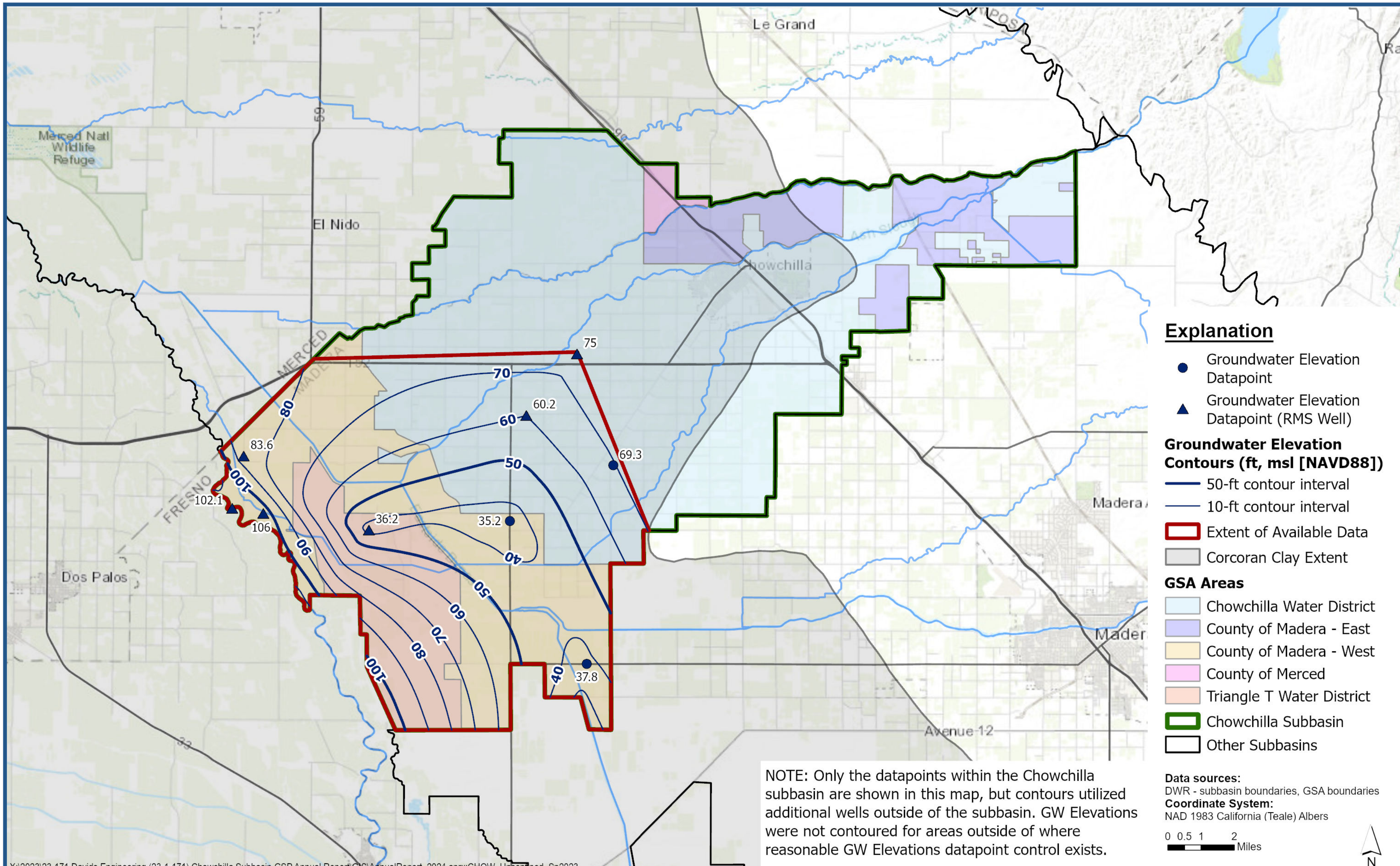

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Contours of Equal Groundwater Elevation: Upper Aquifer - Spring 2023

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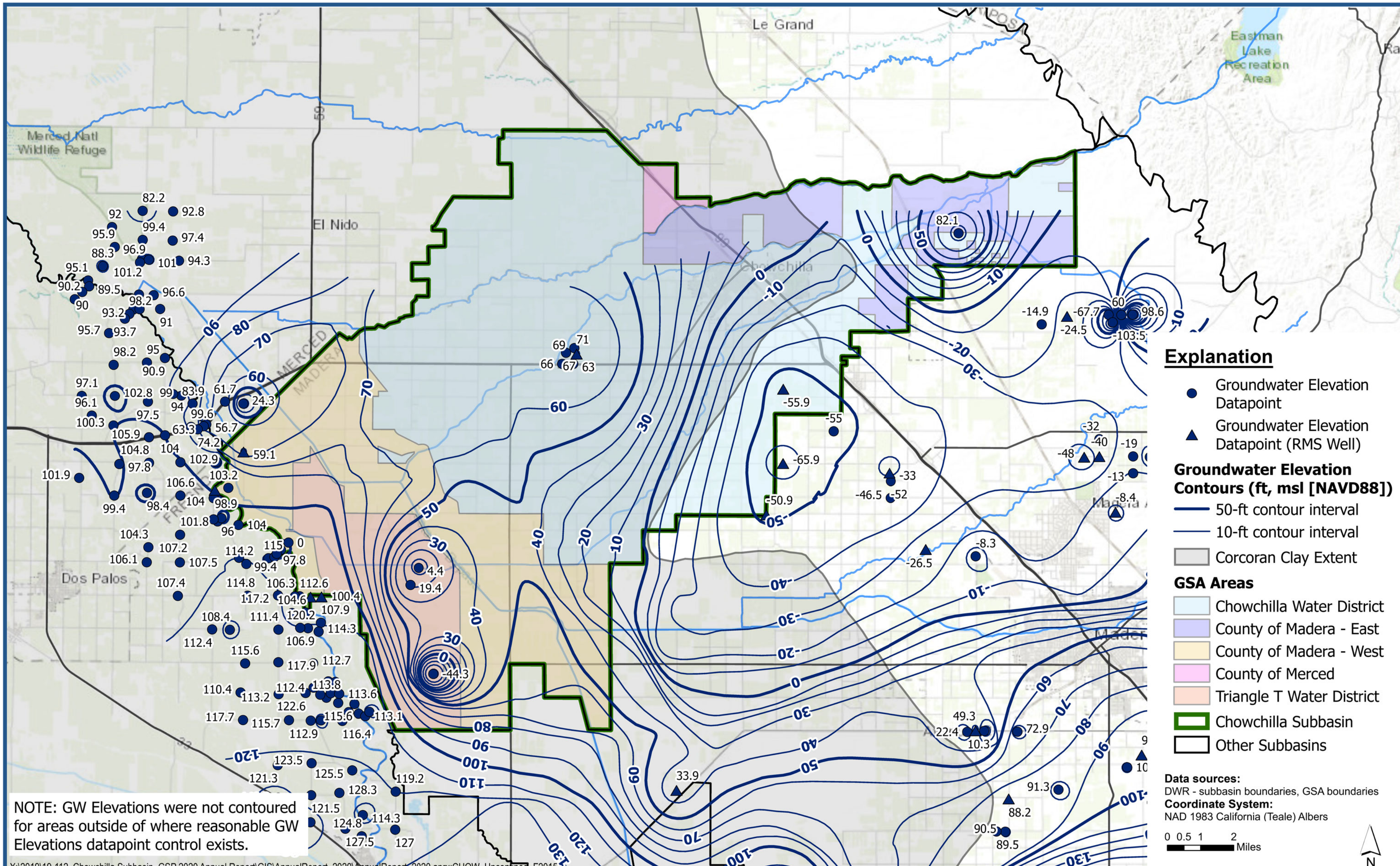
Groundwater Sustainability Plan 2024 Annual Report

Figure 1-3



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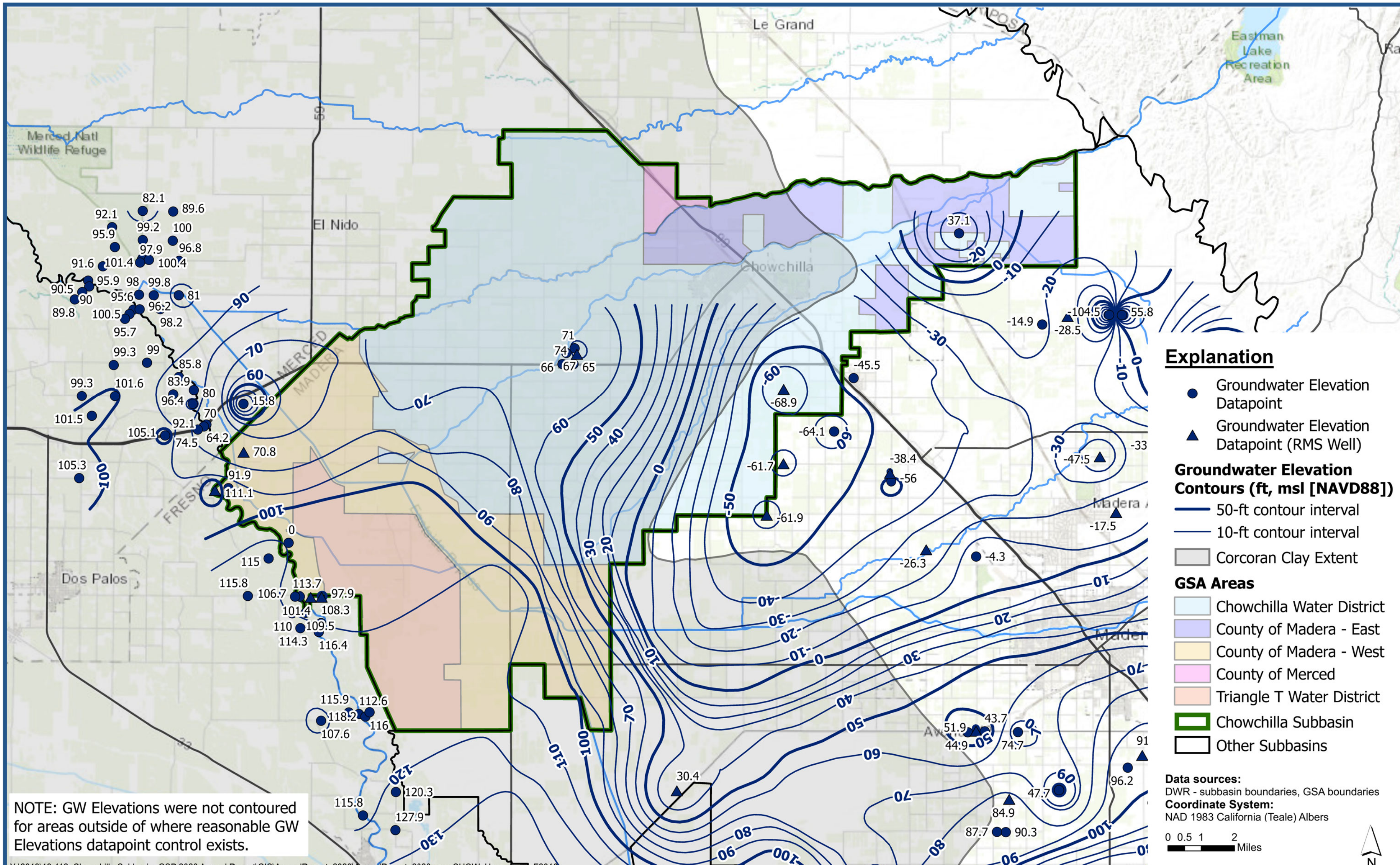
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Fall 2015

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-4



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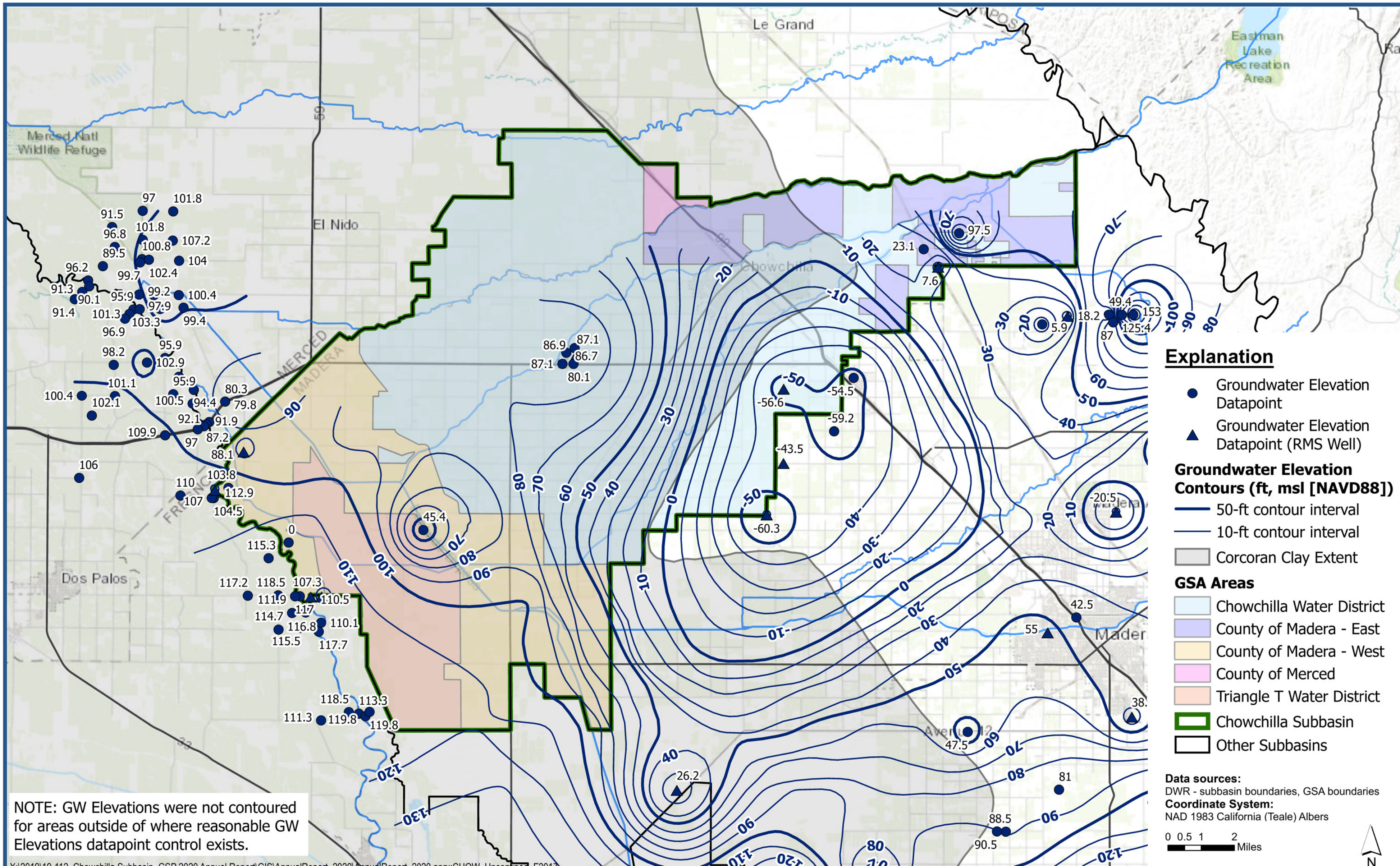
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Fall 2016

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-5



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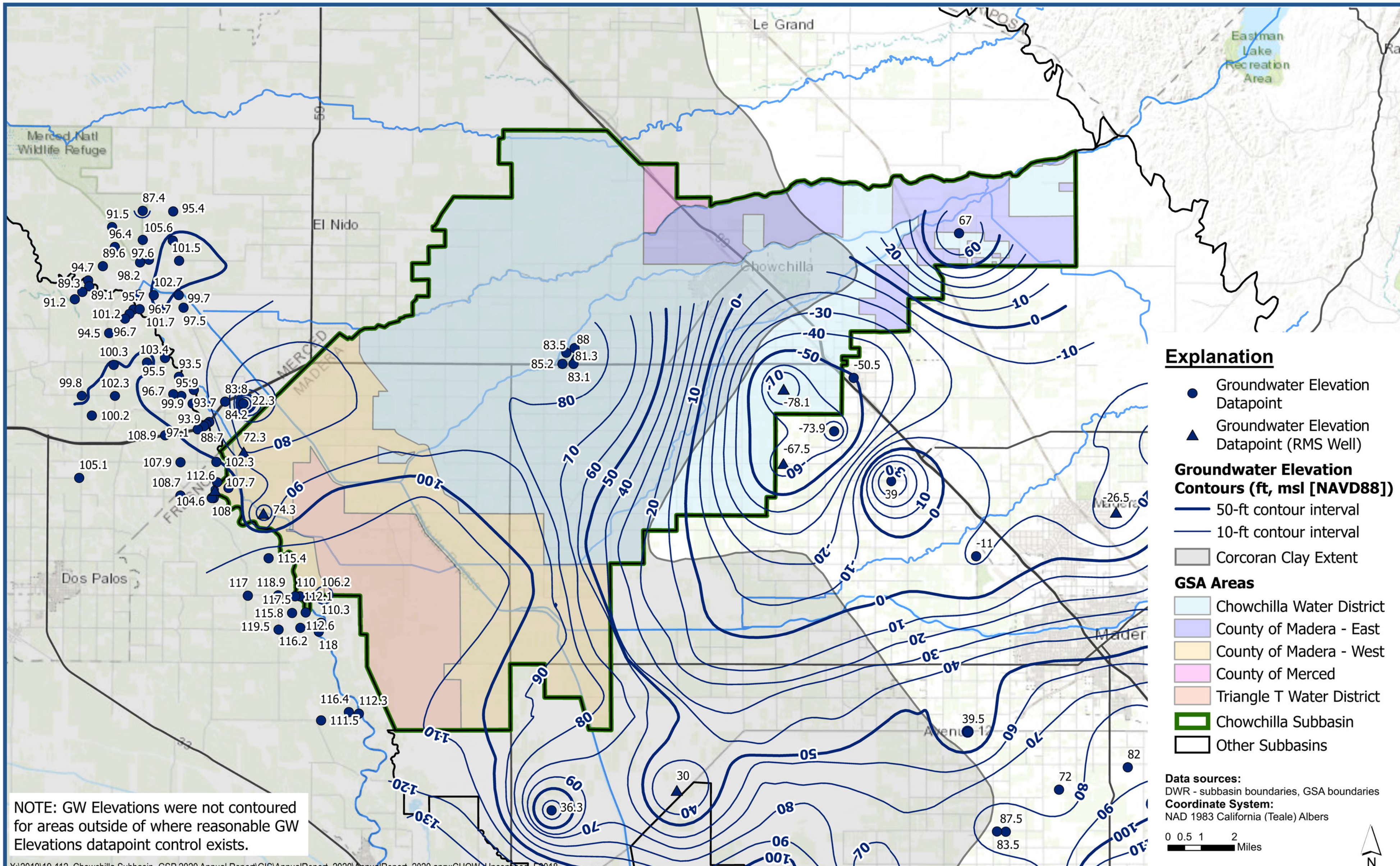
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Fall 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-6



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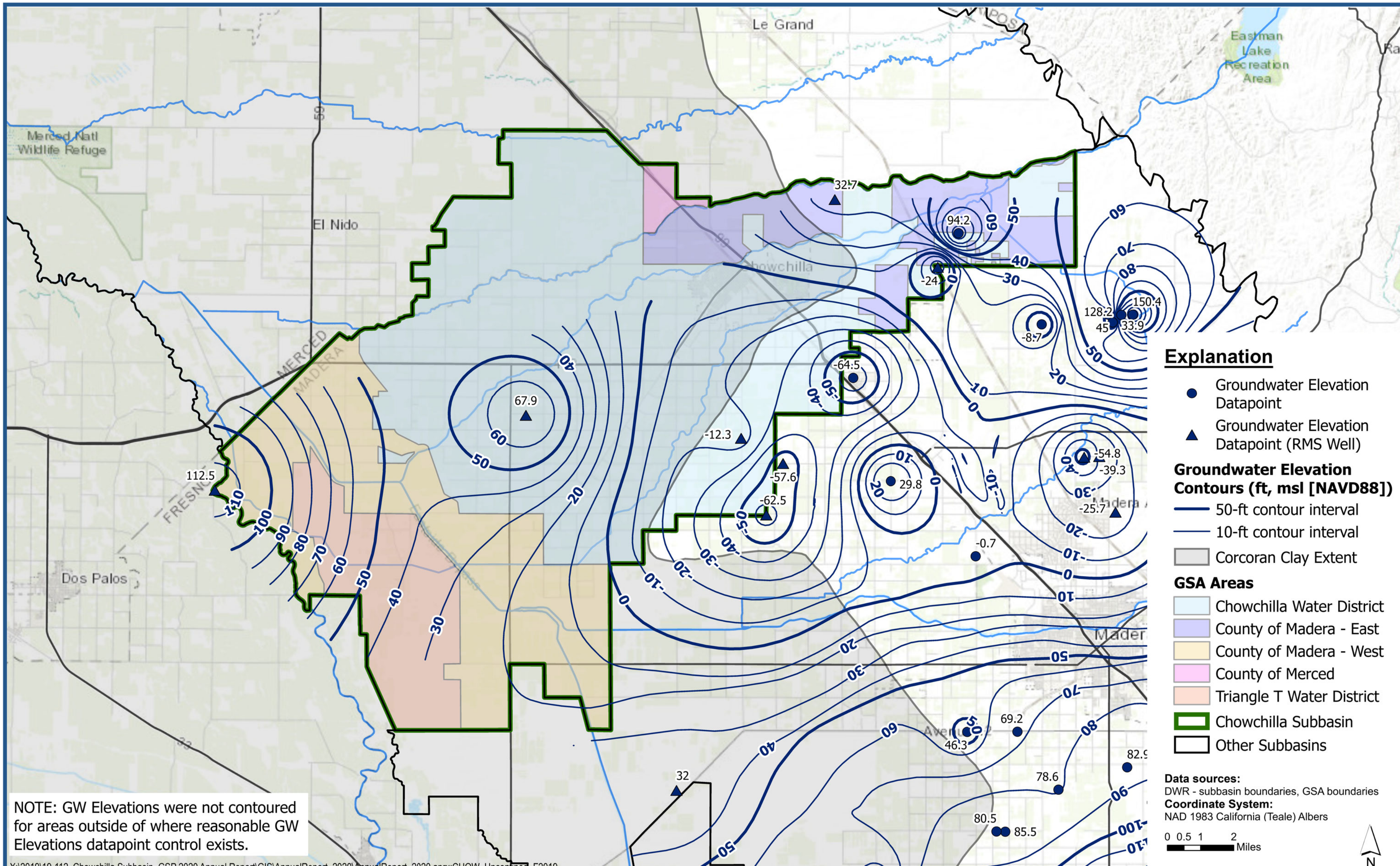
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Fall 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-7



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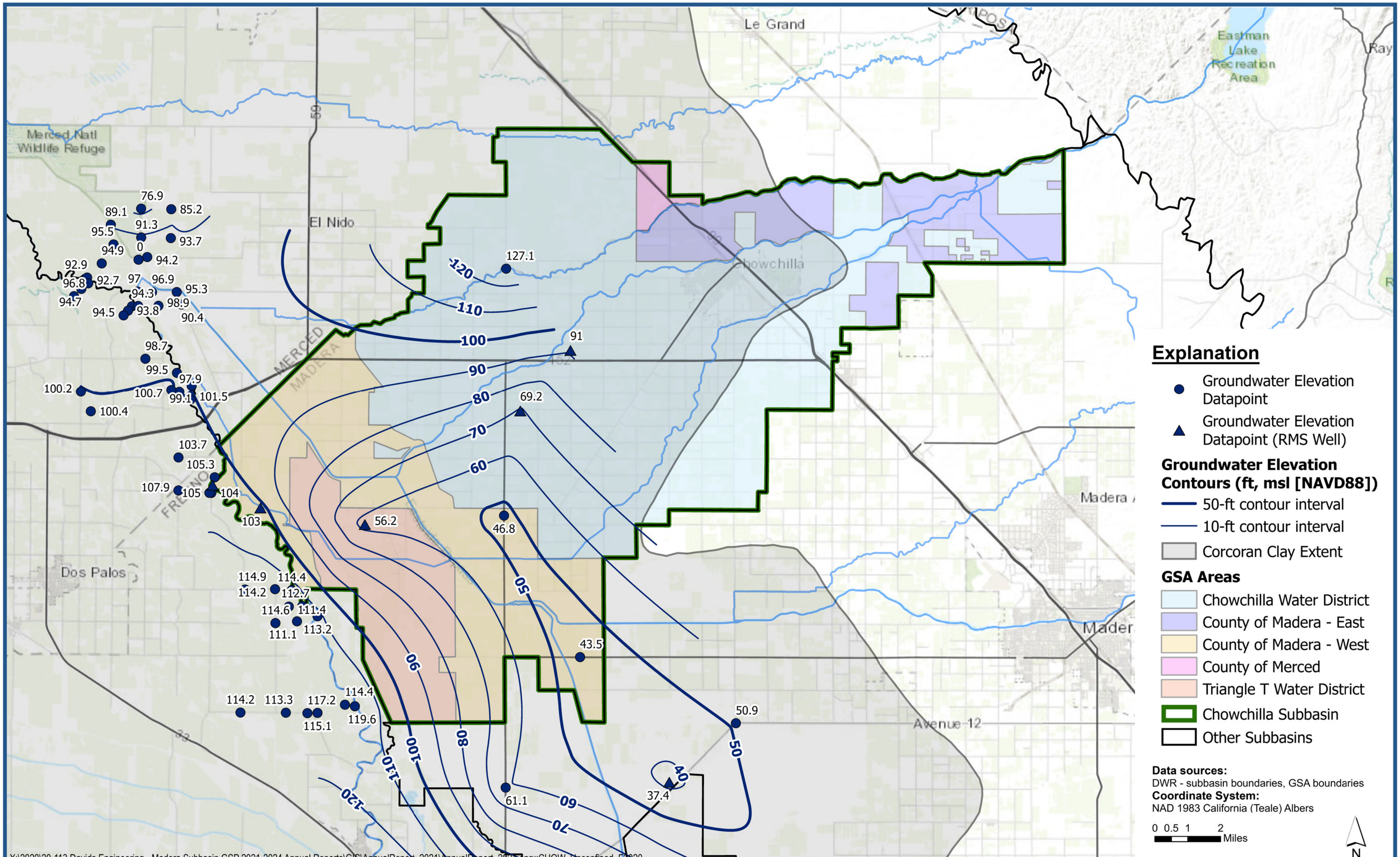
Contours of Equal Groundwater Elevation
Upper Aquifer/Undifferentiated Unconfined Zone - Fall 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure 1-4



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Contours of Equal Groundwater Elevation: Upper Aquifer - Fall 2020

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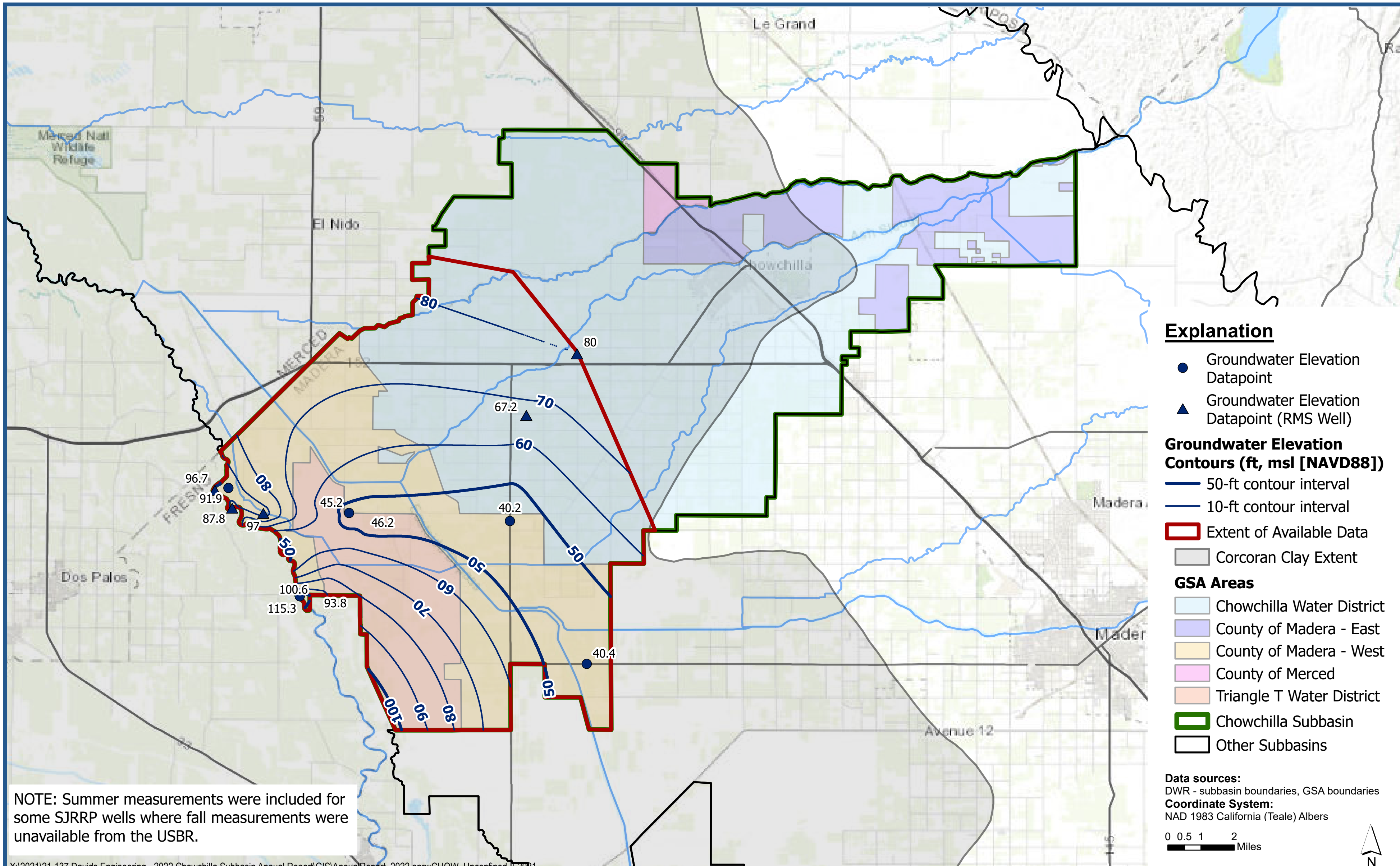
Groundwater Sustainability Plan 2021 Annual Report

Figure 1-4



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Contours of Equal Groundwater Elevation: Upper Aquifer - Fall 2021

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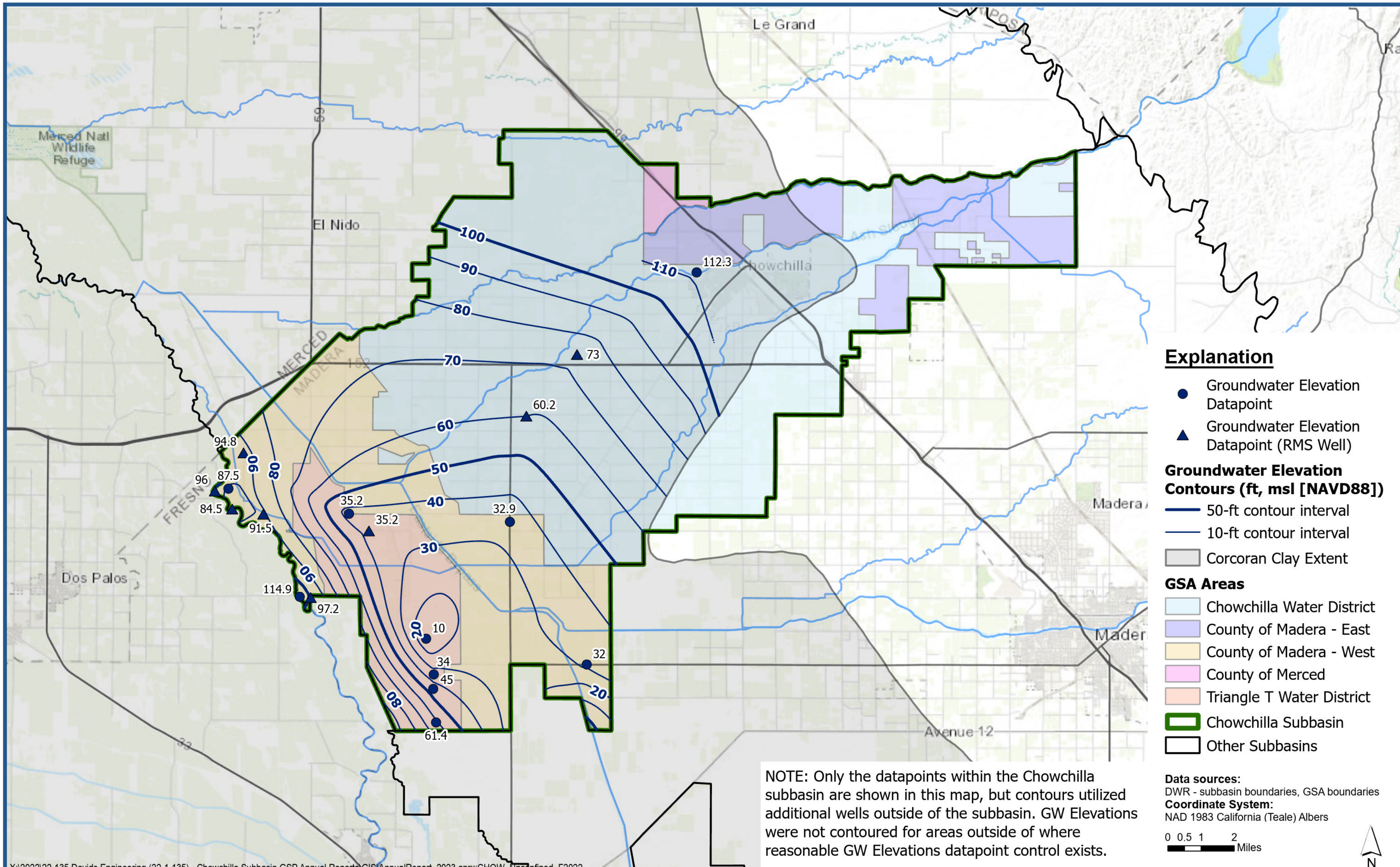
Groundwater Sustainability Plan 2022 Annual Report

Figure 1-4



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Contours of Equal Groundwater Elevation: Upper Aquifer - Fall 2022

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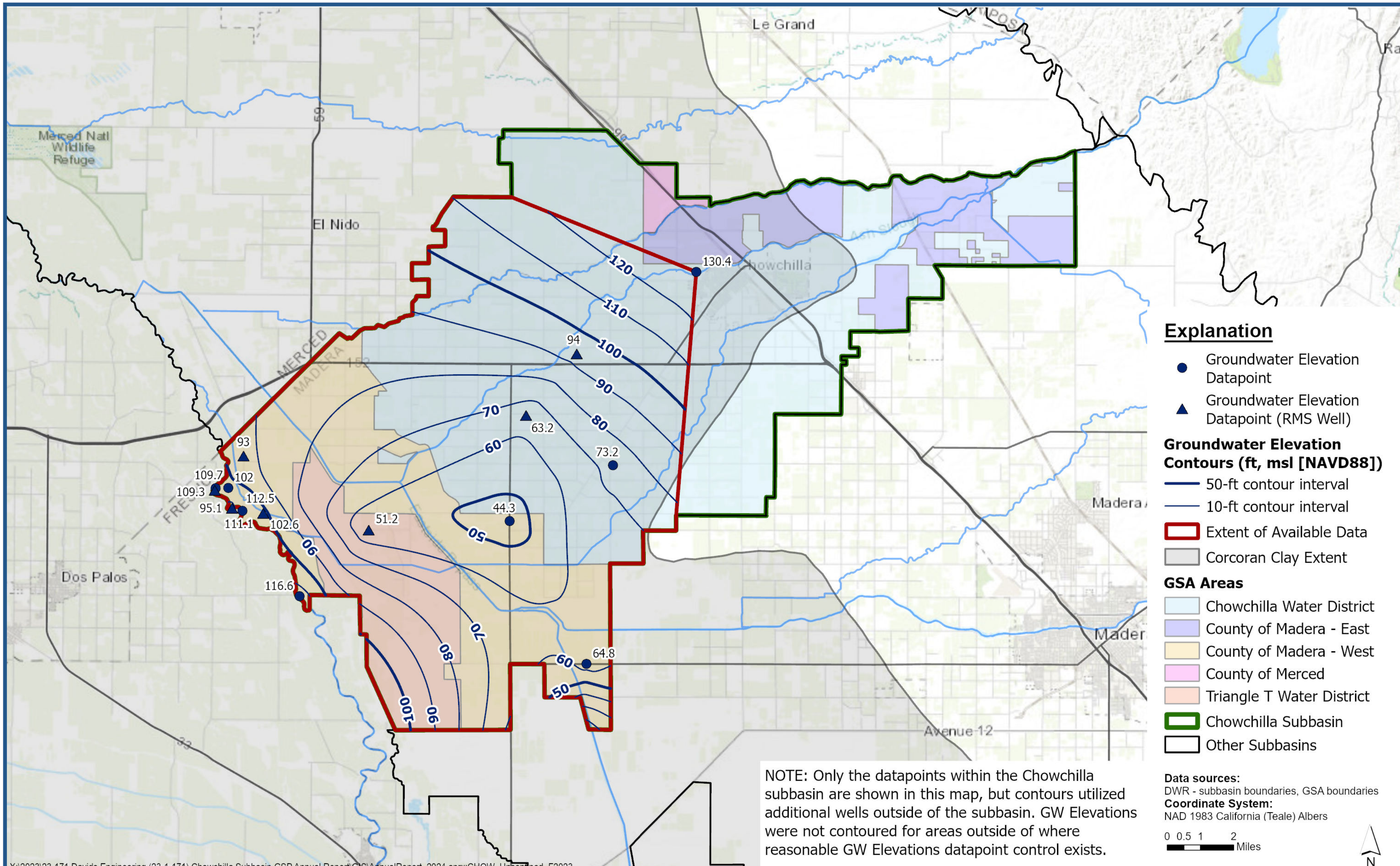
Groundwater Sustainability Plan 2023 Annual Report

Figure 1-4



NOTE: Only the datapoints within the Chowchilla subbasin are shown in this map, but contours utilized additional wells outside of the subbasin. GW Elevations were not contoured for areas outside of where reasonable GW Elevations datapoint control exists.

Data sources:
DWR - subbasin boundaries, GSA boundaries
Coordinate System:
NAD 1983 California (Teale) Albers

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Contours of Equal Groundwater Elevation: Upper Aquifer - Fall 2023

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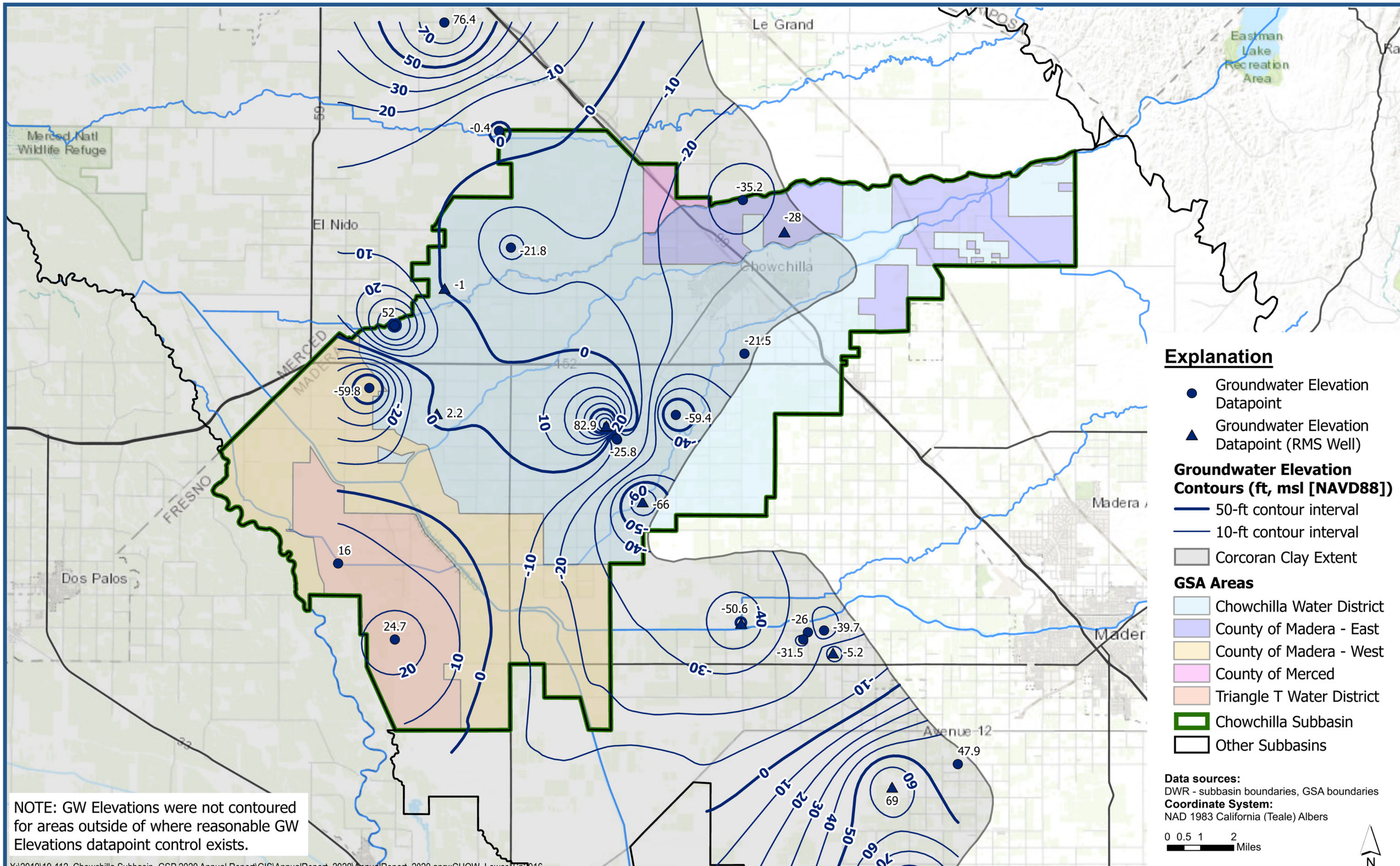
Figure 1-4



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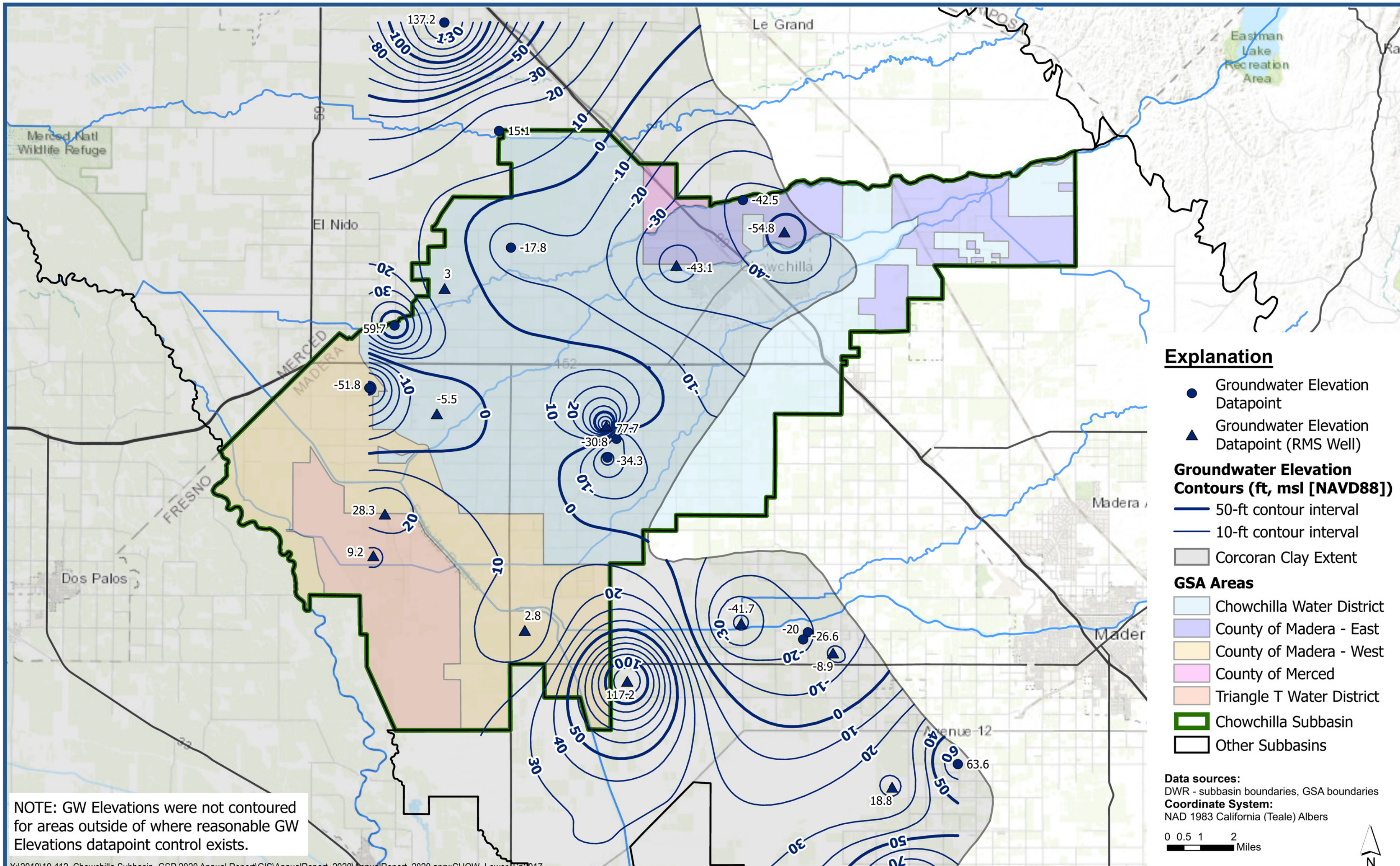
Contours of Equal Groundwater Elevation
Lower Aquifer - Spring 2016

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-8



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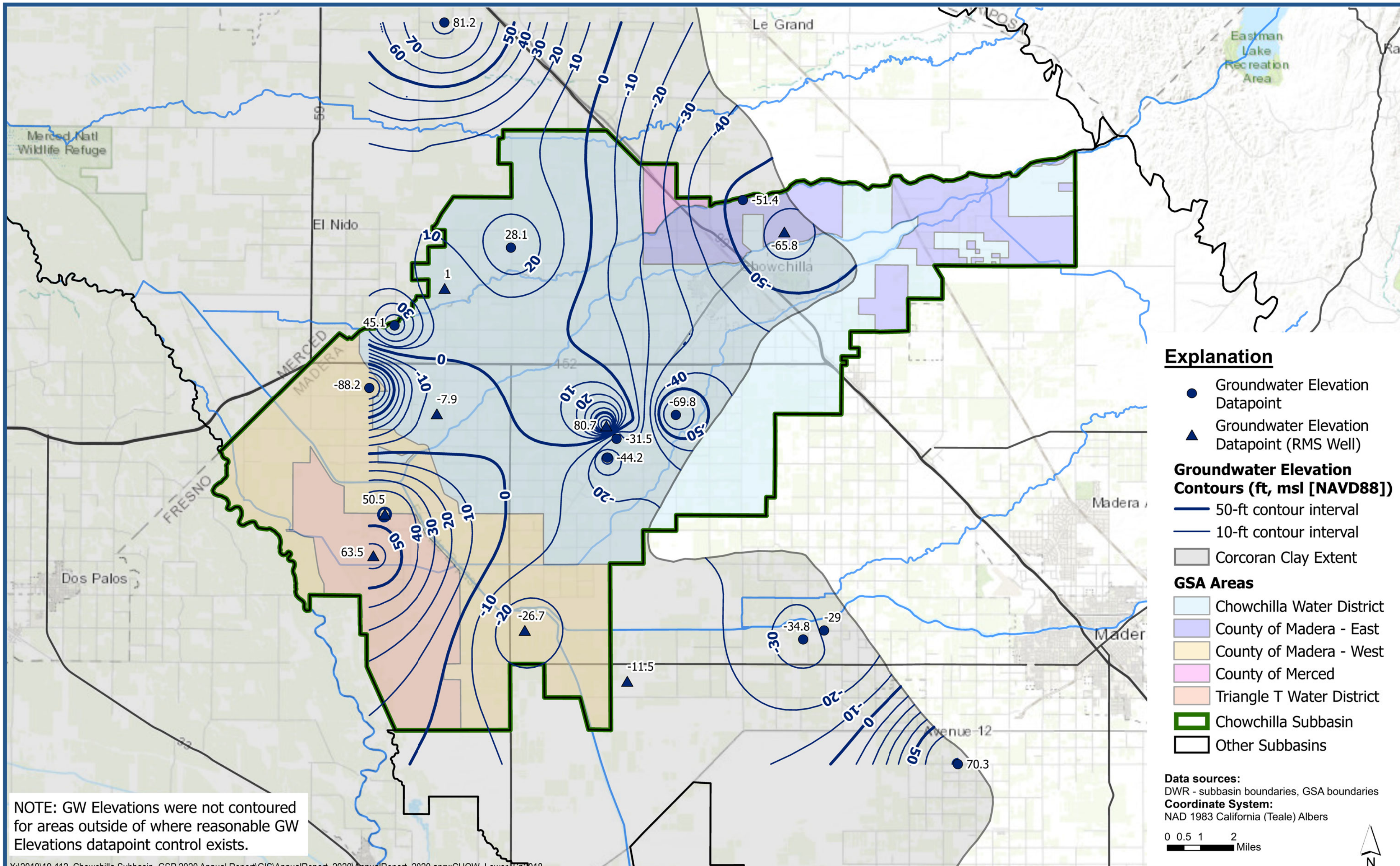
Contours of Equal Groundwater Elevation
Lower Aquifer - Spring 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-9



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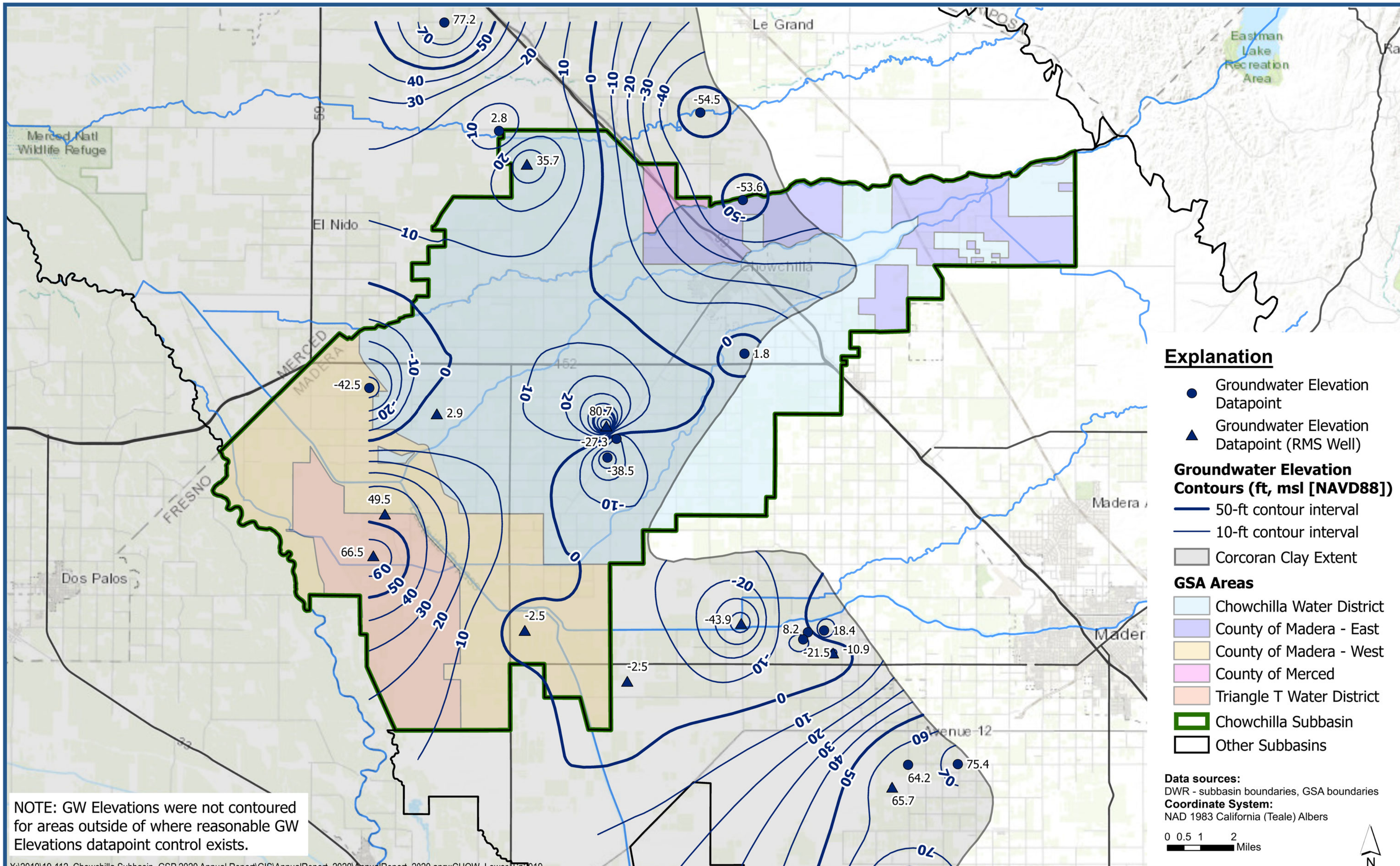
Contours of Equal Groundwater Elevation
Lower Aquifer - Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-10



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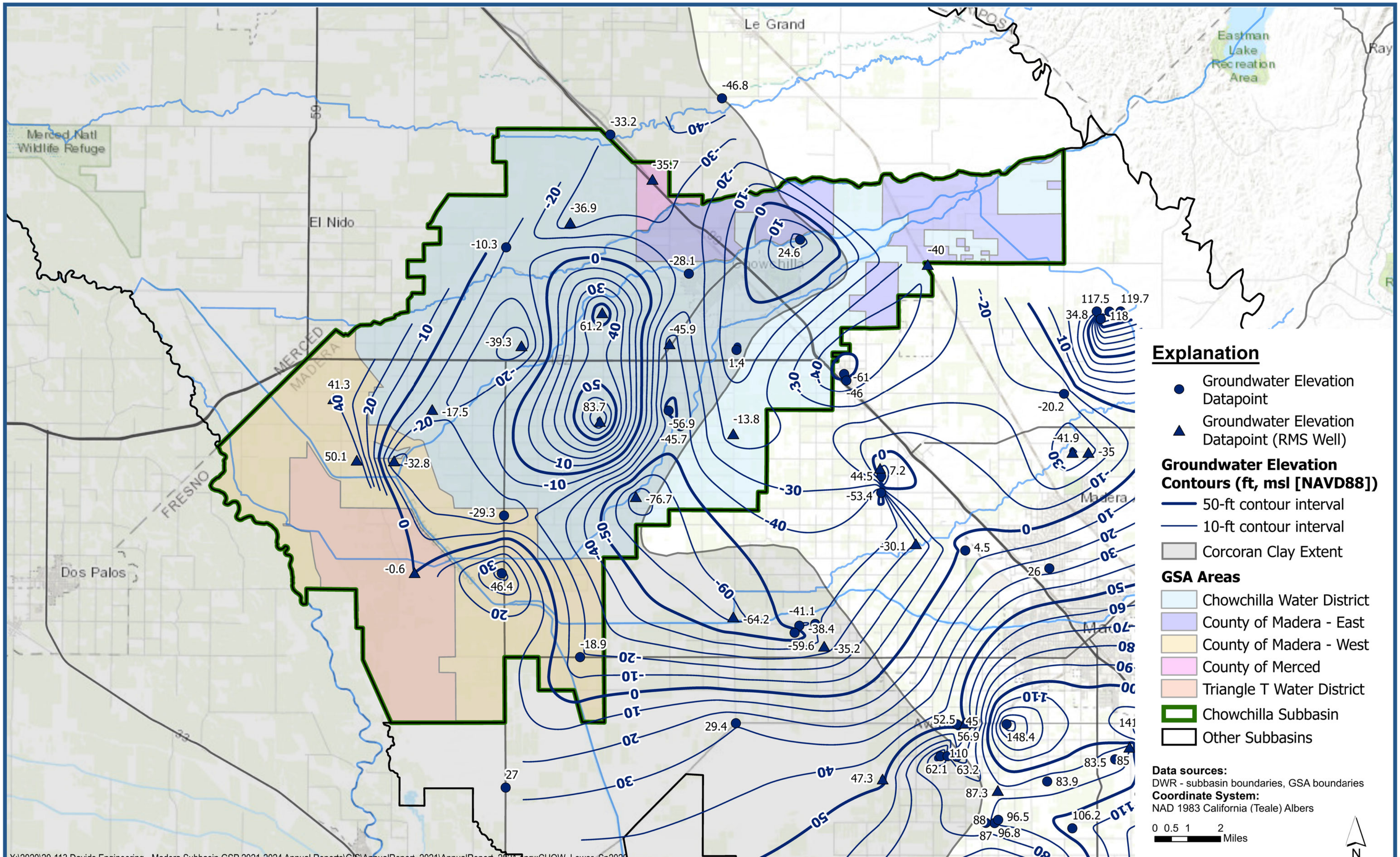
Contours of Equal Groundwater Elevation
Lower Aquifer - Spring 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

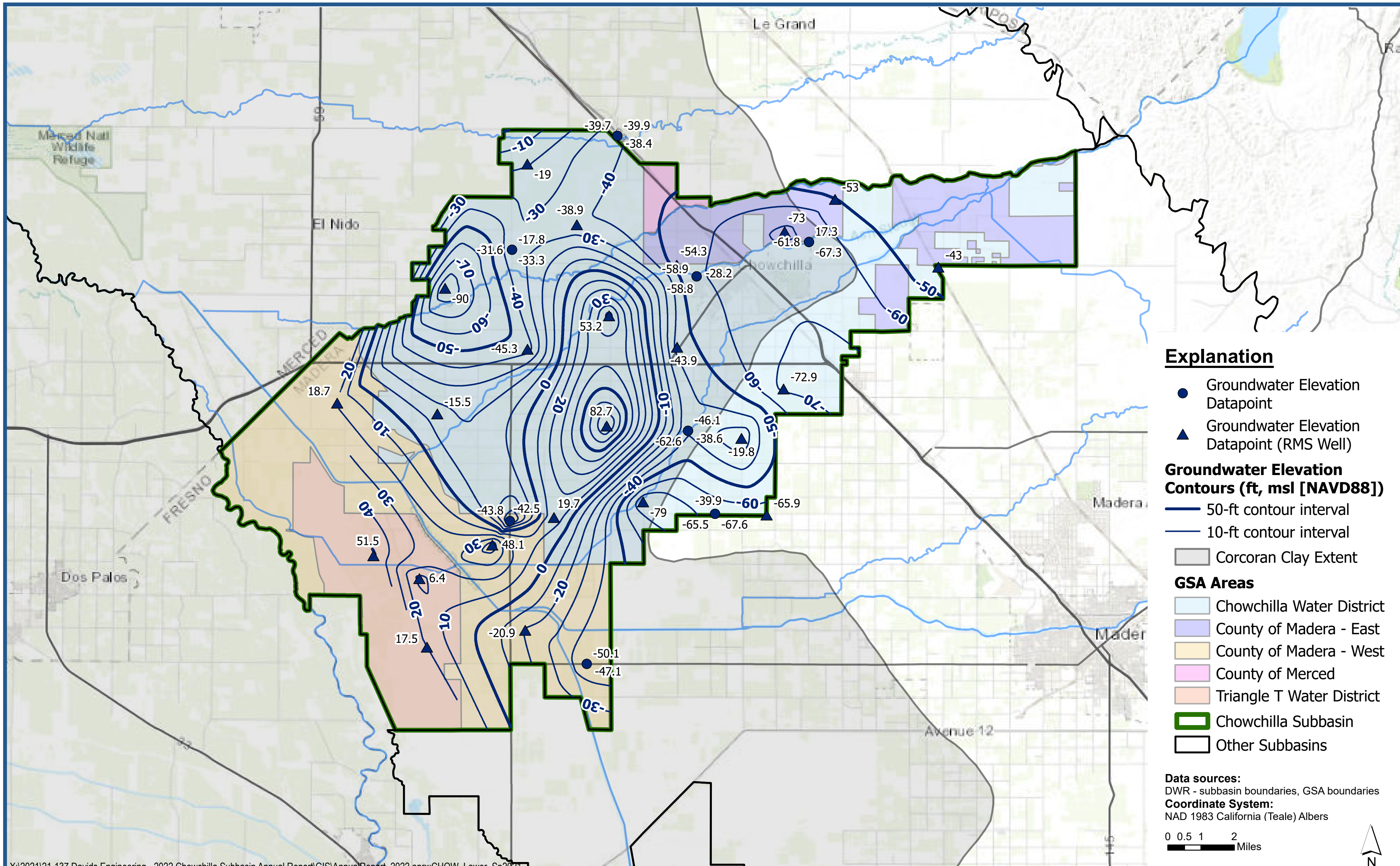
Figure 1-5



Contours of Equal Groundwater Elevation: Lower Aquifer/Undifferentiated Unconfined Zone - Spring 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 1-5



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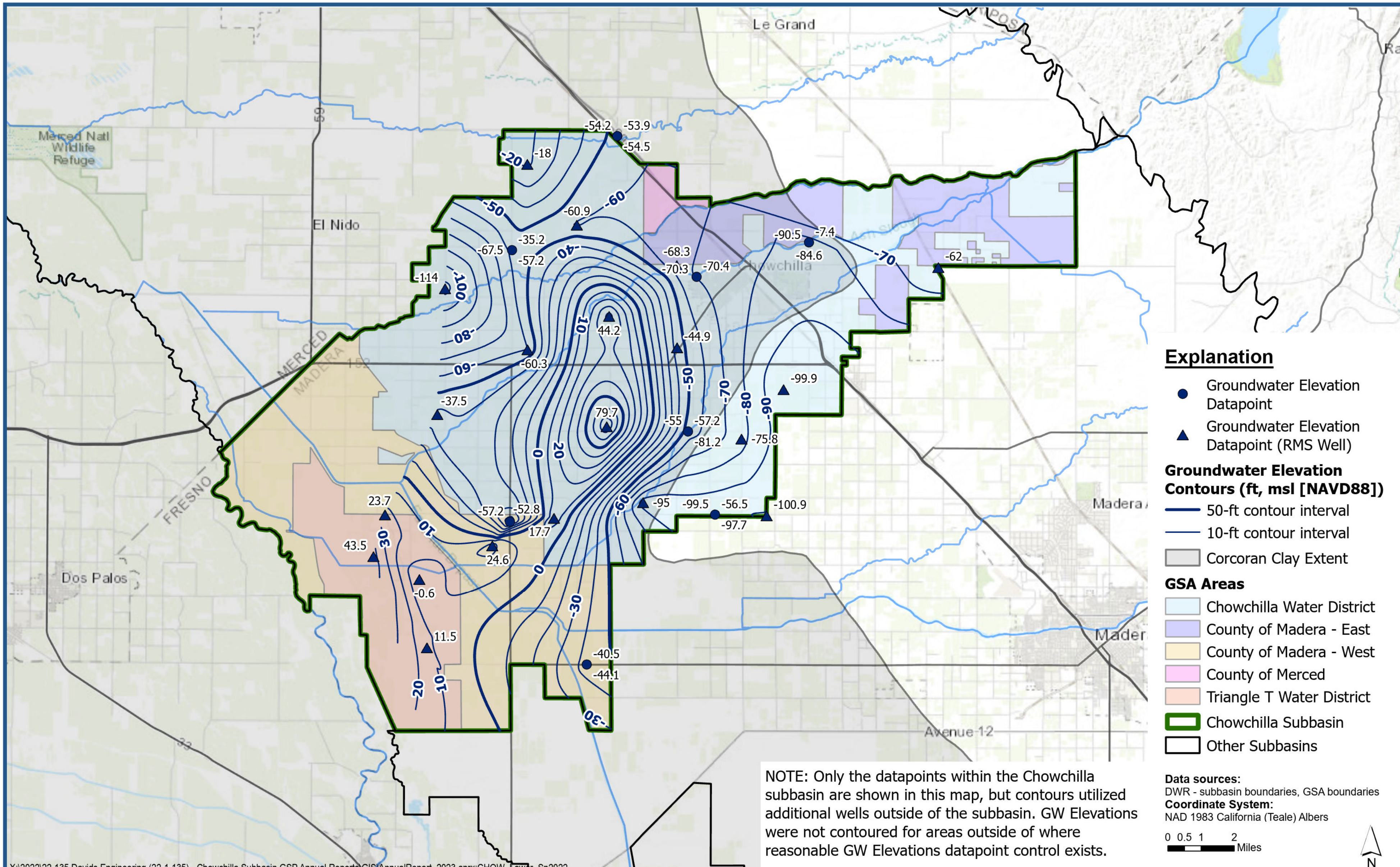
Contours of Equal Groundwater Elevation:
Lower Aquifer/Undifferentiated Unconfined Zone - Spring 2021

Chowchilla Subbasin
Groundwater Sustainability Plan 2022 Annual Report

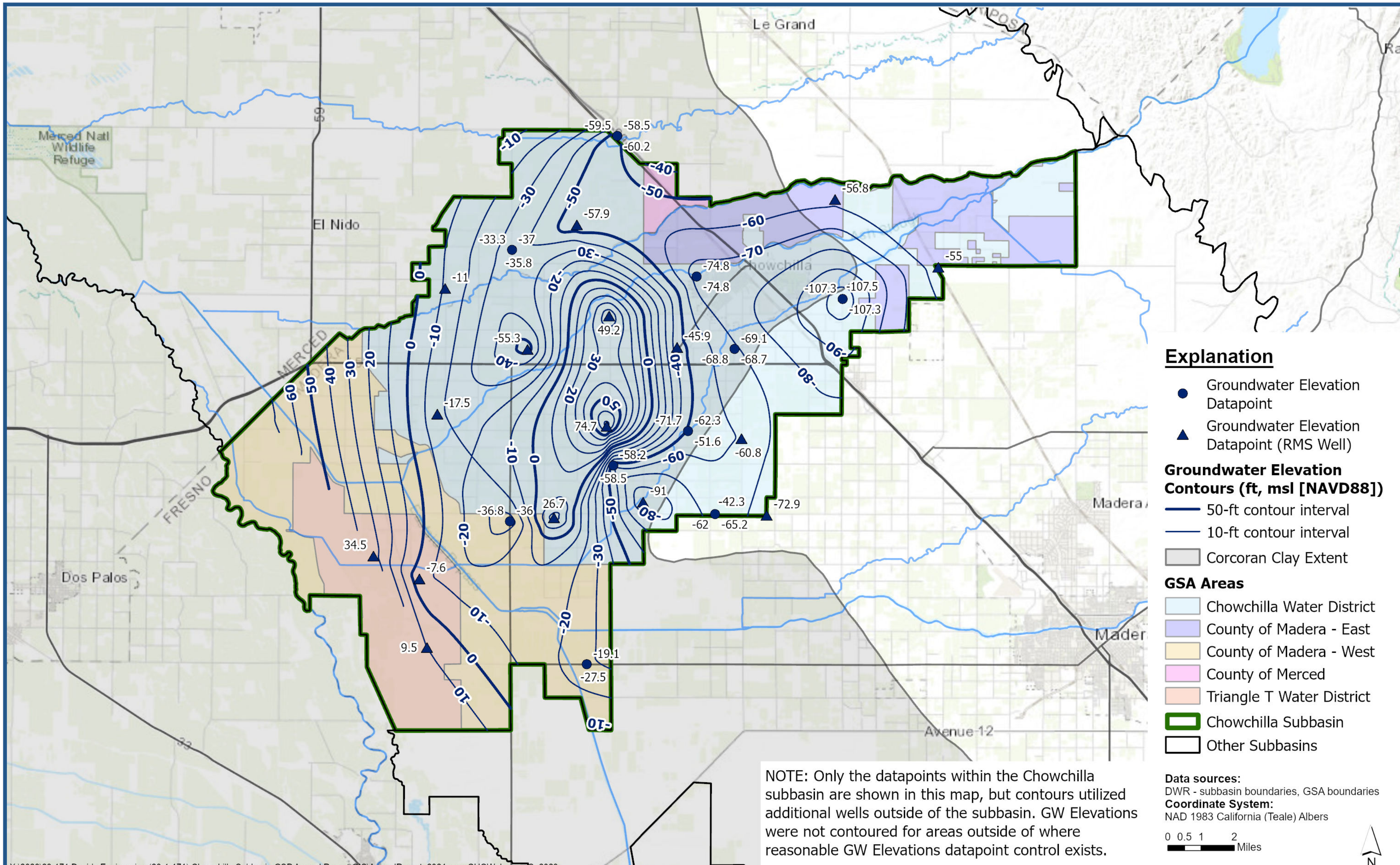
Figure 1-5



Contours of Equal Groundwater Elevation:
Lower Aquifer/Undifferentiated Unconfined Zone - Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 1-5



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Contours of Equal Groundwater Elevation: Lower Aquifer/Undifferentiated Unconfined Zone - Spring 2023

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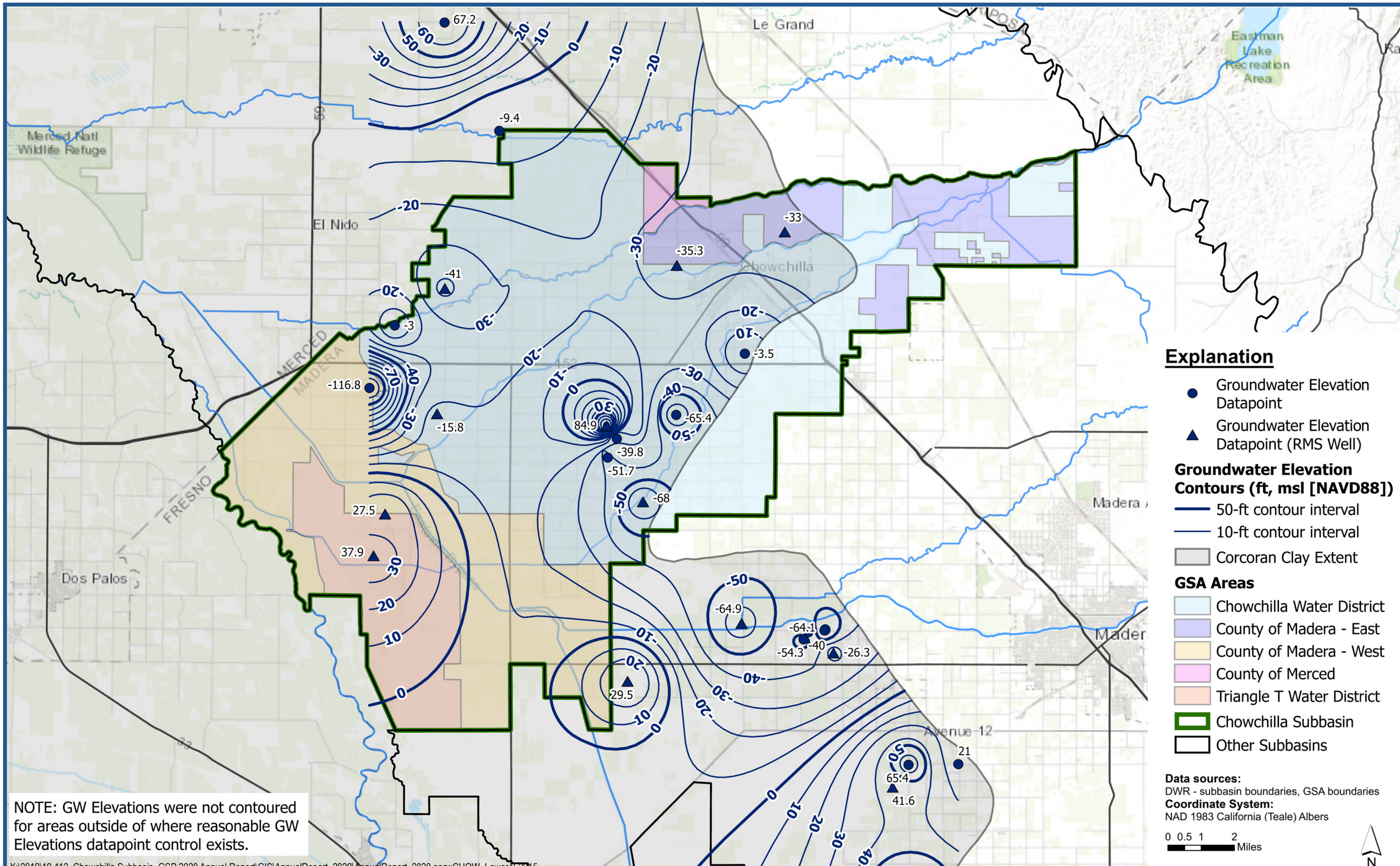
Groundwater Sustainability Plan 2024 Annual Report

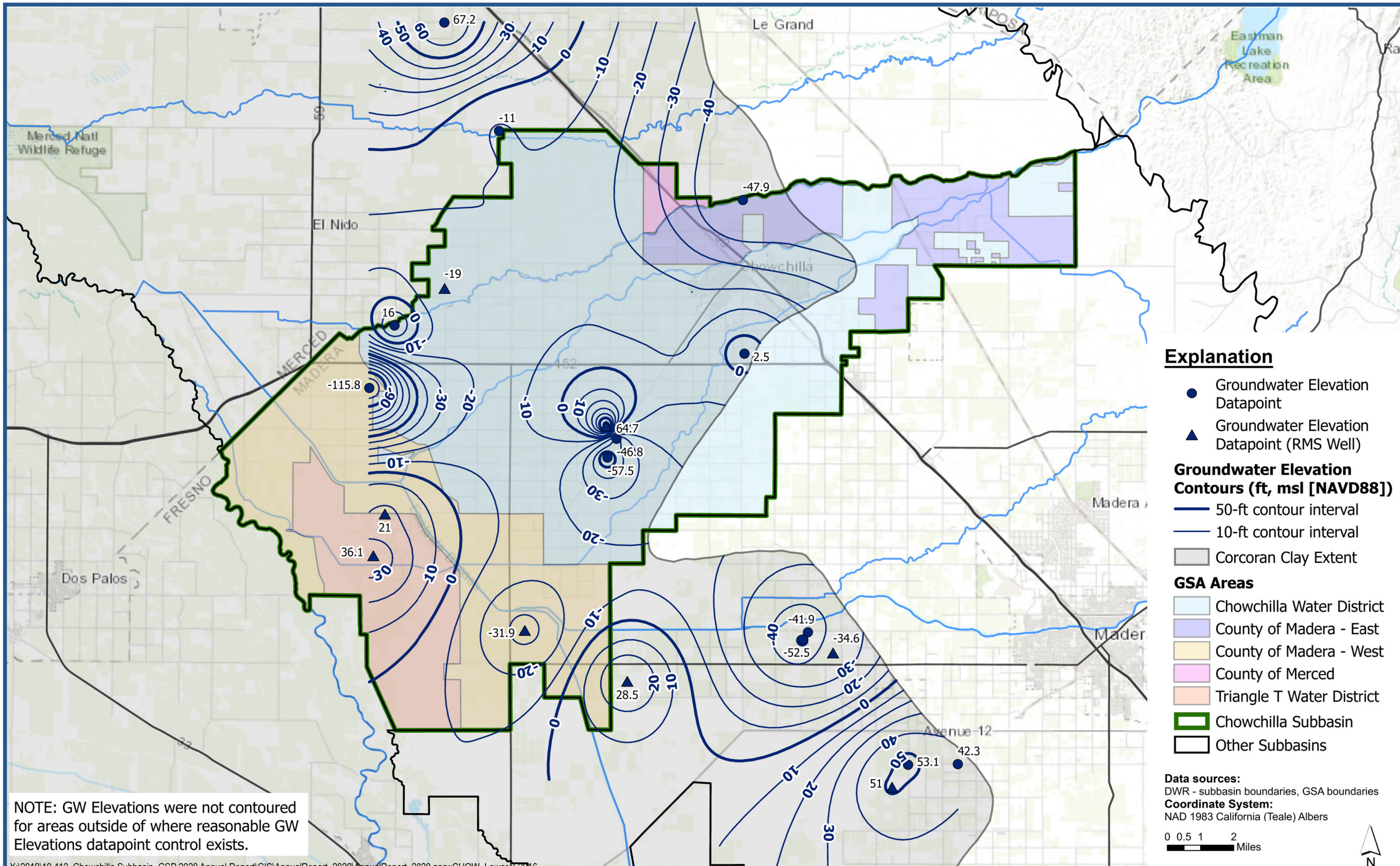
Figure 1-5



Contours of Equal Groundwater Elevation
Lower Aquifer - Fall 2015

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-11



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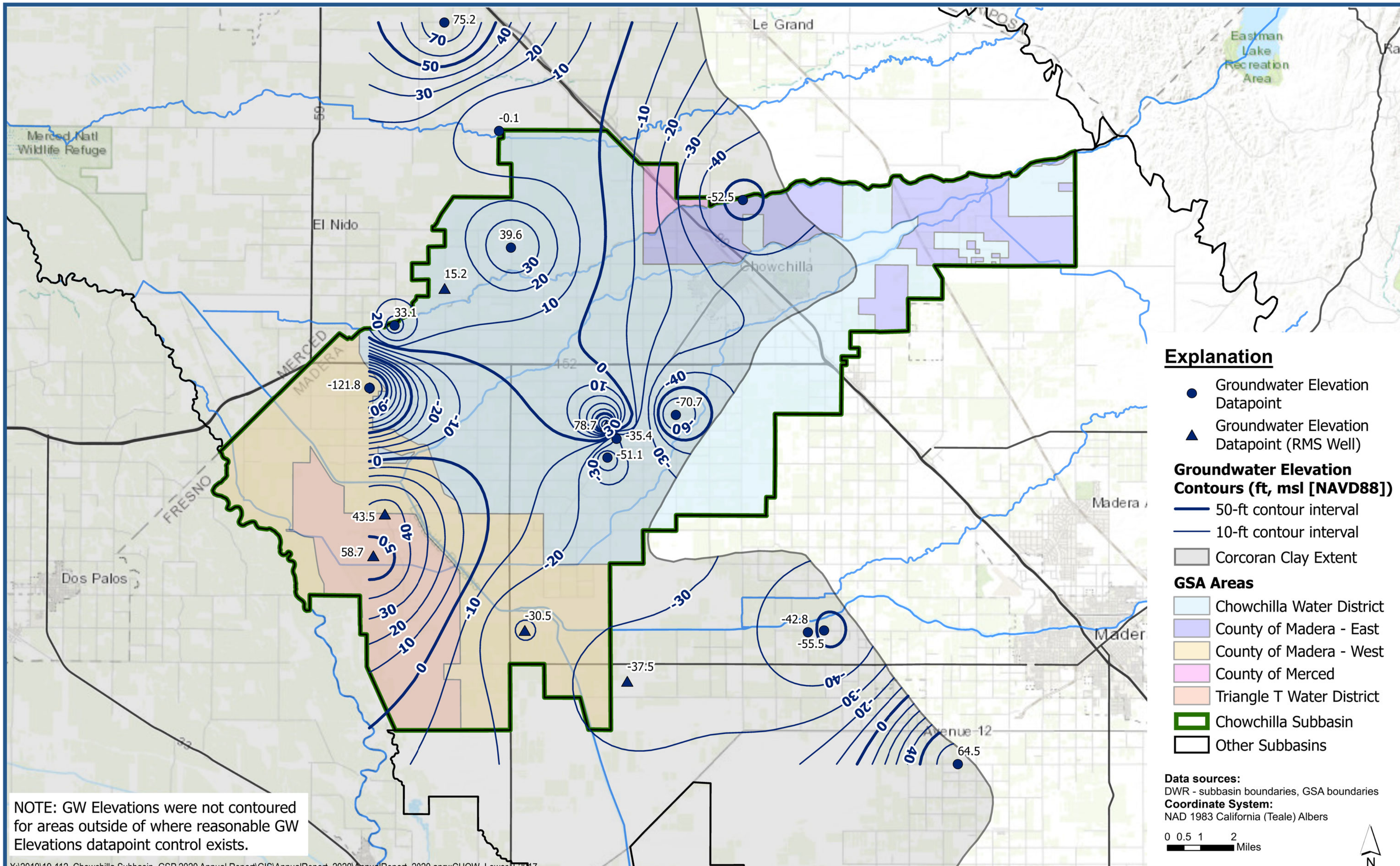
Contours of Equal Groundwater Elevation
Lower Aquifer - Fall 2016

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-12



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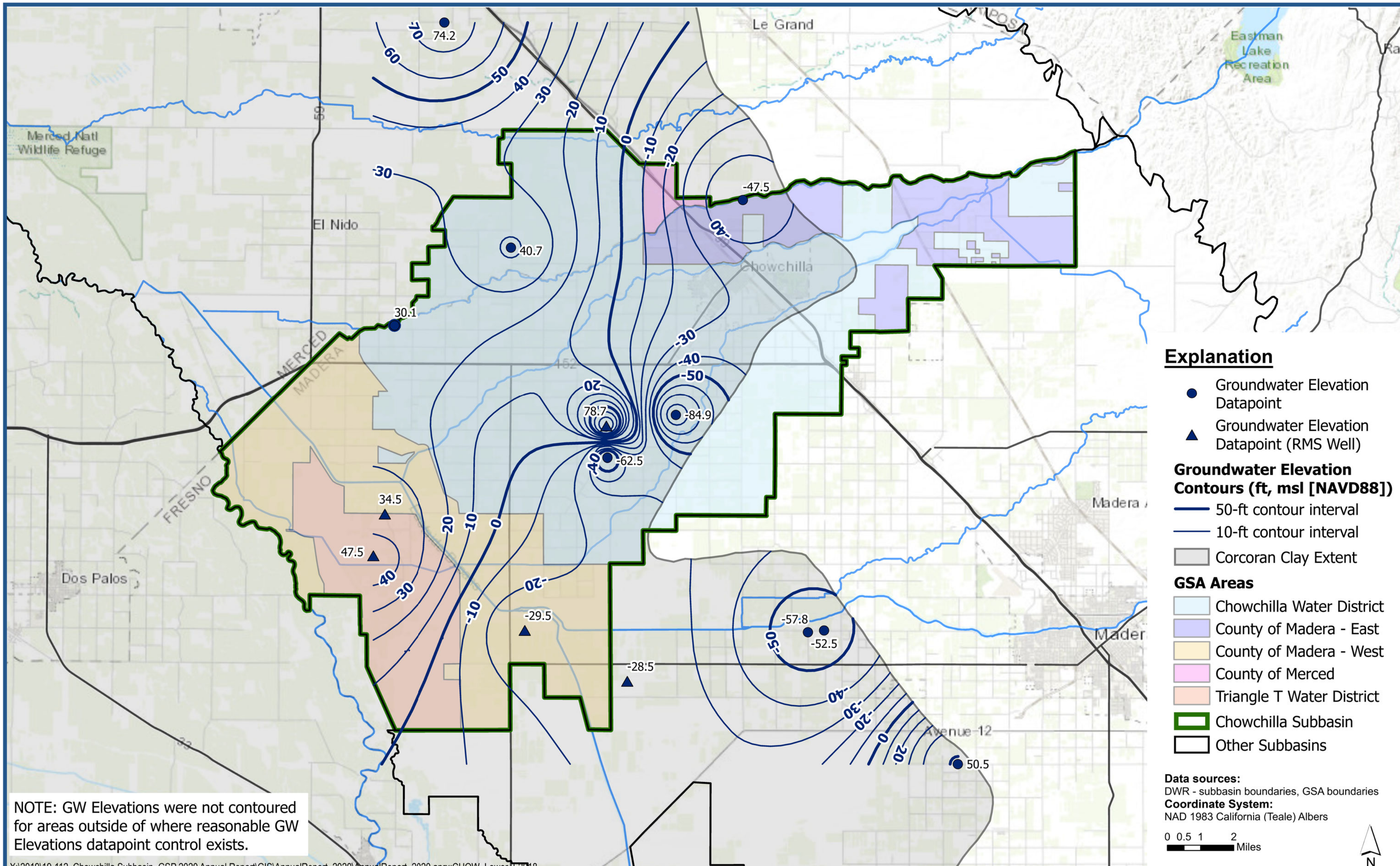
Contours of Equal Groundwater Elevation
Lower Aquifer - Fall 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-13



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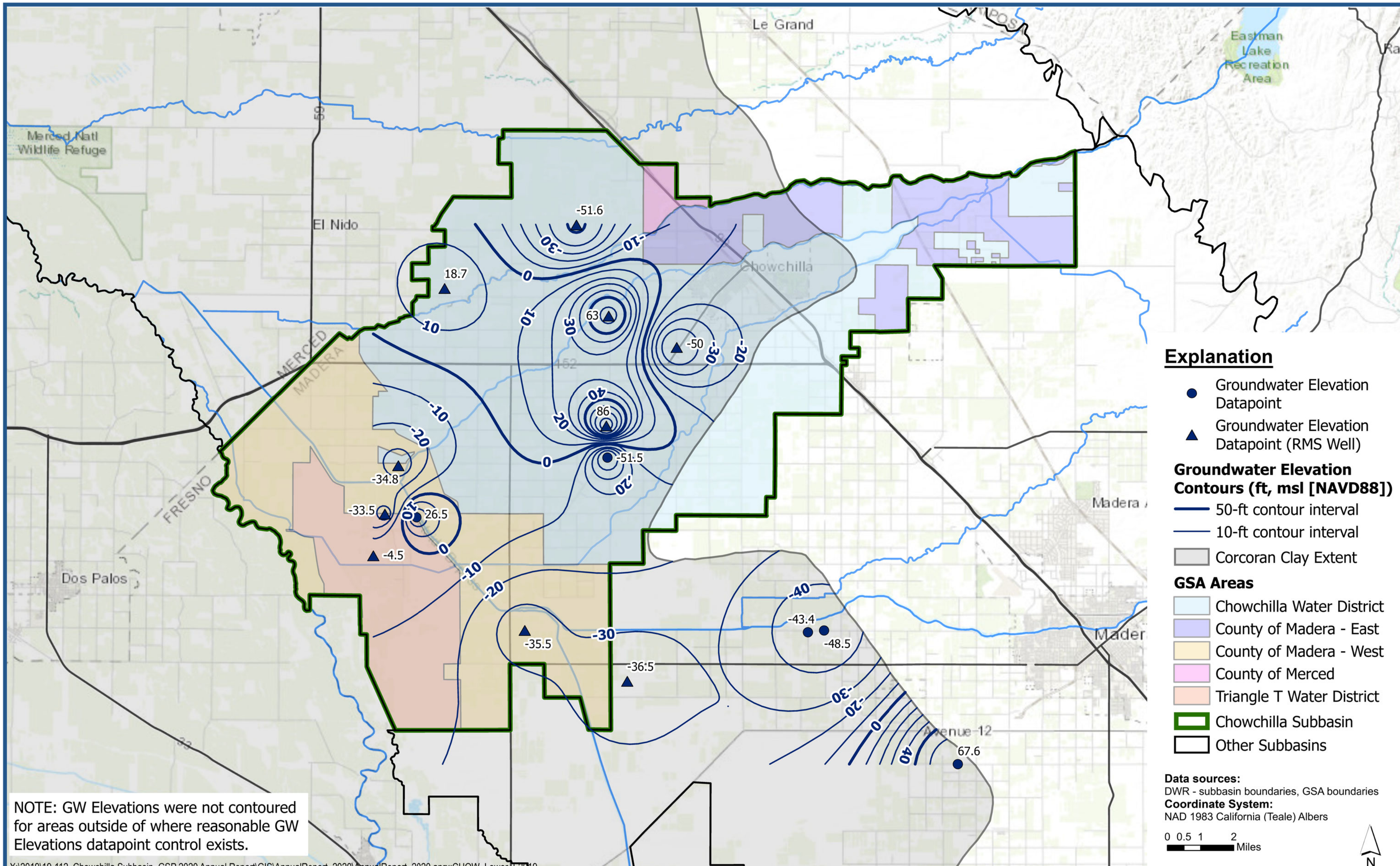
Contours of Equal Groundwater Elevation
Lower Aquifer - Fall 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure A-14



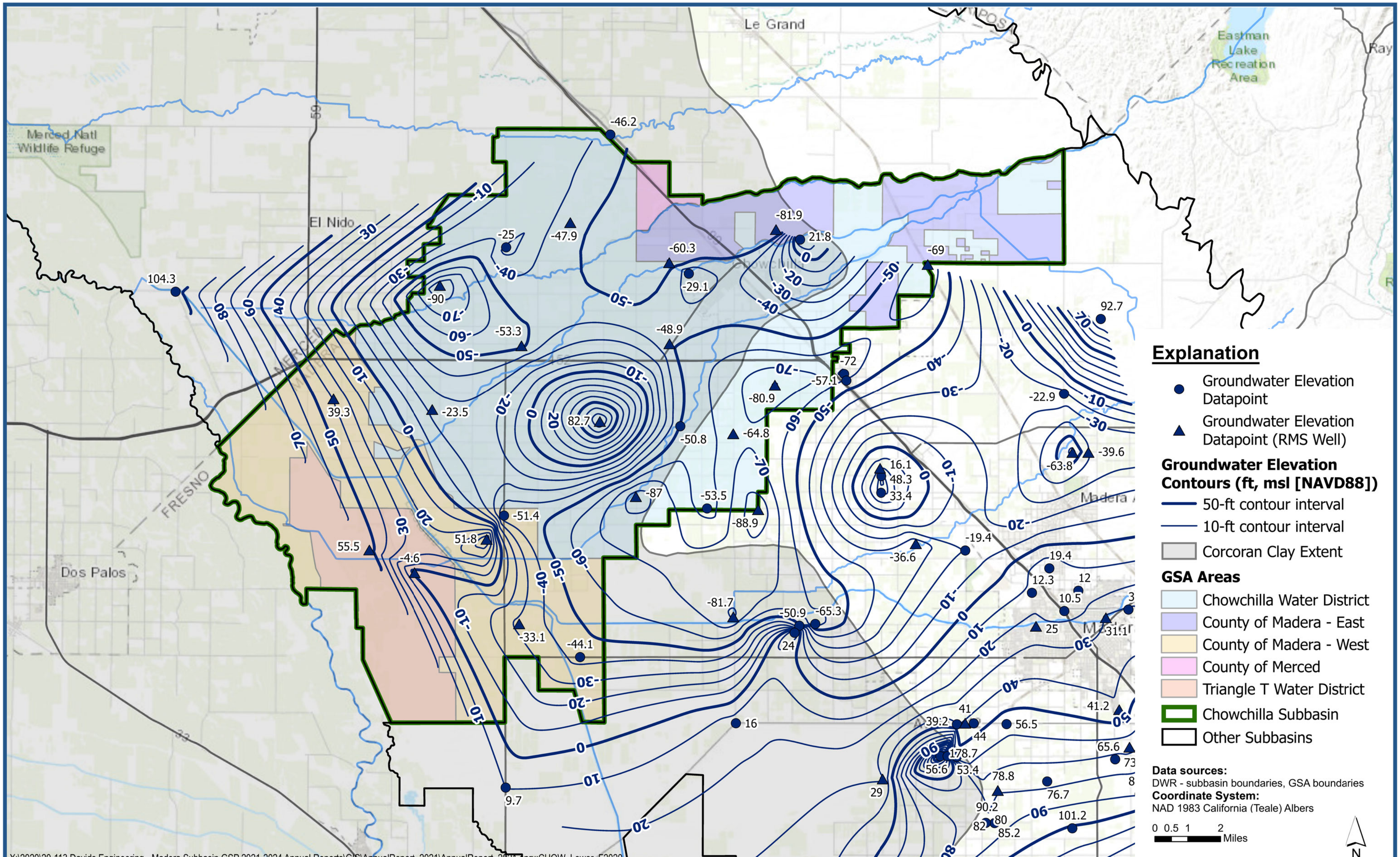
DAVIDS ENGINEERING, INC

Luhdorff & Scalmanini Consulting Engineers

Contours of Equal Groundwater Elevation
Lower Aquifer - Fall 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure 1-6



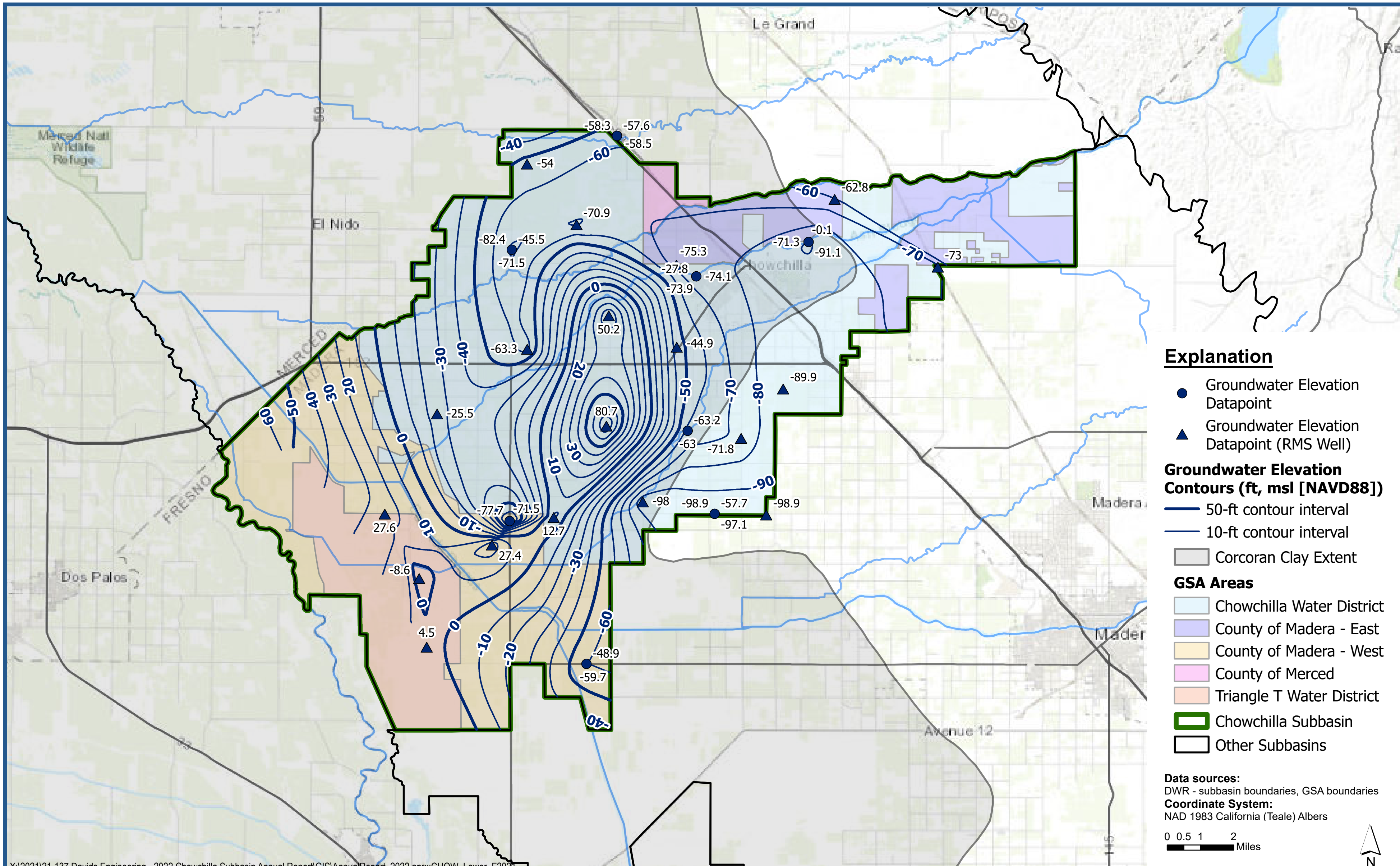
DAVIDS ENGINEERING, INC

Luhdorff & Scalmanini Consulting Engineers

Contours of Equal Groundwater Elevation:
Lower Aquifer/Undifferentiated Unconfined Zone - Fall 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 1-6



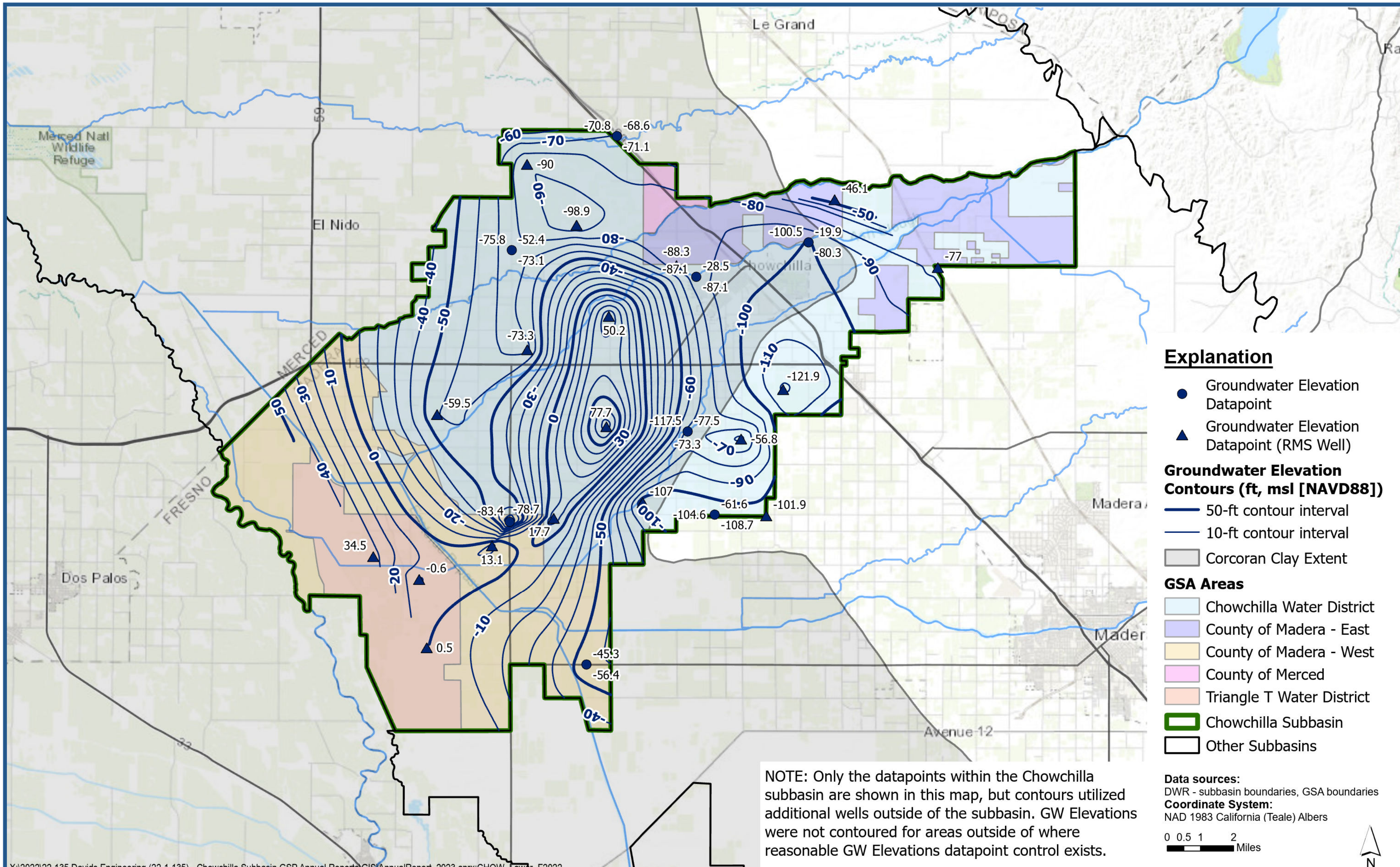
DAVIDS ENGINEERING, INC

Luhdorff & Scalmanini Consulting Engineers

Contours of Equal Groundwater Elevation:
Lower Aquifer/Undifferentiated Unconfined Zone - Fall 2021

Chowchilla Subbasin
Groundwater Sustainability Plan 2022 Annual Report

Figure 1-6

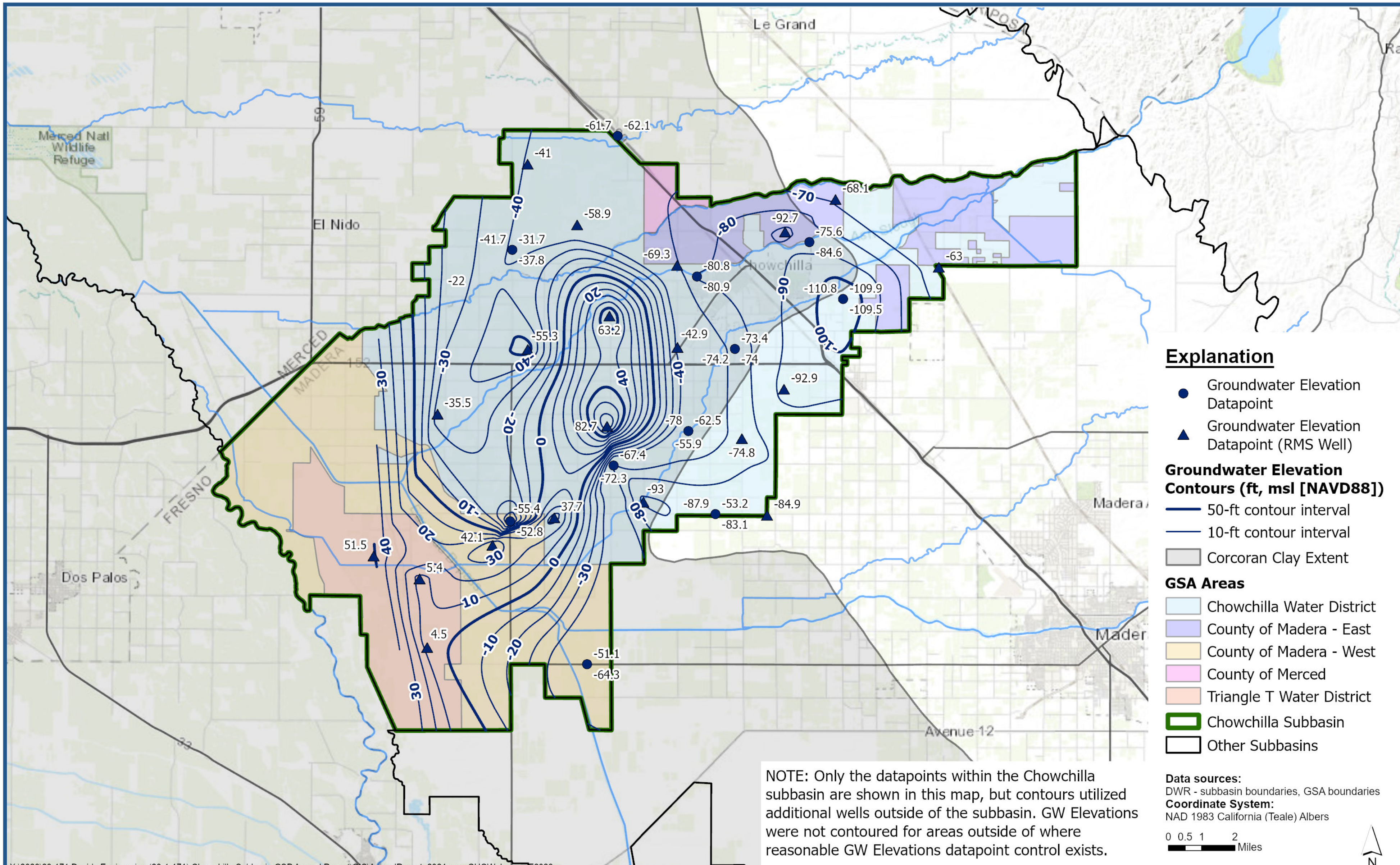


DAVIDS ENGINEERING, INC
Luhdorff & Scalmanini Consulting Engineers

Contours of Equal Groundwater Elevation: Lower Aquifer/Undifferentiated Unconfined Zone - Fall 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 1-6



DAVIDS ENGINEERING, INC

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Contours of Equal Groundwater Elevation: Lower Aquifer/Undifferentiated Unconfined Zone - Fall 2023

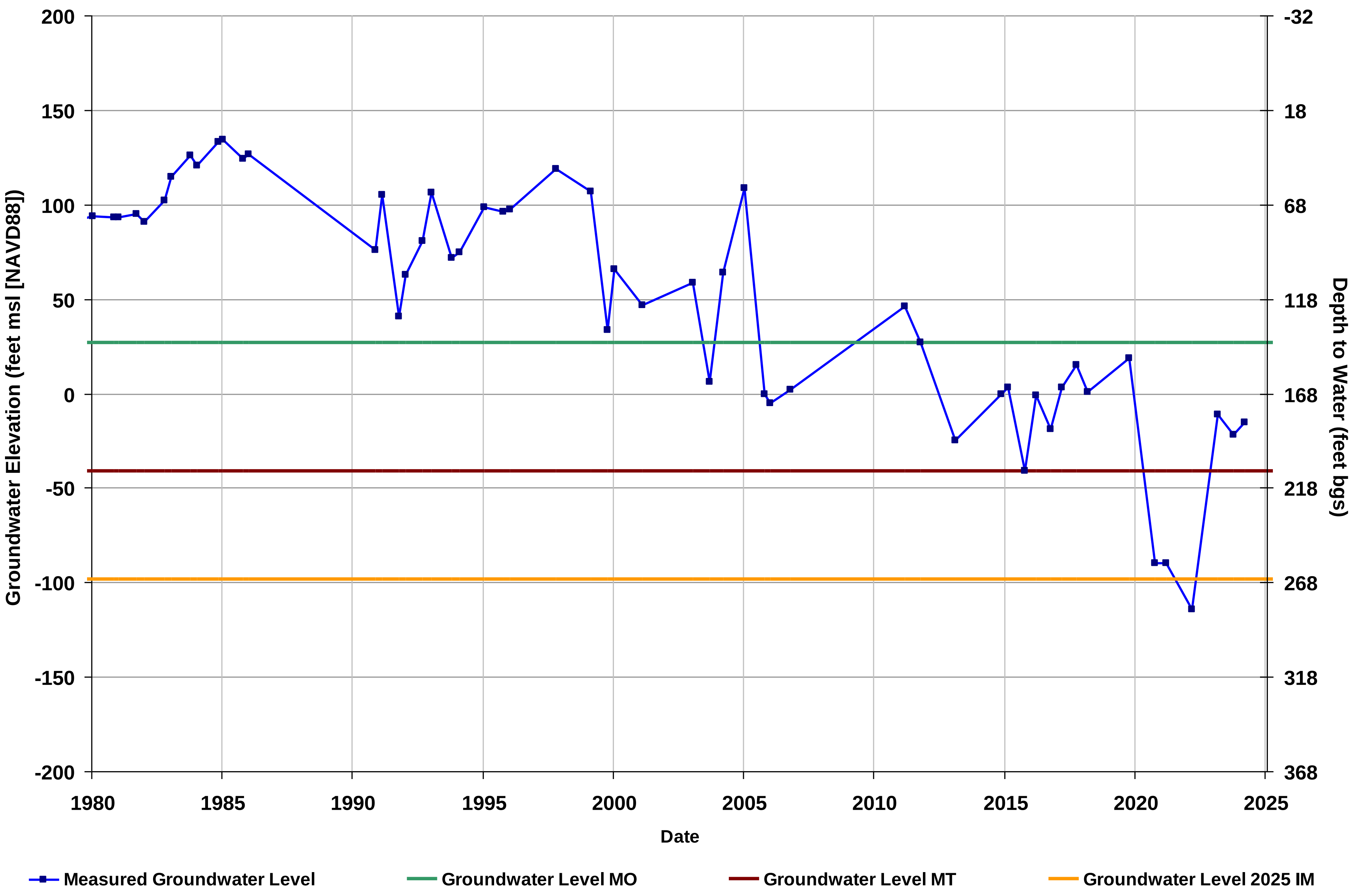
Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

Figure 1-6

Appendix B. Hydrographs of Time-Series Groundwater Level Data for Groundwater Level RMS Wells.

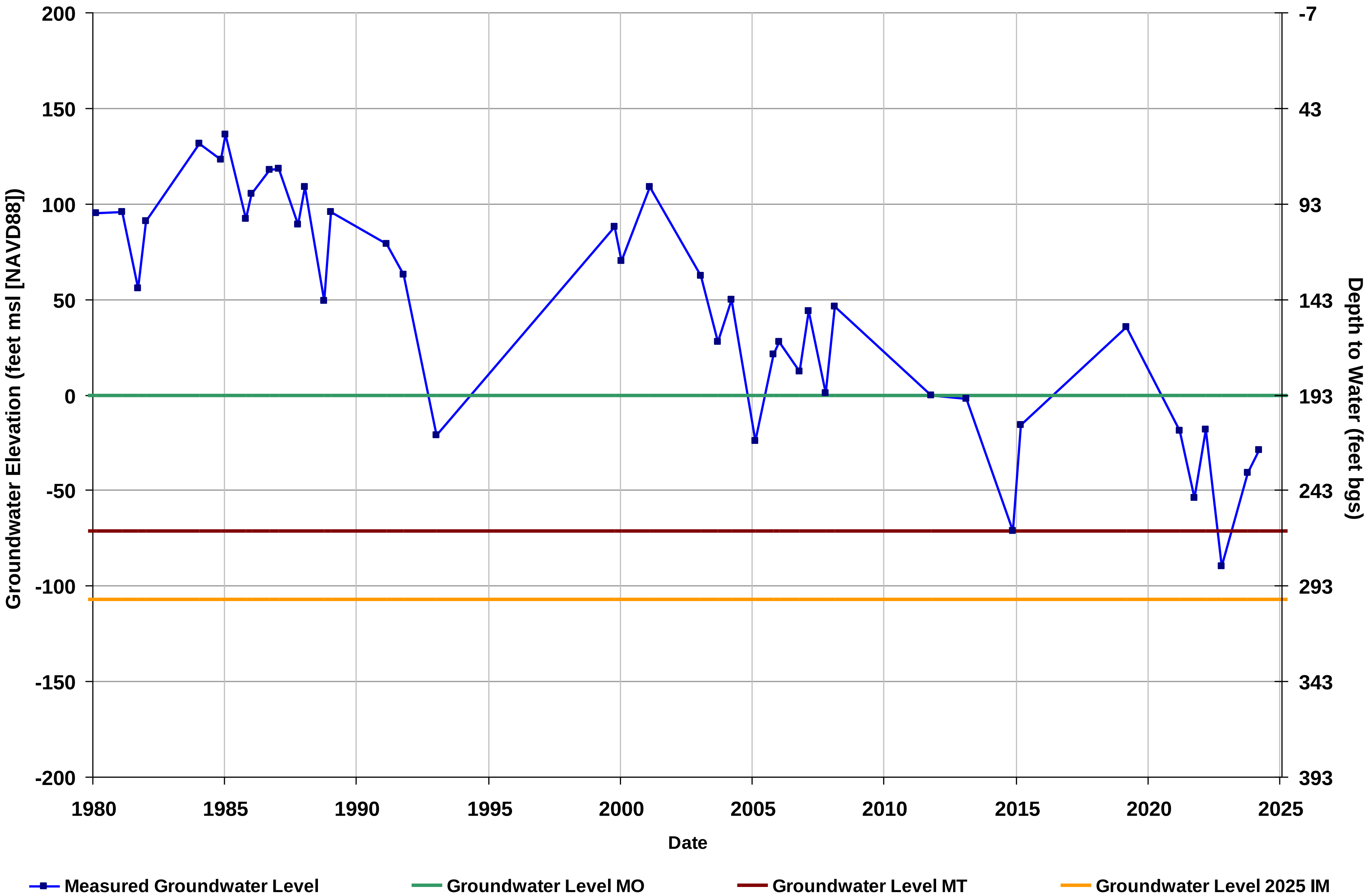
Well Name: CWD RMS-1
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 275
Perf. Top (ft bgs): 160
Perf. Bottom (ft bgs): 275
GSE (ft, msl): 171



Well Name: CWD RMS-2
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 780
Perf. Top (ft bgs): 230
Perf. Bottom (ft bgs): 775
GSE (ft, msl): 193

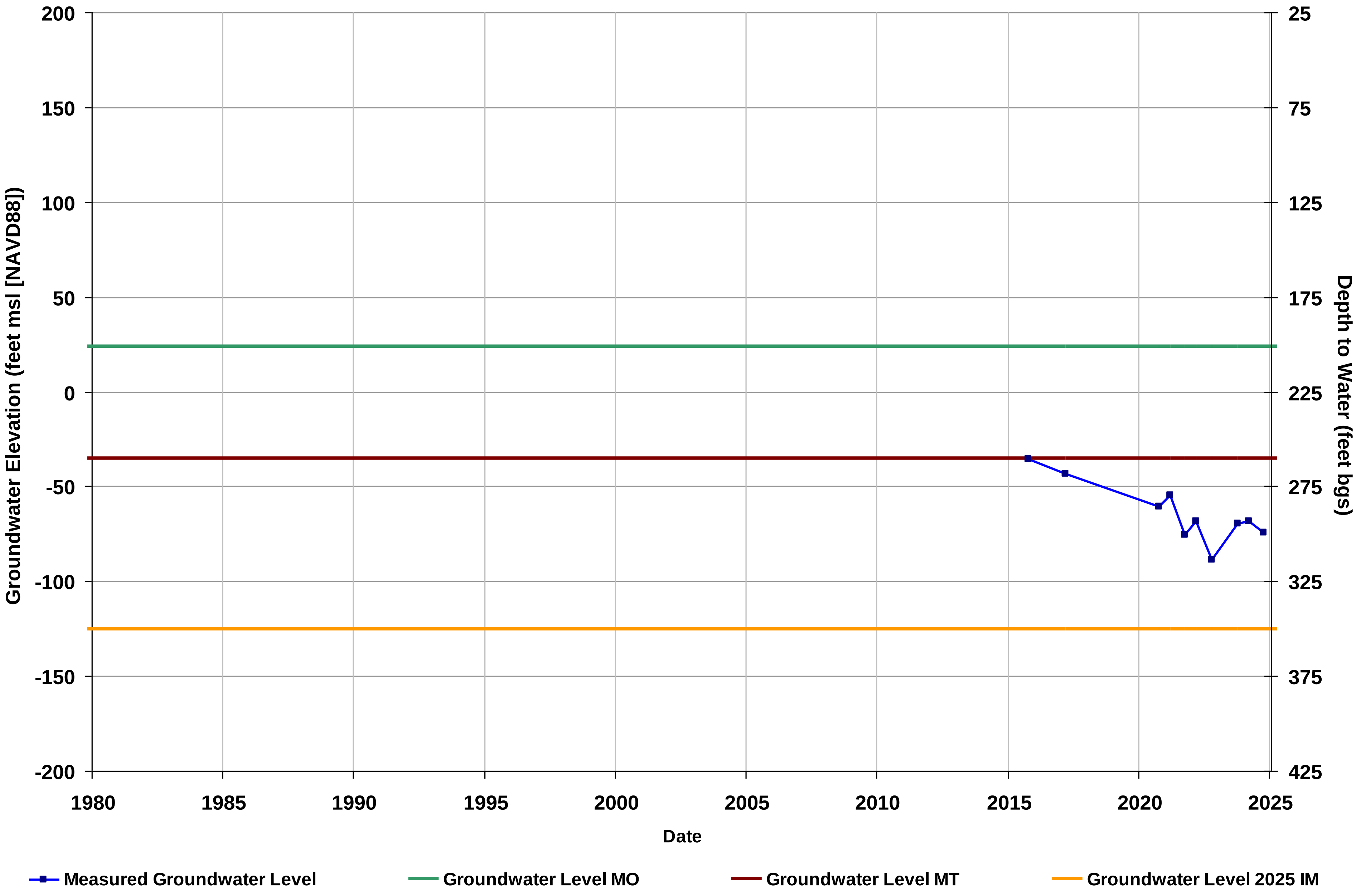


Well Name: CWD RMS-3
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 206

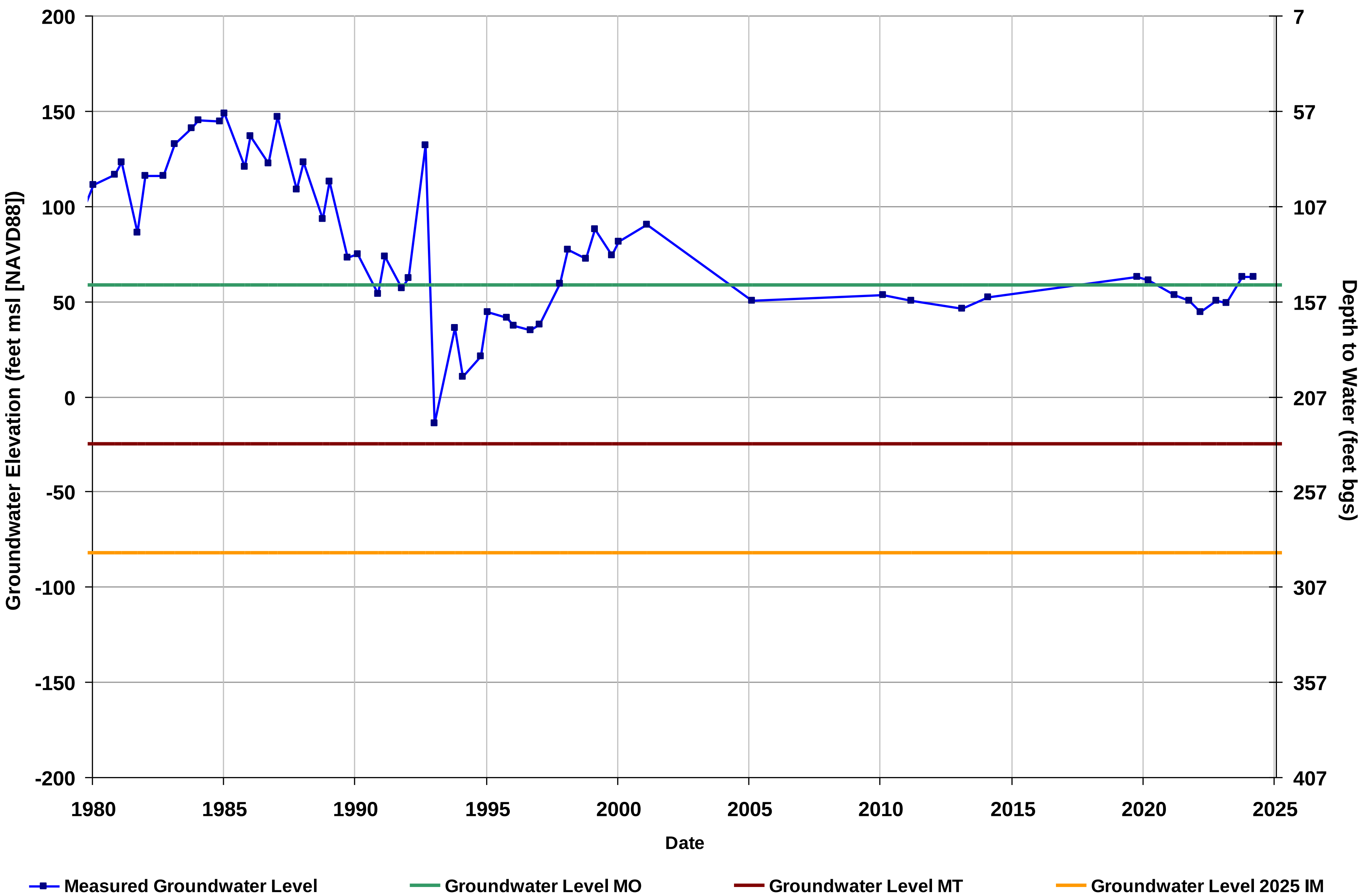
Well Name: CWD RMS-4
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 800
Perf. Top (ft bgs): 320
Perf. Bottom (ft bgs): 800
GSE (ft, msl): 225



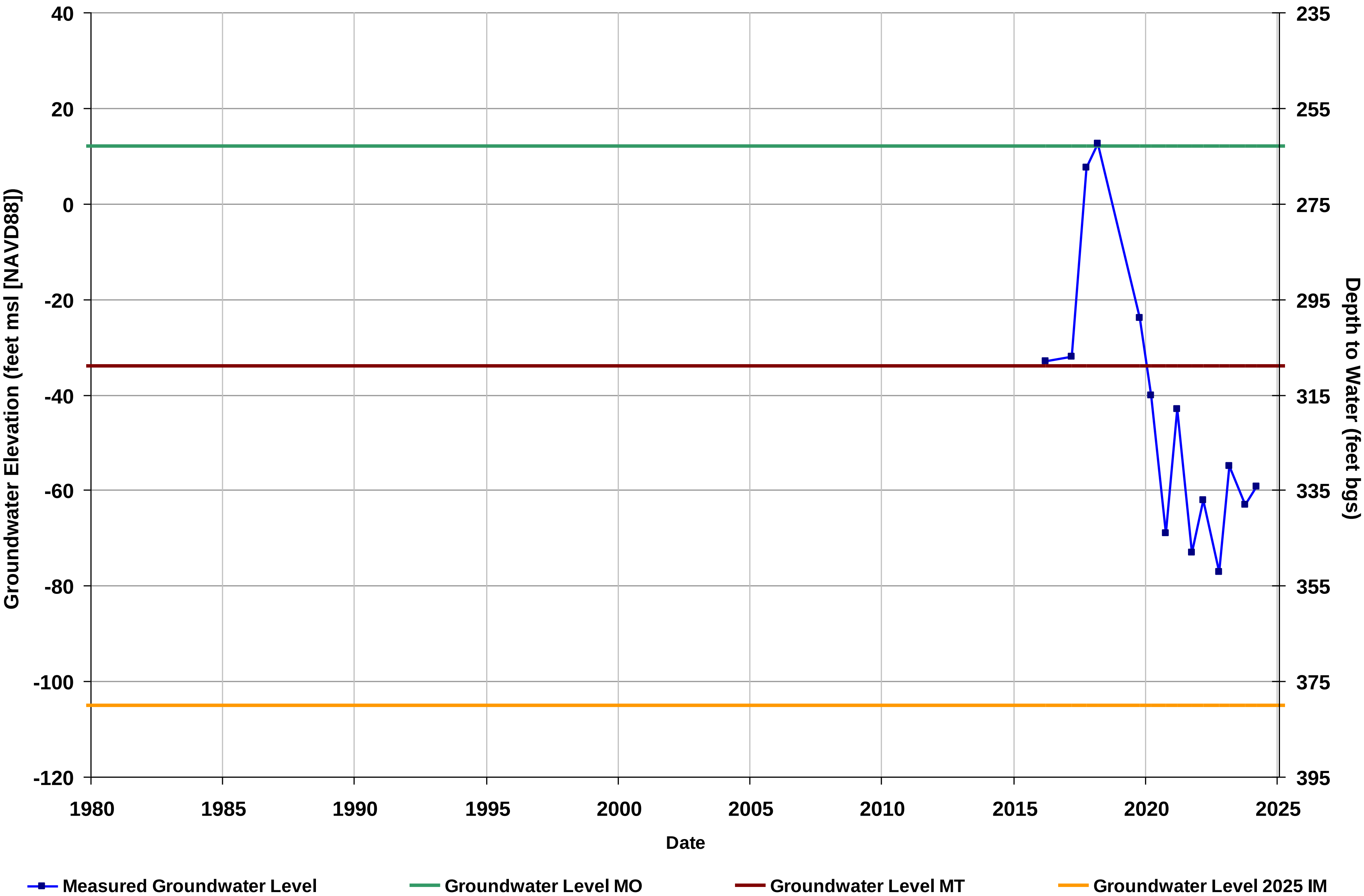
Well Name: CWD RMS-5
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 207



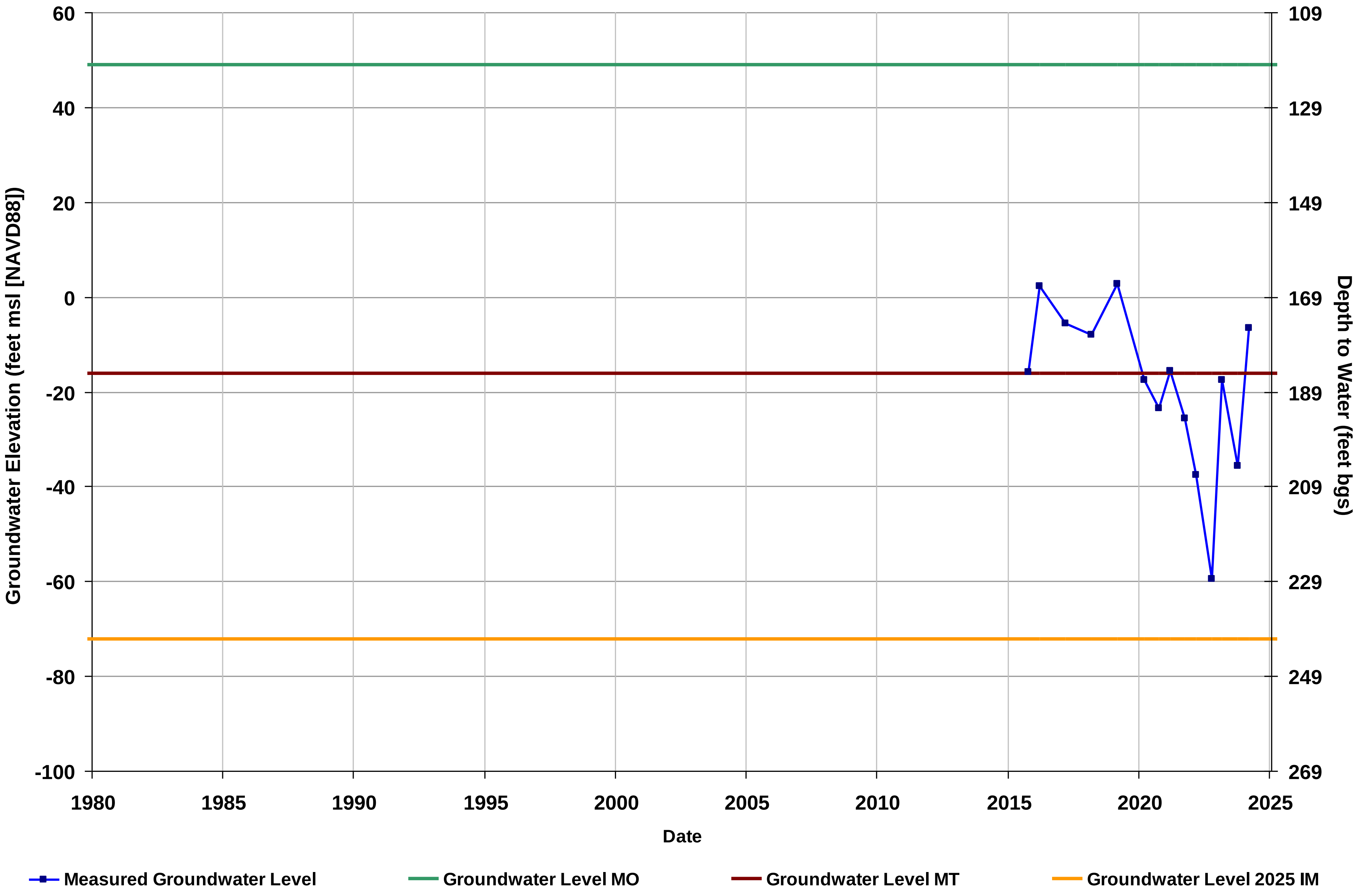
Well Name: CWD RMS-6
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 820
Perf. Top (ft bgs): 257
Perf. Bottom (ft bgs): 726
GSE (ft, msl): 275



Well Name: CWD RMS-7
Depth Zone: Composite
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 330
Perf. Top (ft bgs): 135
Perf. Bottom (ft bgs): 288
GSE (ft, msl): 169

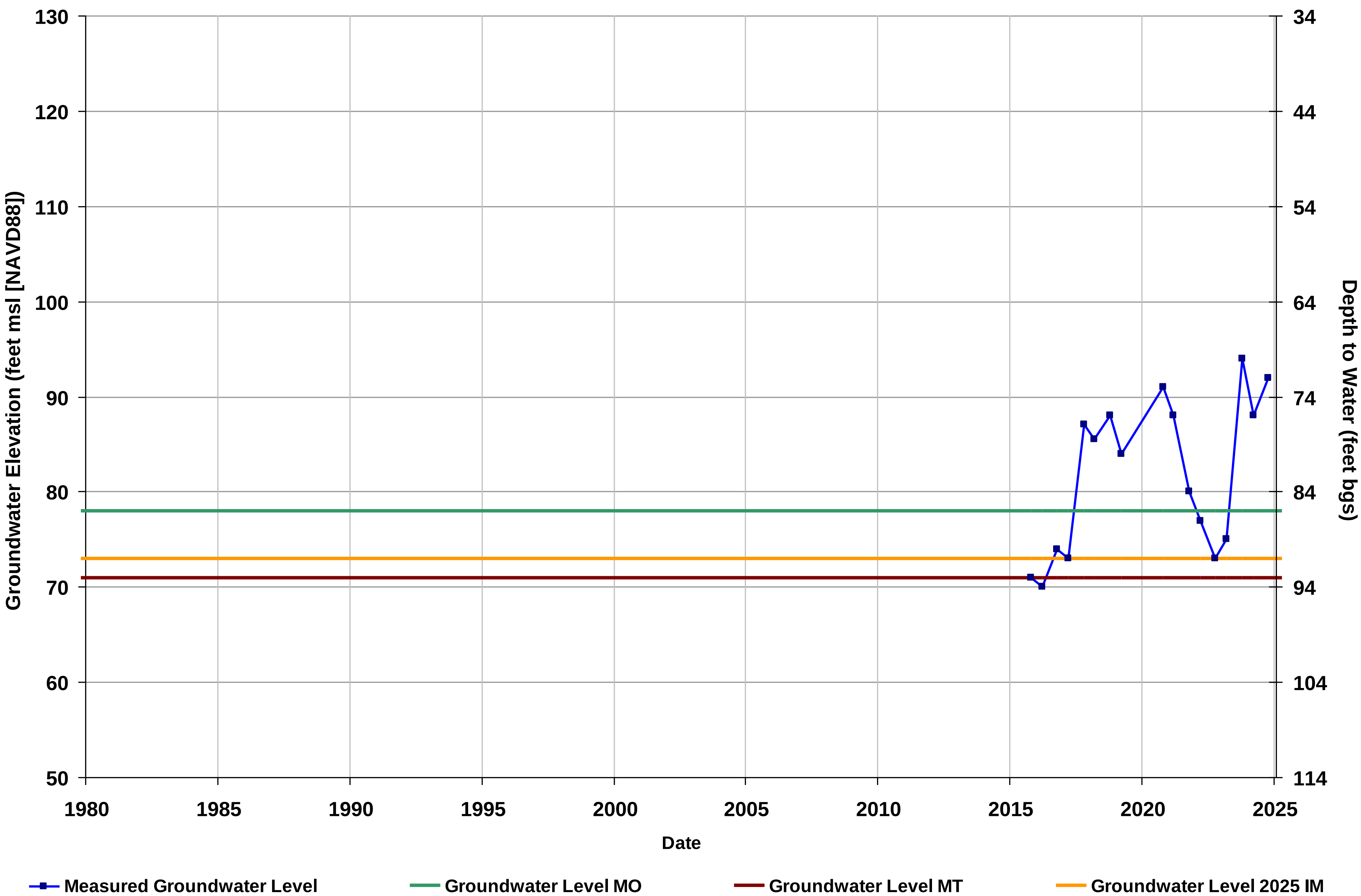


Well Name: CWD RMS-8
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 219

Well Name: CWD RMS-9
Depth Zone: Upper
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 97
Perf. Top (ft bgs): 82
Perf. Bottom (ft bgs): 97
GSE (ft, msl): 164

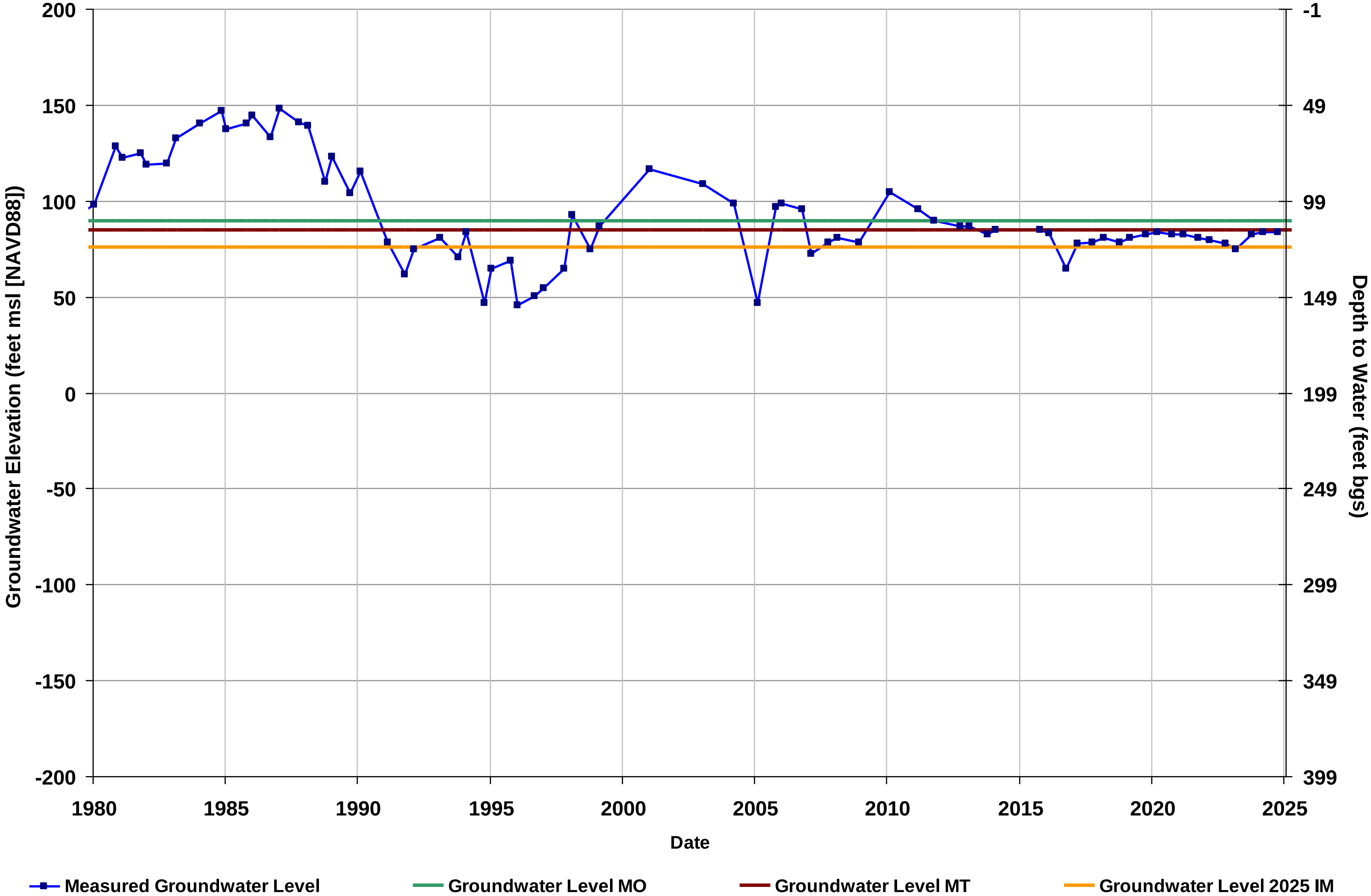


Well Name: CWD RMS-10
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 182

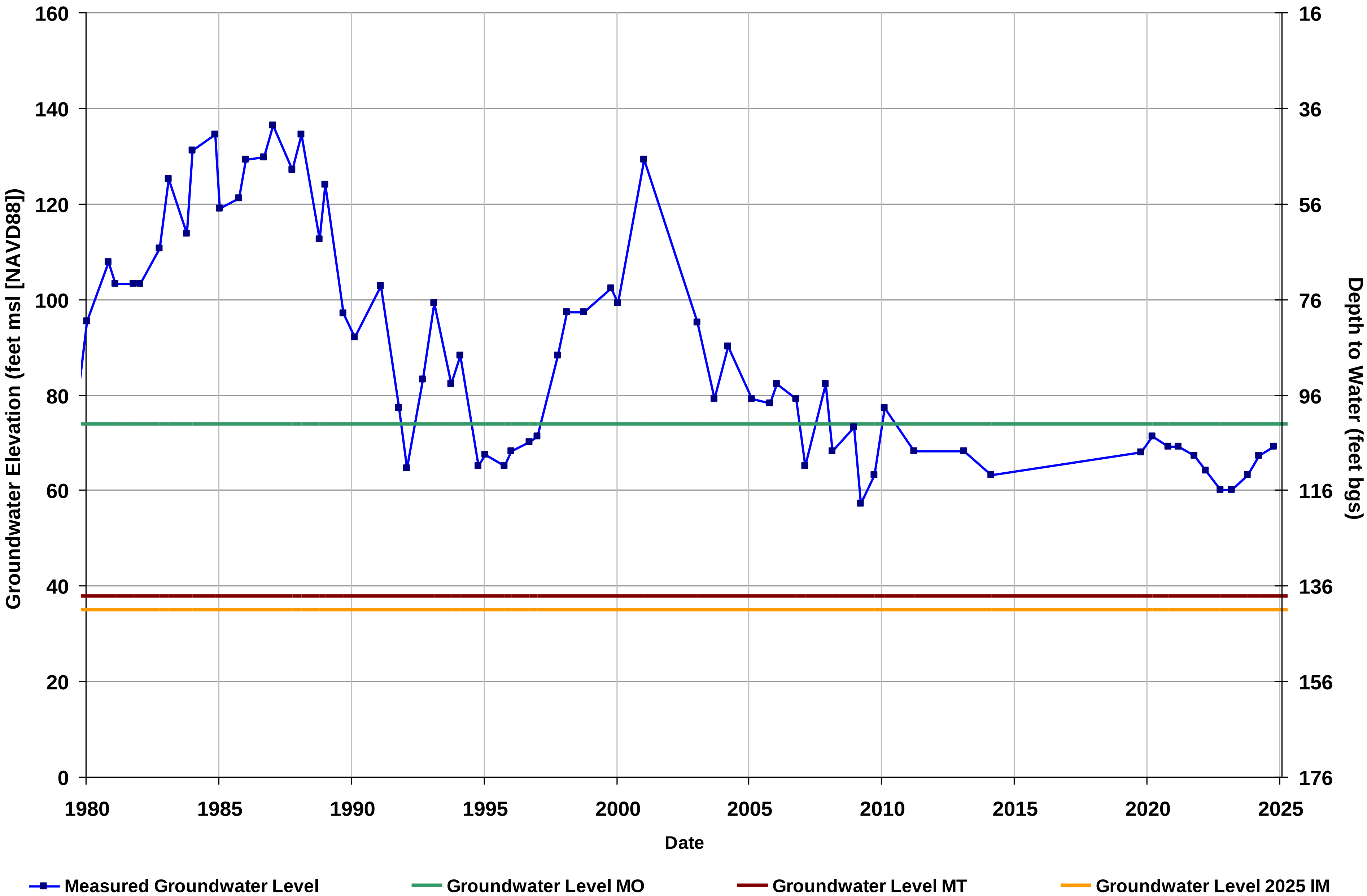
Well Name: CWD RMS-11
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 529
Perf. Top (ft bgs): 187
Perf. Bottom (ft bgs): 529
GSE (ft, msl): 199



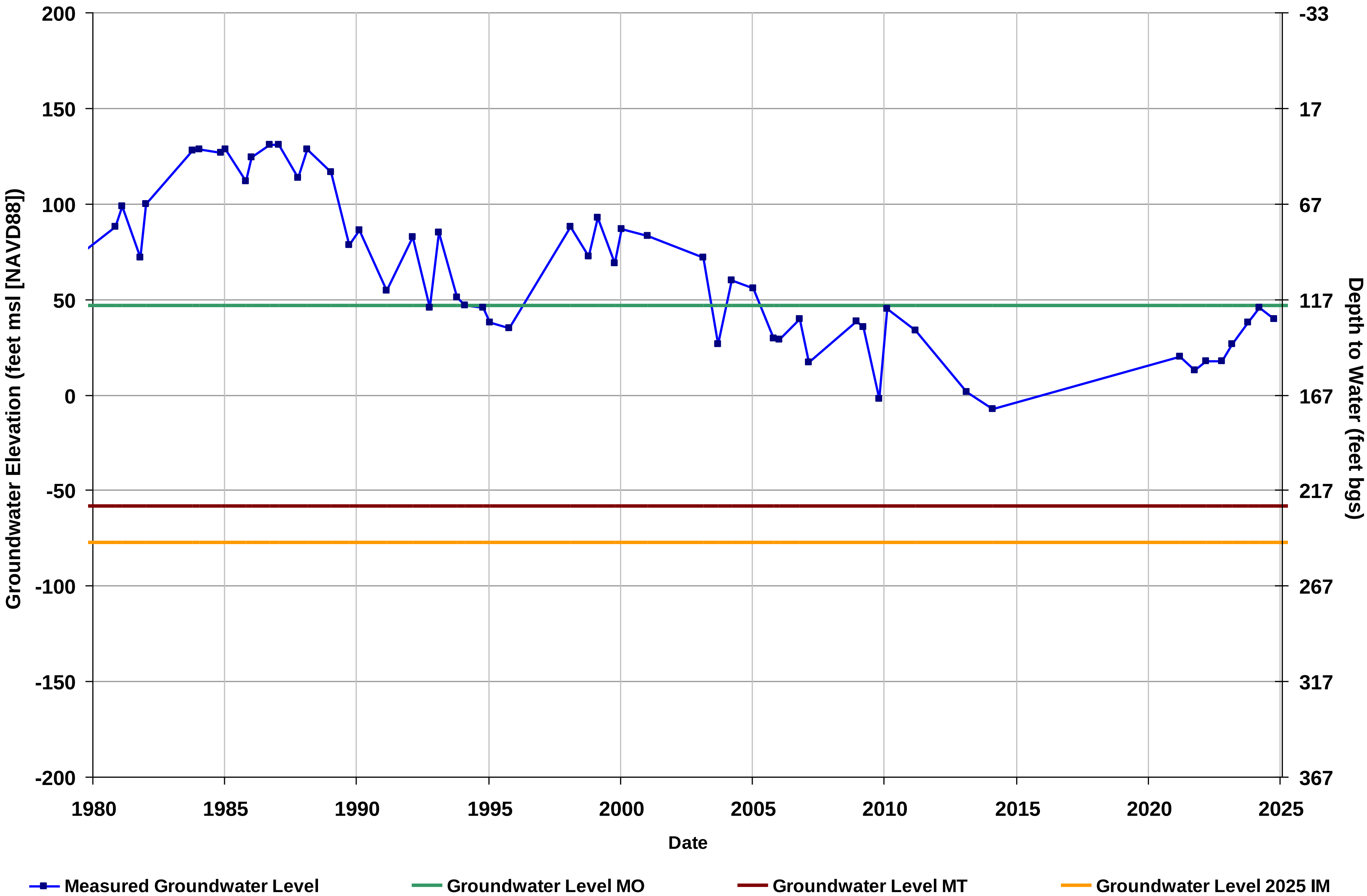
Well Name: CWD RMS-12
Depth Zone: Upper
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 176



Well Name: CWD RMS-13
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 167

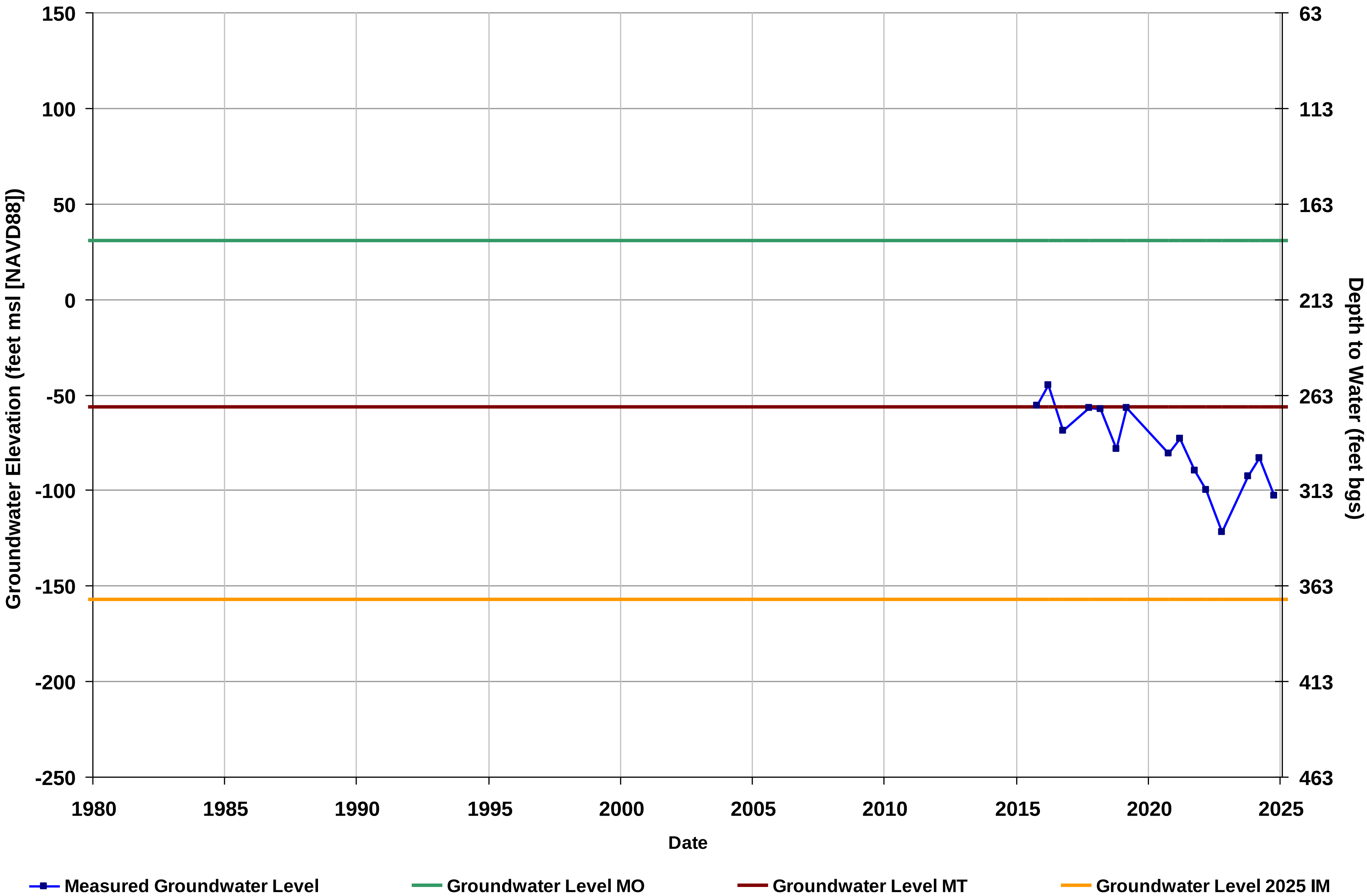


Well Name: CWD RMS-14
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 455
Perf. Top (ft bgs): 185
Perf. Bottom (ft bgs): 365
GSE (ft, msl): 152

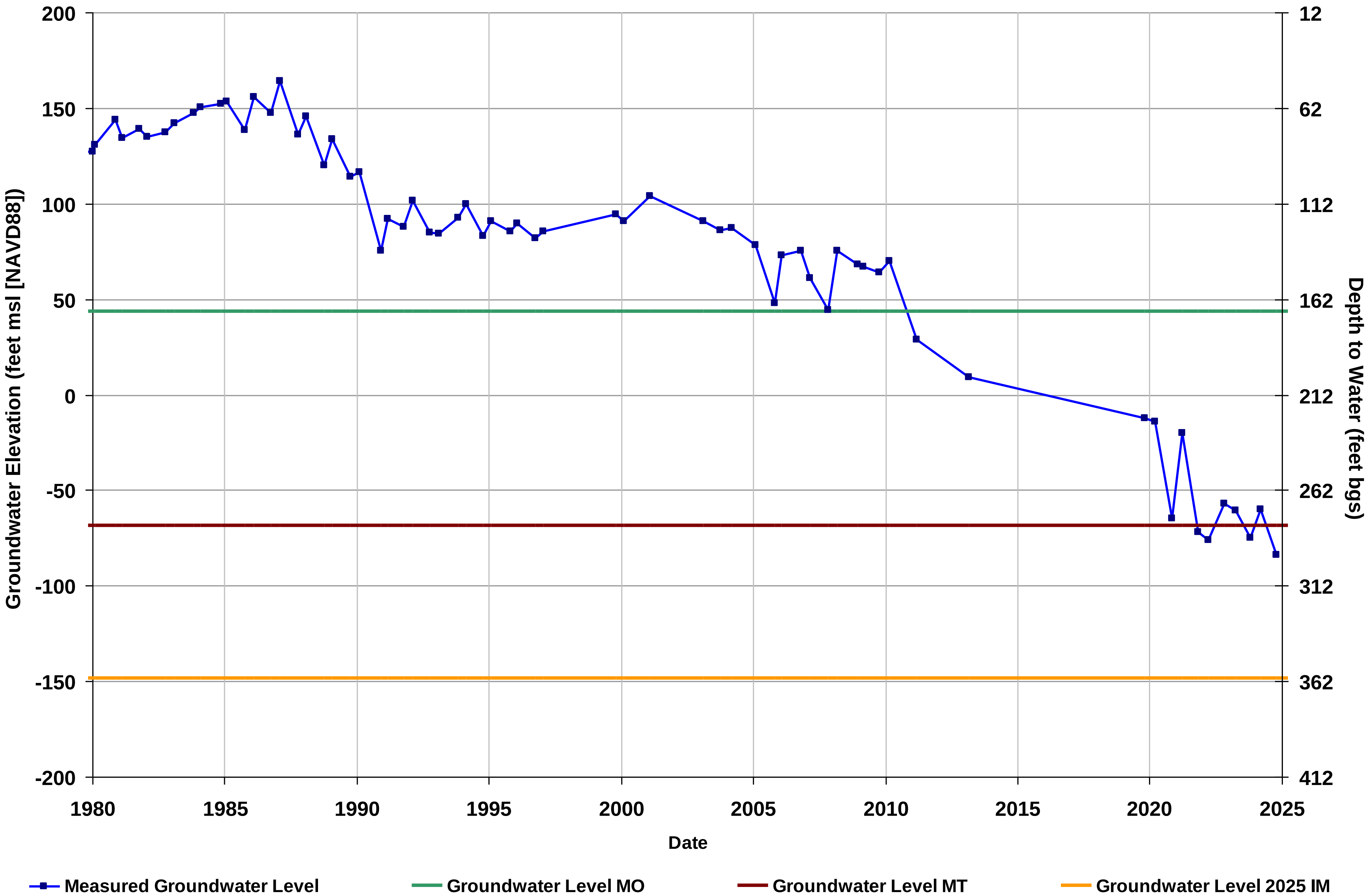
Well Name: CWD RMS-15
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 955
Perf. Top (ft bgs): 290
Perf. Bottom (ft bgs): 935
GSE (ft, msl): 213



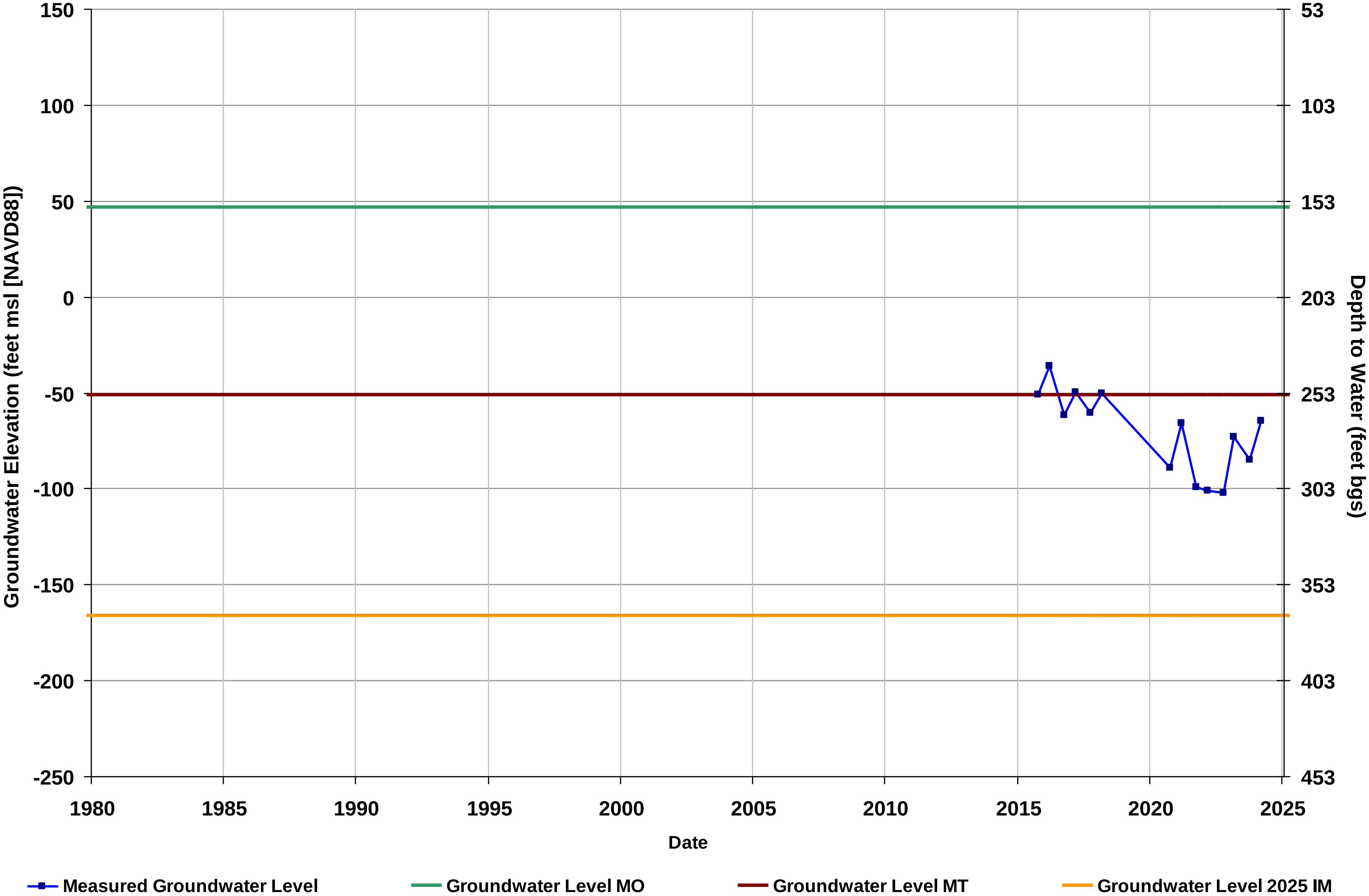
Well Name: CWD RMS-16
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 212



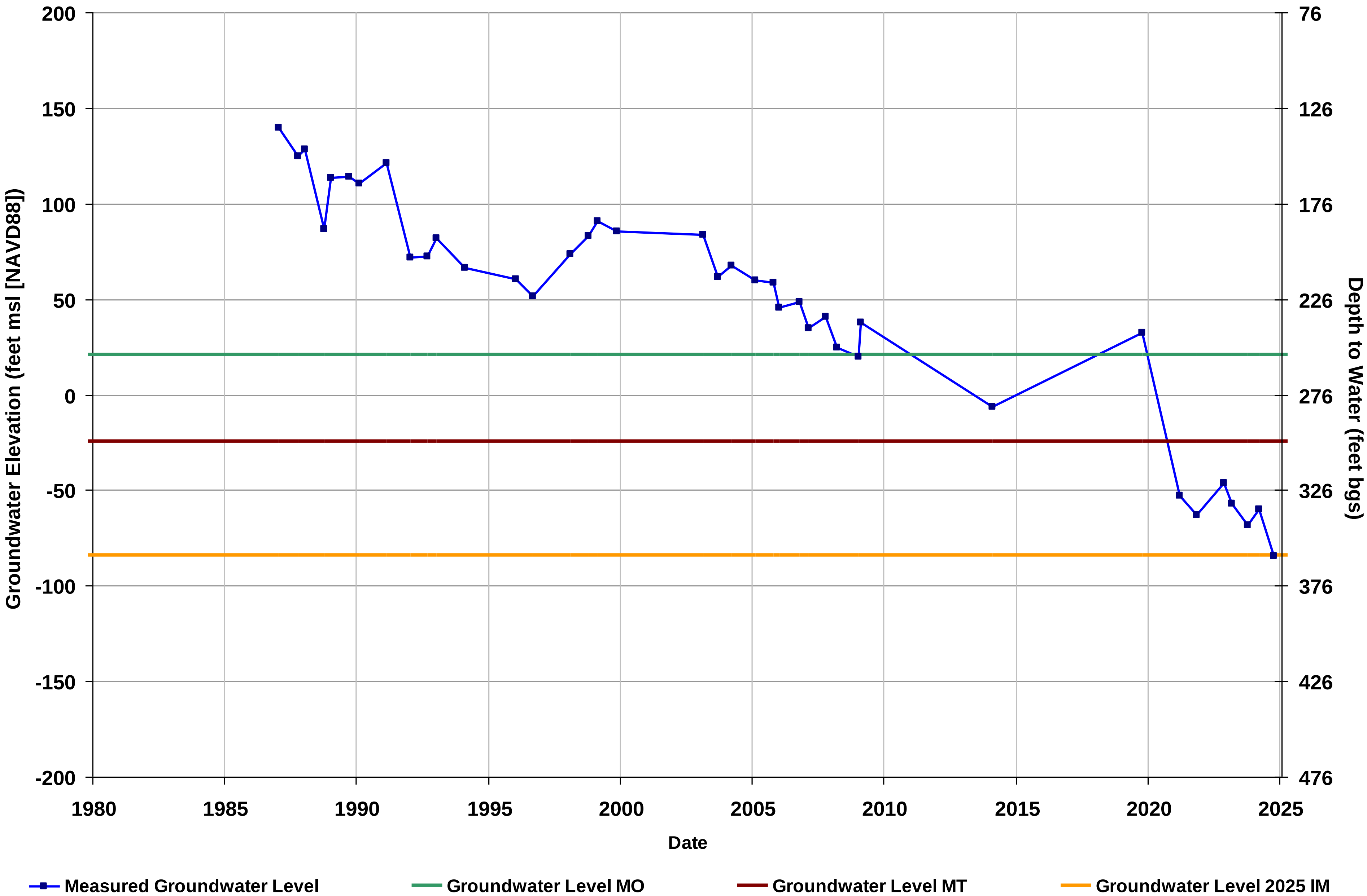
Well Name: CWD RMS-17
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Chowchilla Water District

Total Depth (ft bgs): 624
Perf. Top (ft bgs): 278
Perf. Bottom (ft bgs): 588
GSE (ft, msl): 203



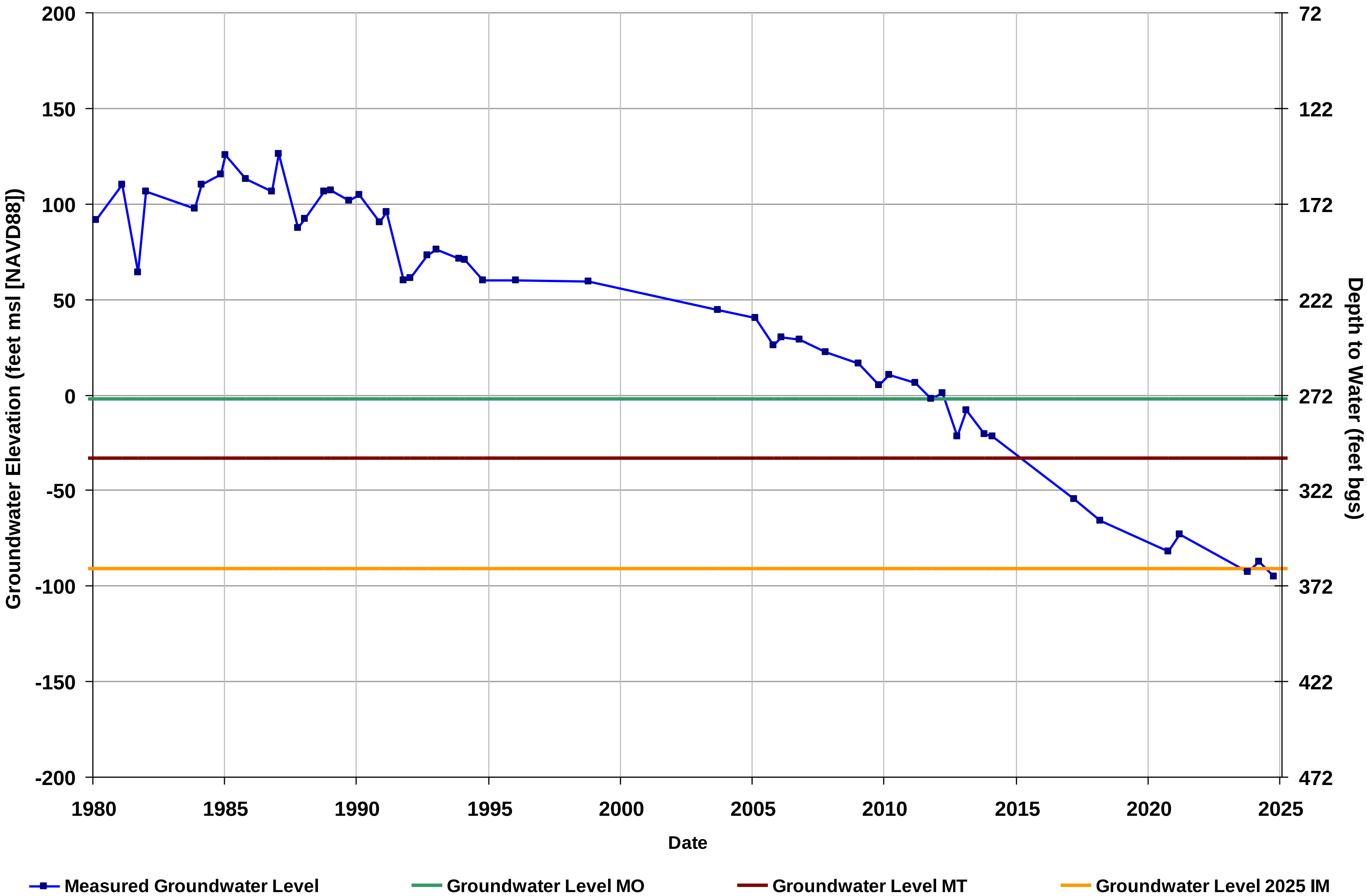
Well Name: MCE RMS-1
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - East

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 276



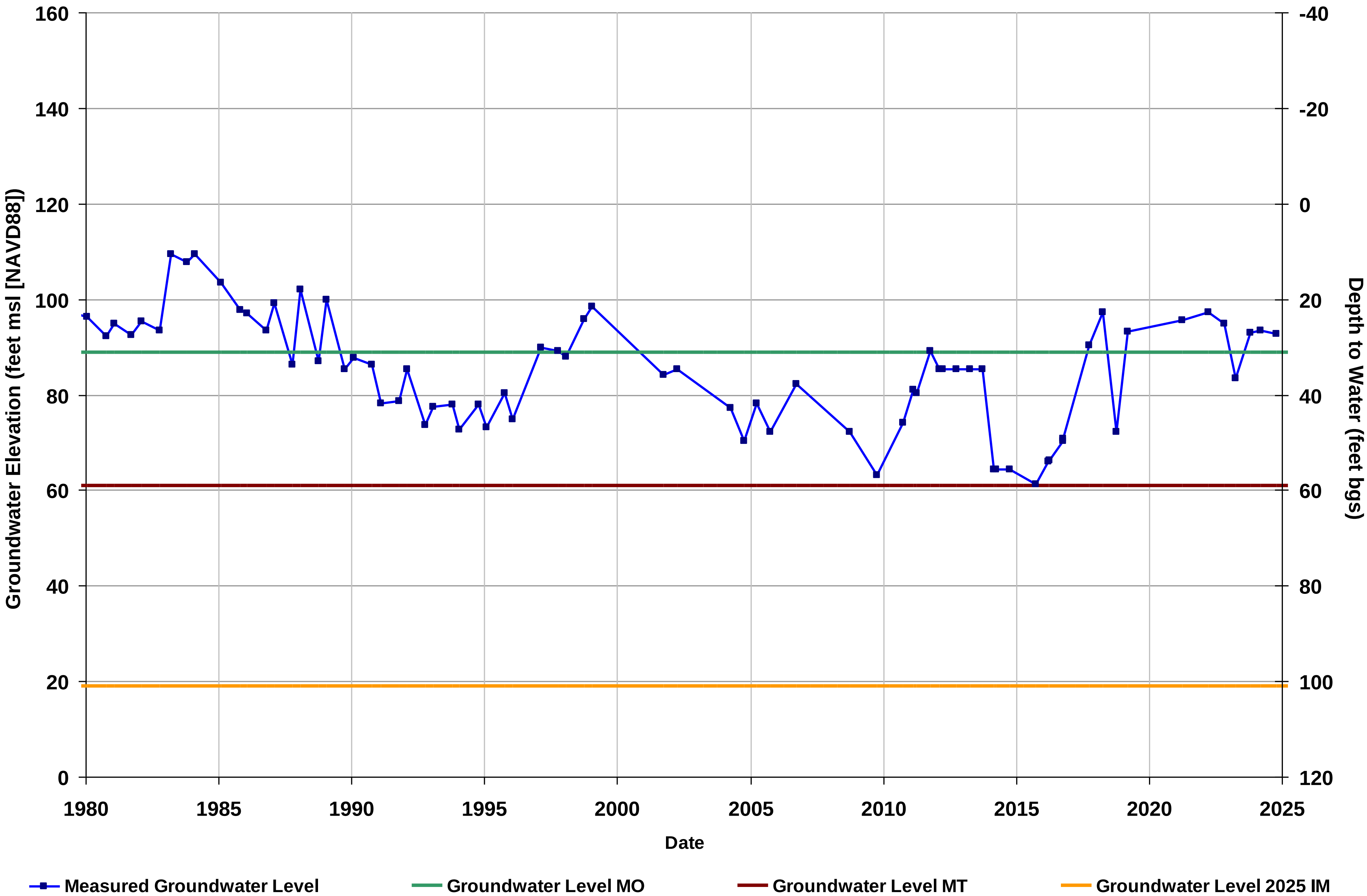
Well Name: MCE RMS-2
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - East

Total Depth (ft bgs): 466
Perf. Top (ft bgs): 218
Perf. Bottom (ft bgs): 464
GSE (ft, msl): 272



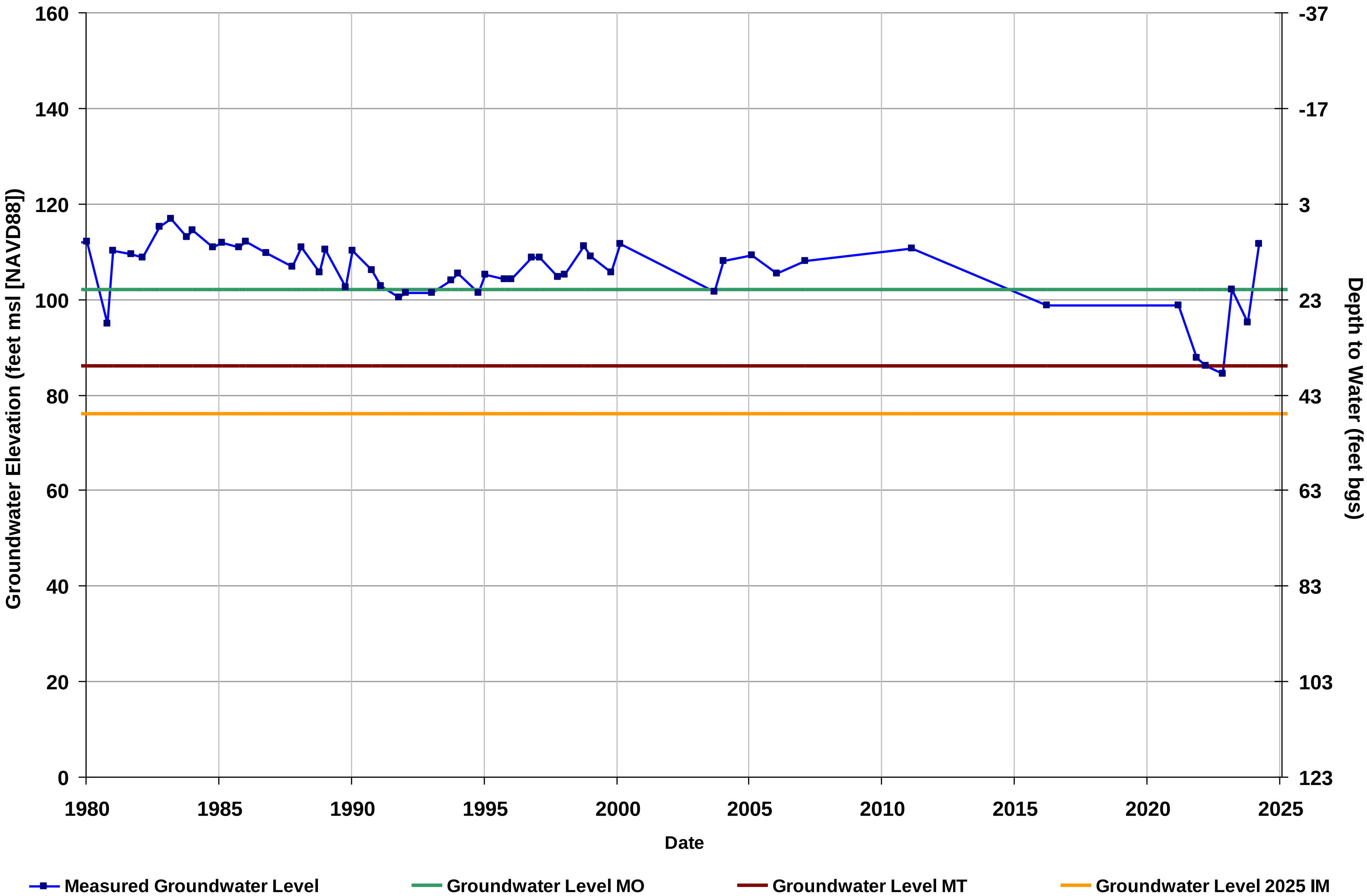
Well Name: MCW RMS-1
Depth Zone: Upper
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 150
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 120



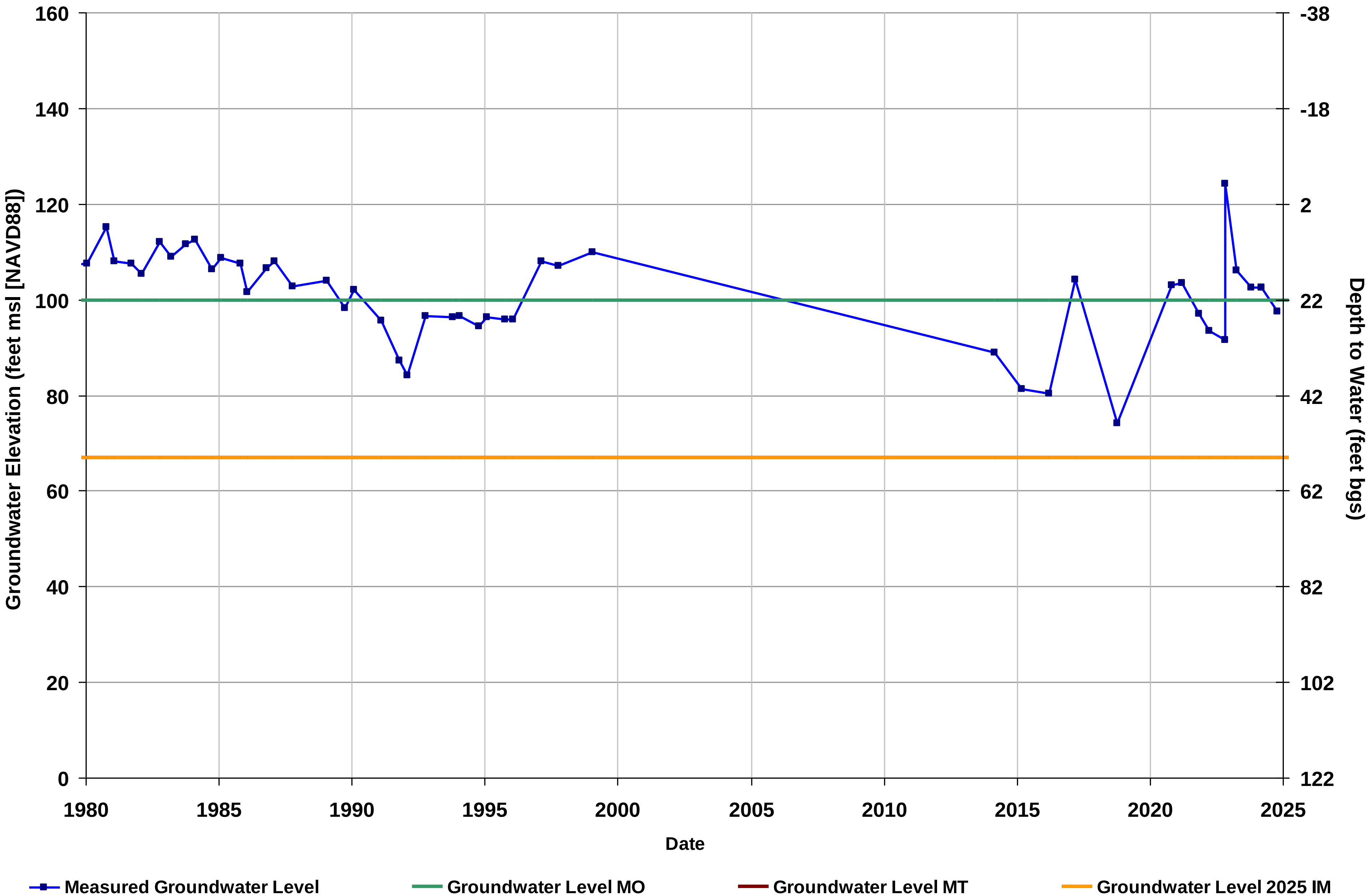
Well Name: MCW RMS-2
Depth Zone: Upper
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 123



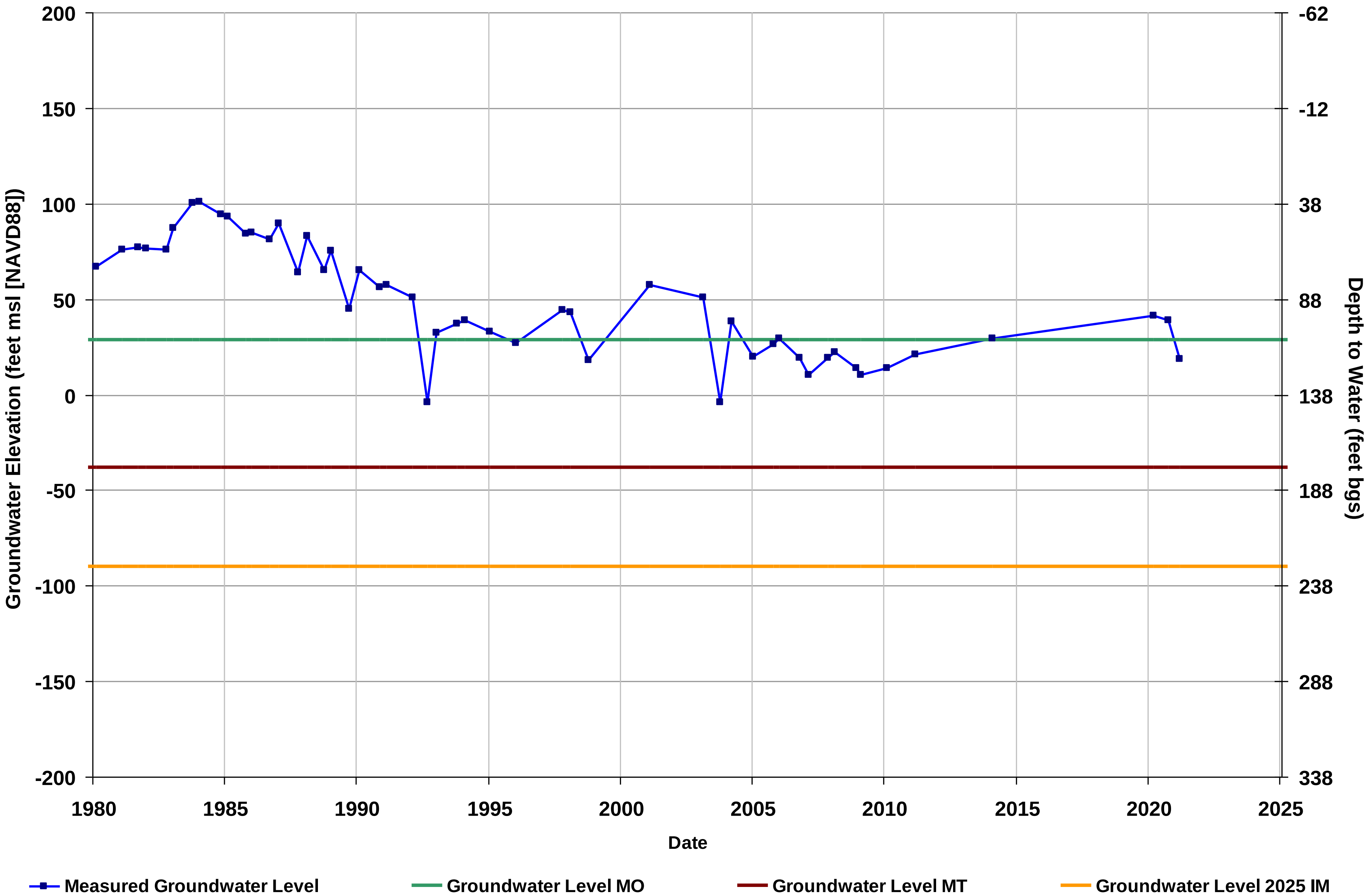
Well Name: MCW RMS-3
Depth Zone: Upper
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 122



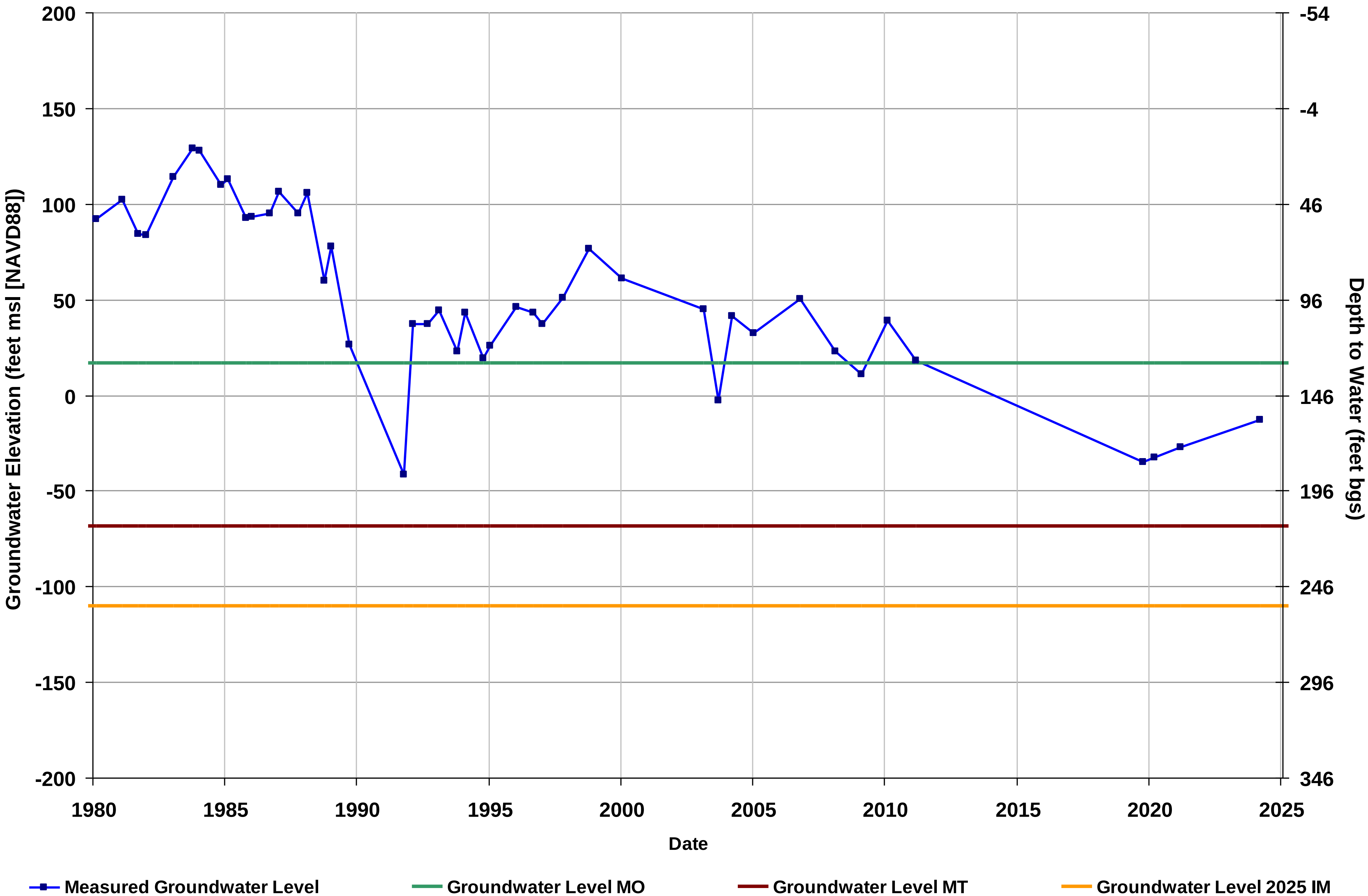
Well Name: MCW RMS-4
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 138



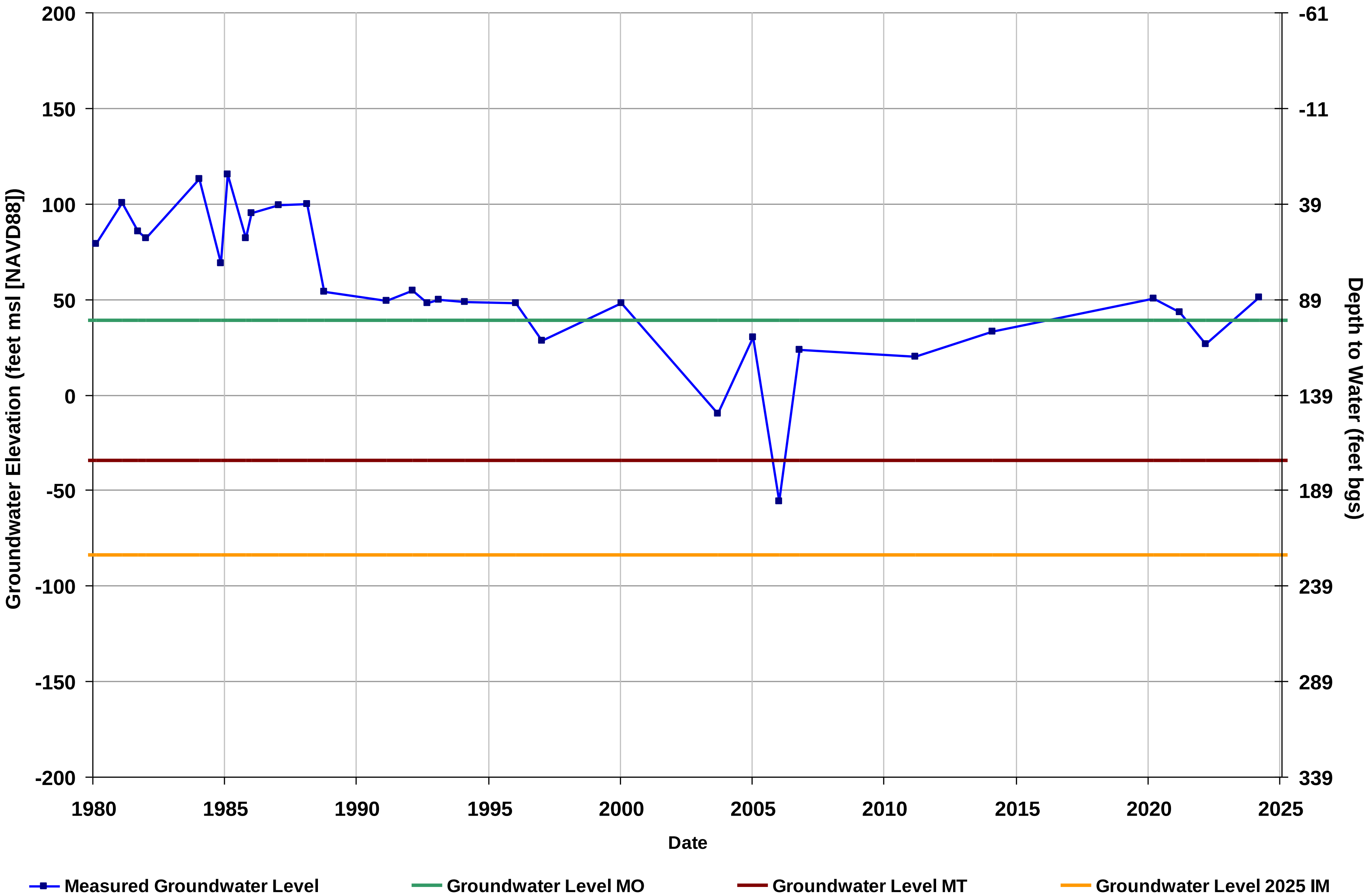
Well Name: MCW RMS-5
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 146



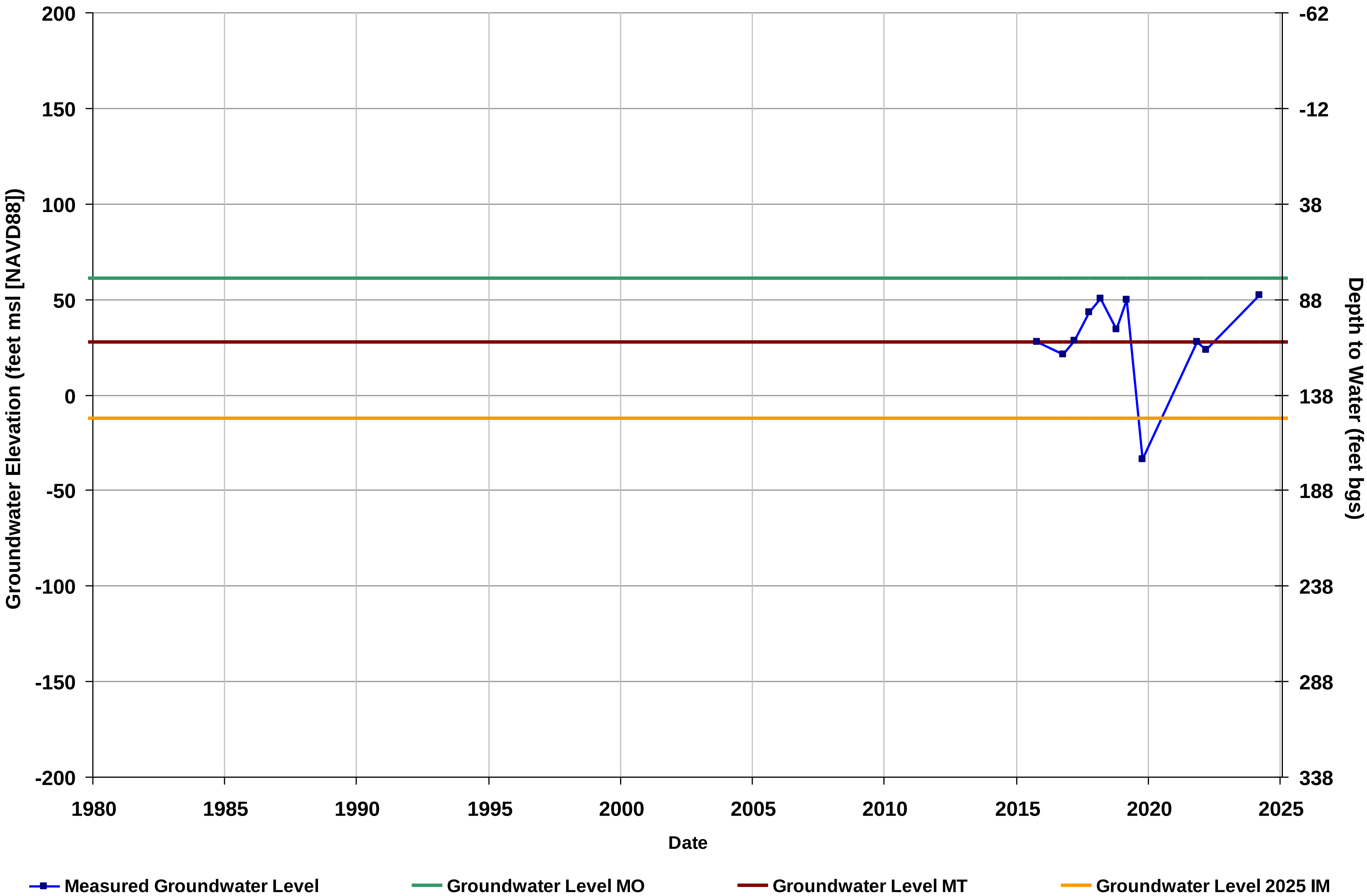
Well Name: MCW RMS-6
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 139



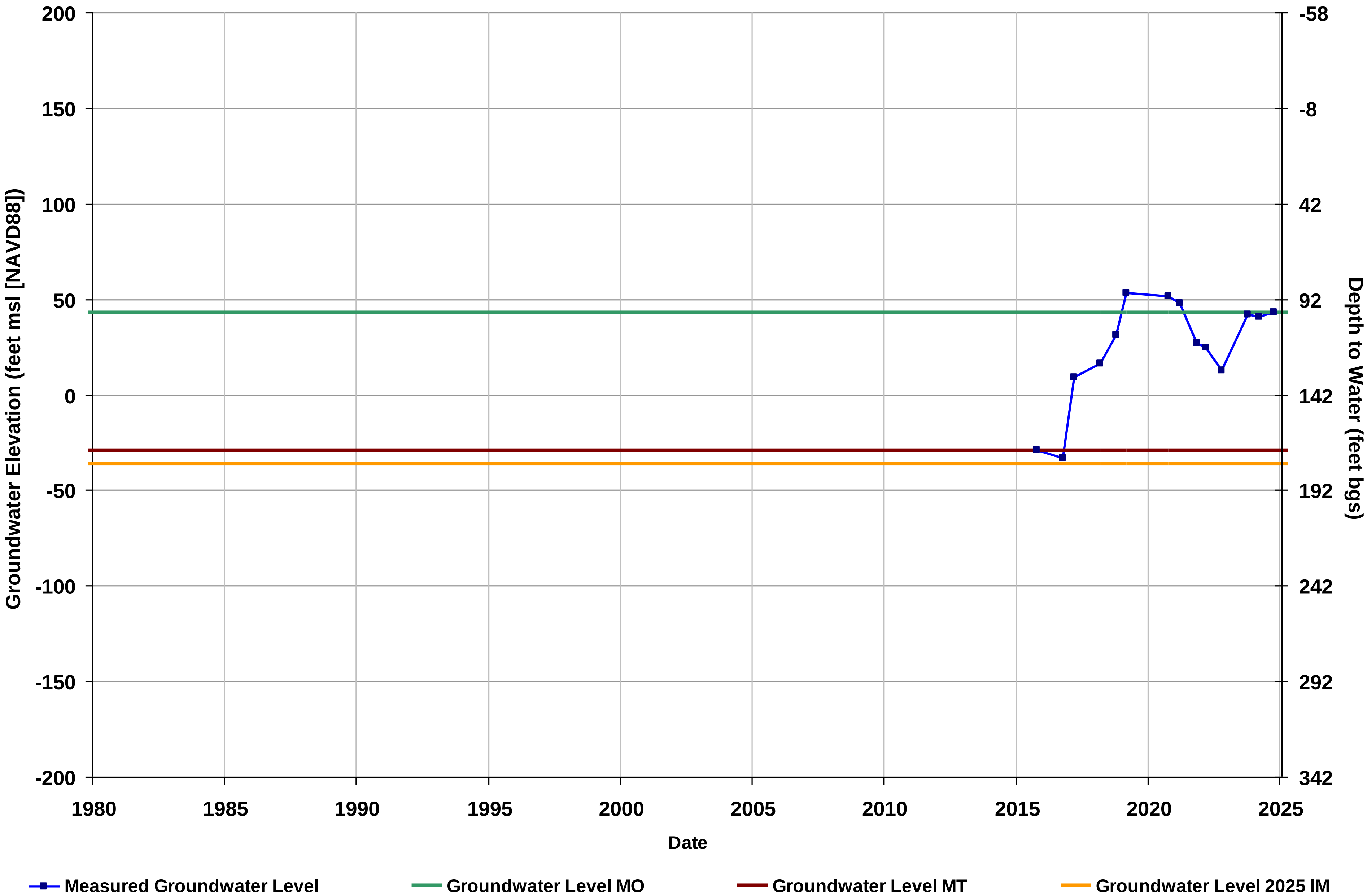
Well Name: MCW RMS-7
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 800
Perf. Top (ft bgs): 290
Perf. Bottom (ft bgs): 400
GSE (ft, msl): 138



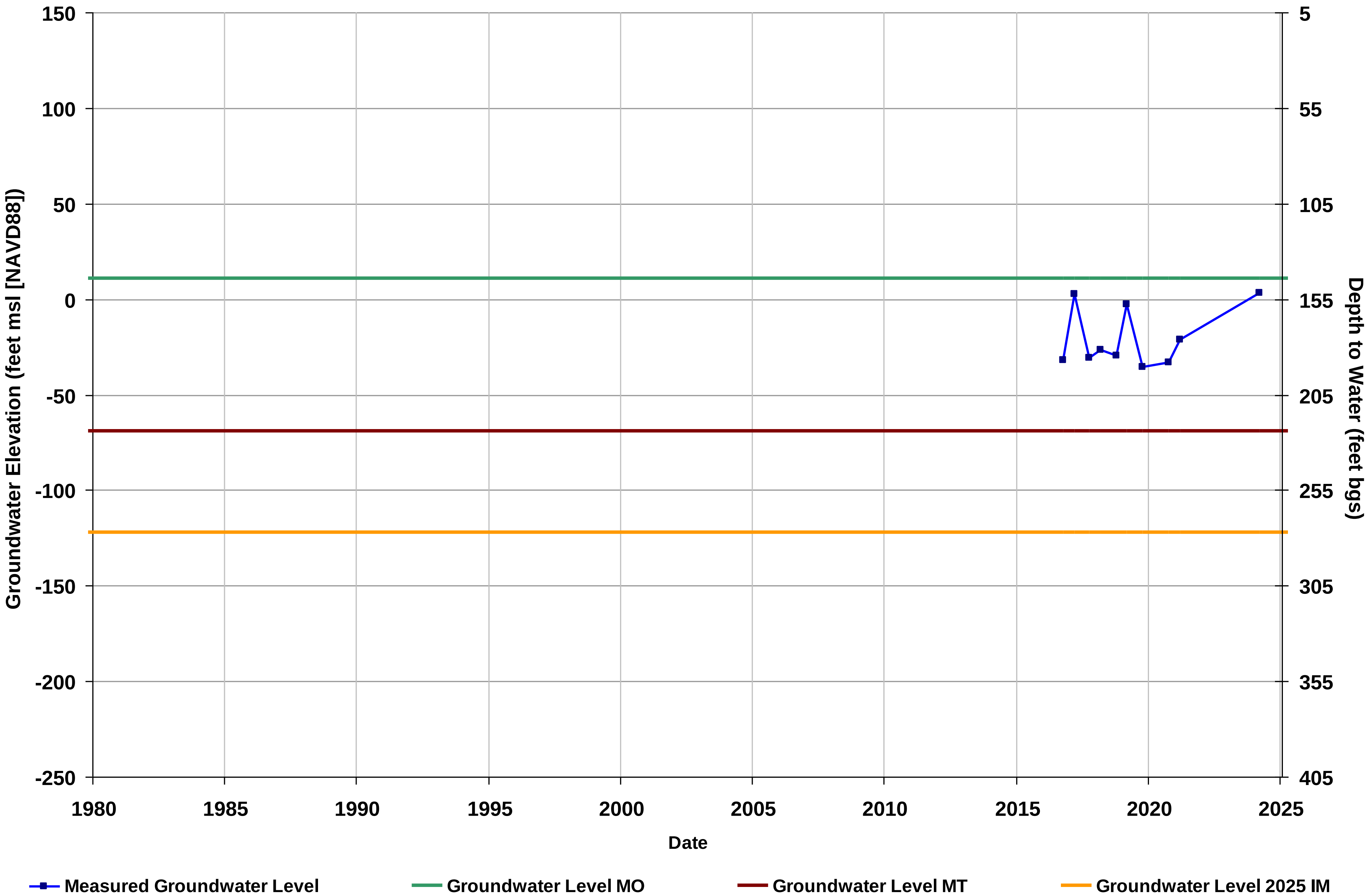
Well Name: MCW RMS-8
Depth Zone: Composite
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 480
Perf. Top (ft bgs): 160
Perf. Bottom (ft bgs): 475
GSE (ft, msl): 142



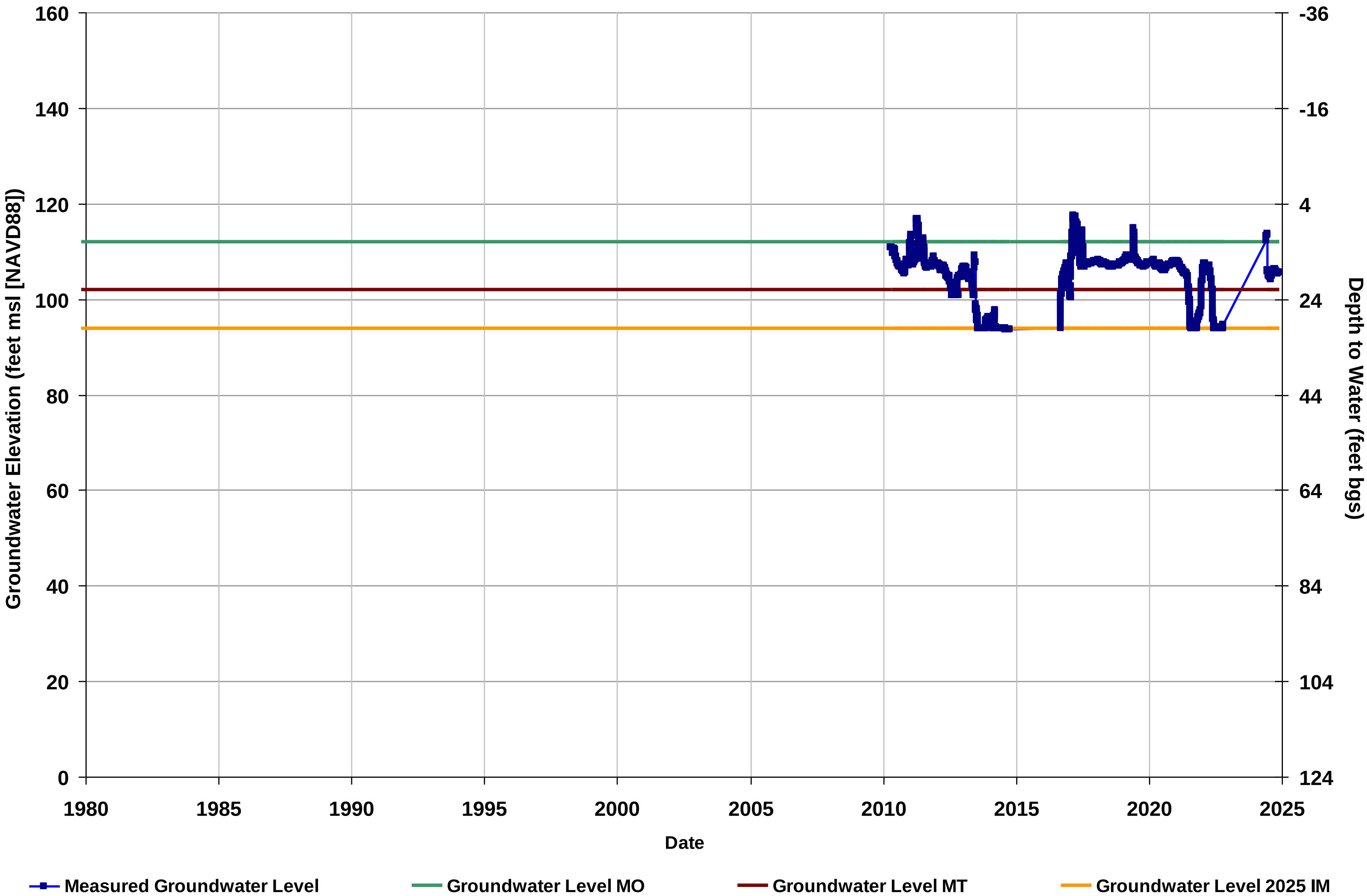
Well Name: MCW RMS-9
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 700
Perf. Top (ft bgs): 265
Perf. Bottom (ft bgs): 696
GSE (ft, msl): 155



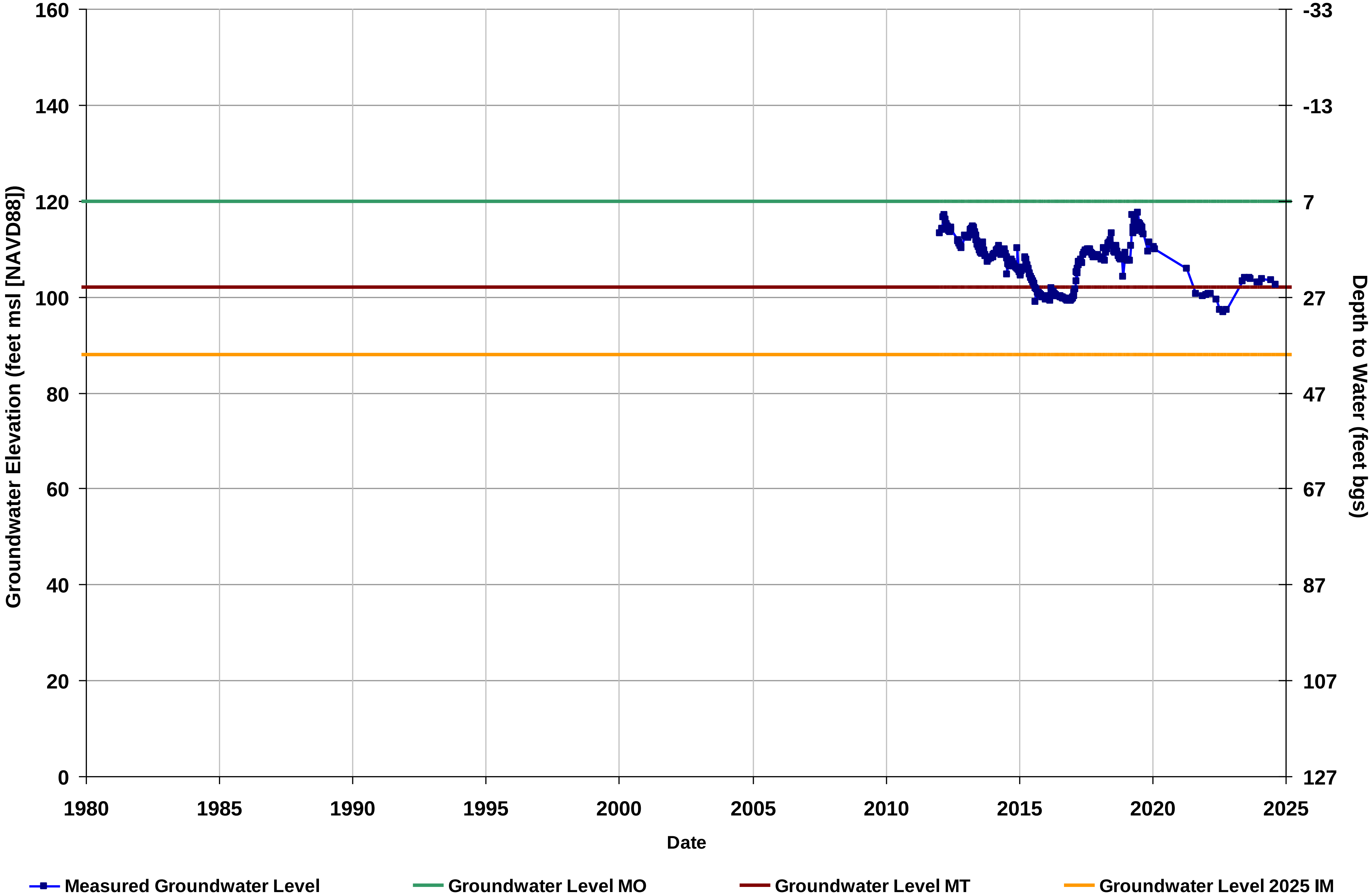
Well Name: MCW RMS-10
Depth Zone: Shallow
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 26
Perf. Top (ft bgs): 10
Perf. Bottom (ft bgs): 25
GSE (ft, msl): 123



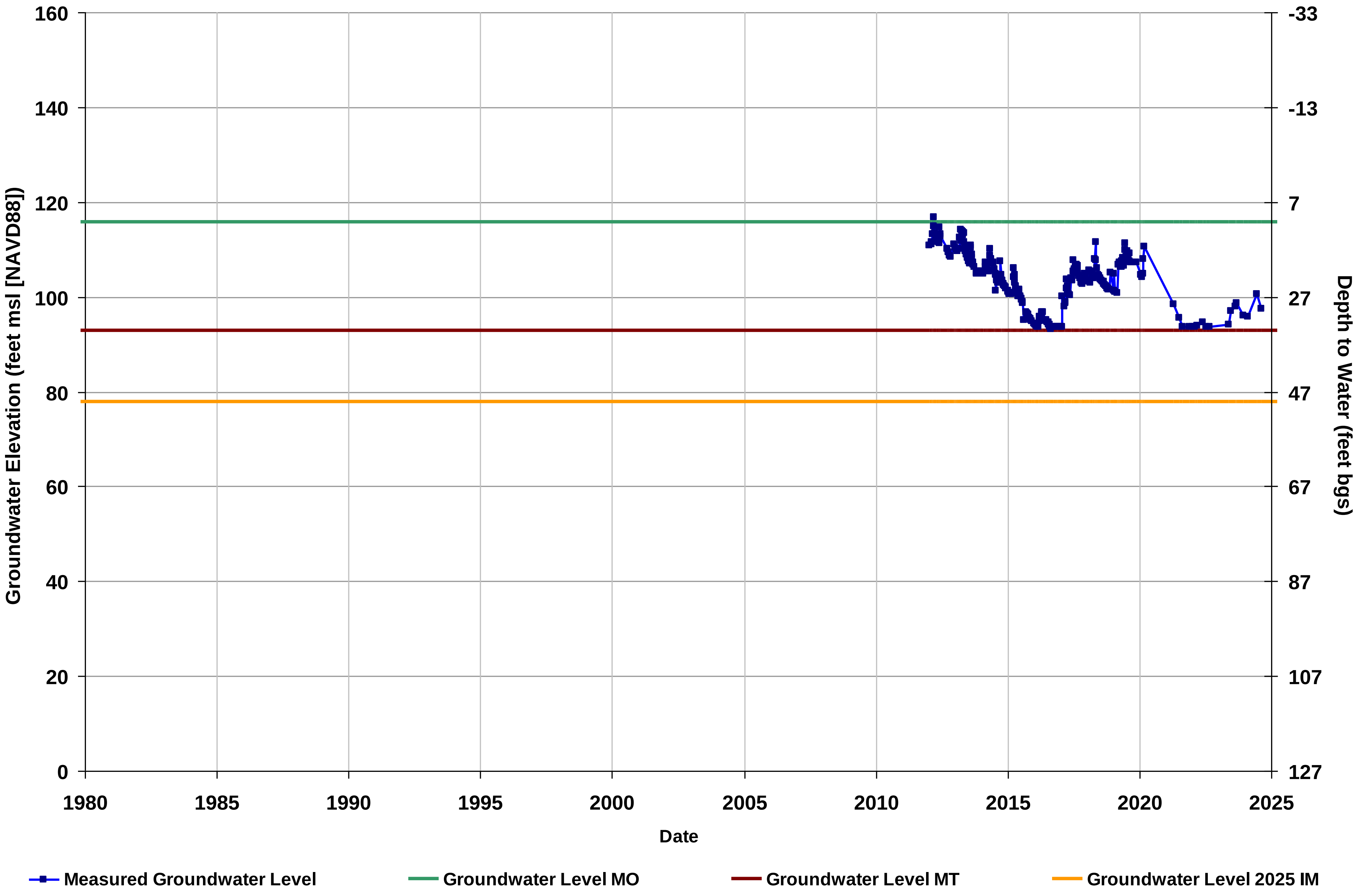
Well Name: MCW RMS-11
Depth Zone: Shallow
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 30
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 127



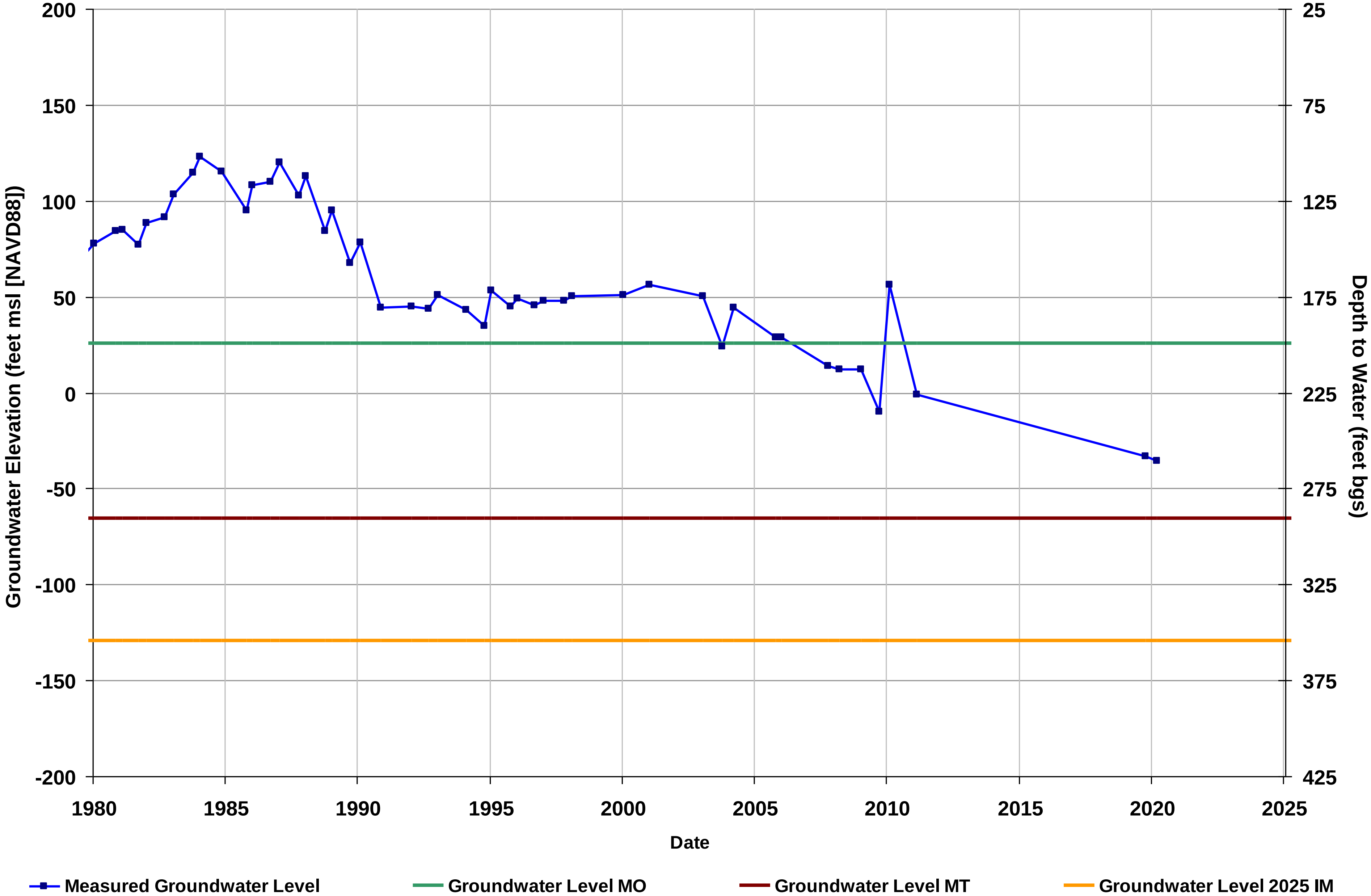
Well Name: MCW RMS-12
Depth Zone: Shallow
Subbasin: Chowchilla
GSA: County of Madera - West

Total Depth (ft bgs): 29
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 127



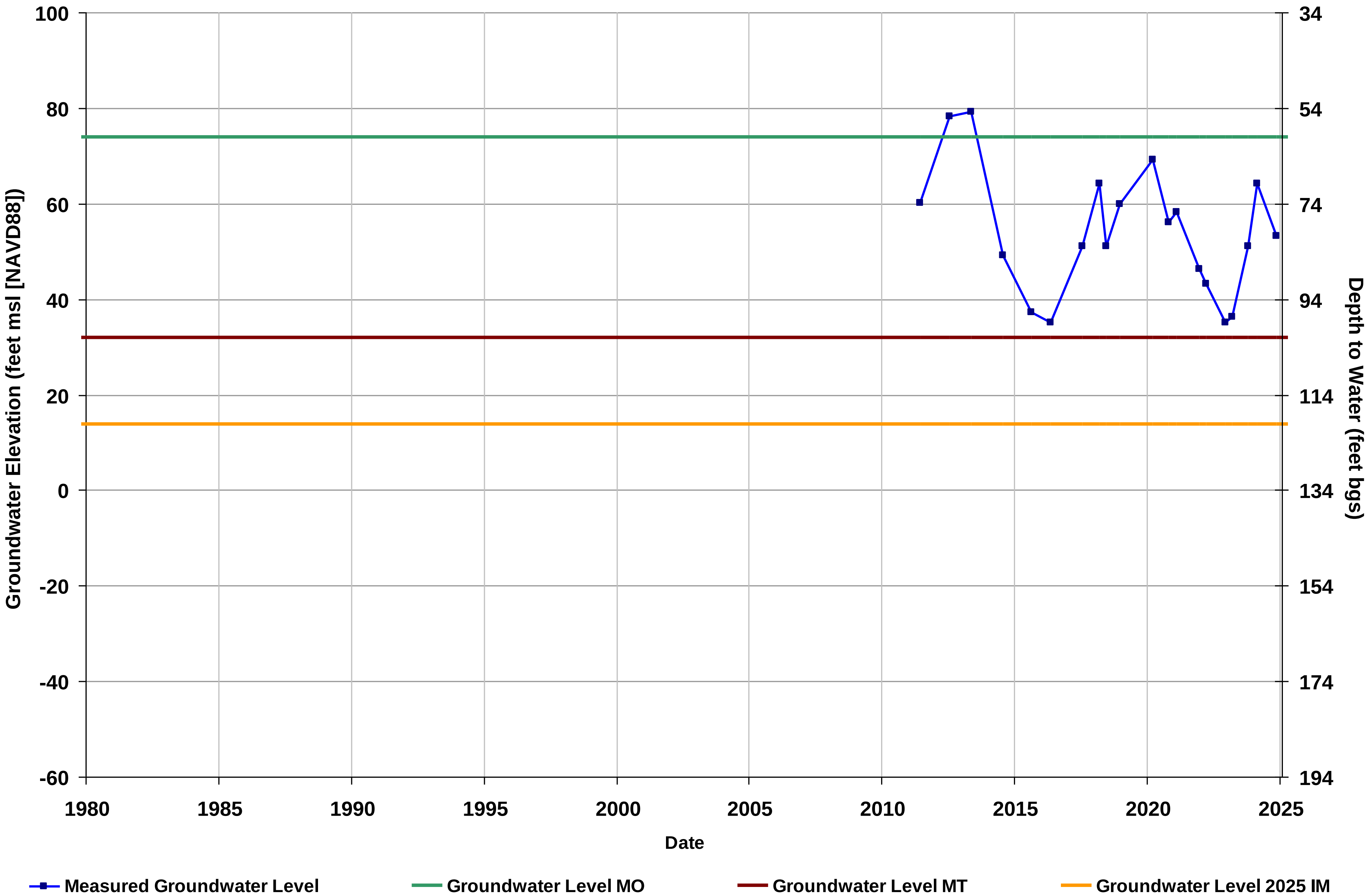
Well Name: MER RMS-1
Depth Zone: Lower
Subbasin: Chowchilla
GSA: County of Merced

Total Depth (ft bgs):
Perf. Top (ft bgs):
Perf. Bottom (ft bgs):
GSE (ft, msl): 225



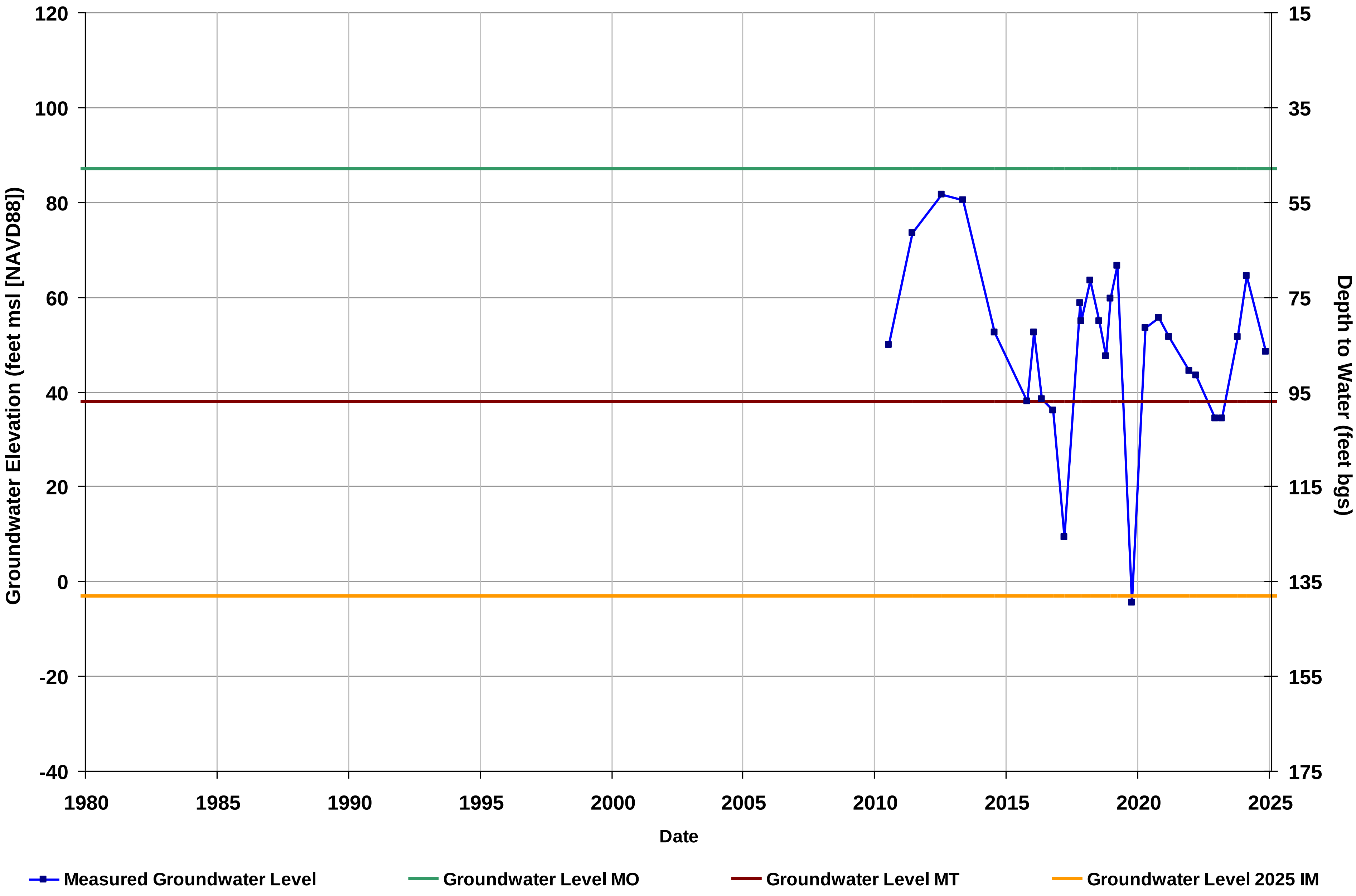
Well Name: TRT RMS-1
Depth Zone: Upper
Subbasin: Chowchilla
GSA: Triangle T Water District

Total Depth (ft bgs): 196
Perf. Top (ft bgs): 158
Perf. Bottom (ft bgs): 192
GSE (ft, msl): 134



Well Name: TRT RMS-2
Depth Zone: Lower
Subbasin: Chowchilla
GSA: Triangle T Water District

Total Depth (ft bgs): 500
Perf. Top (ft bgs): 300
Perf. Bottom (ft bgs): 500
GSE (ft, msl): 135

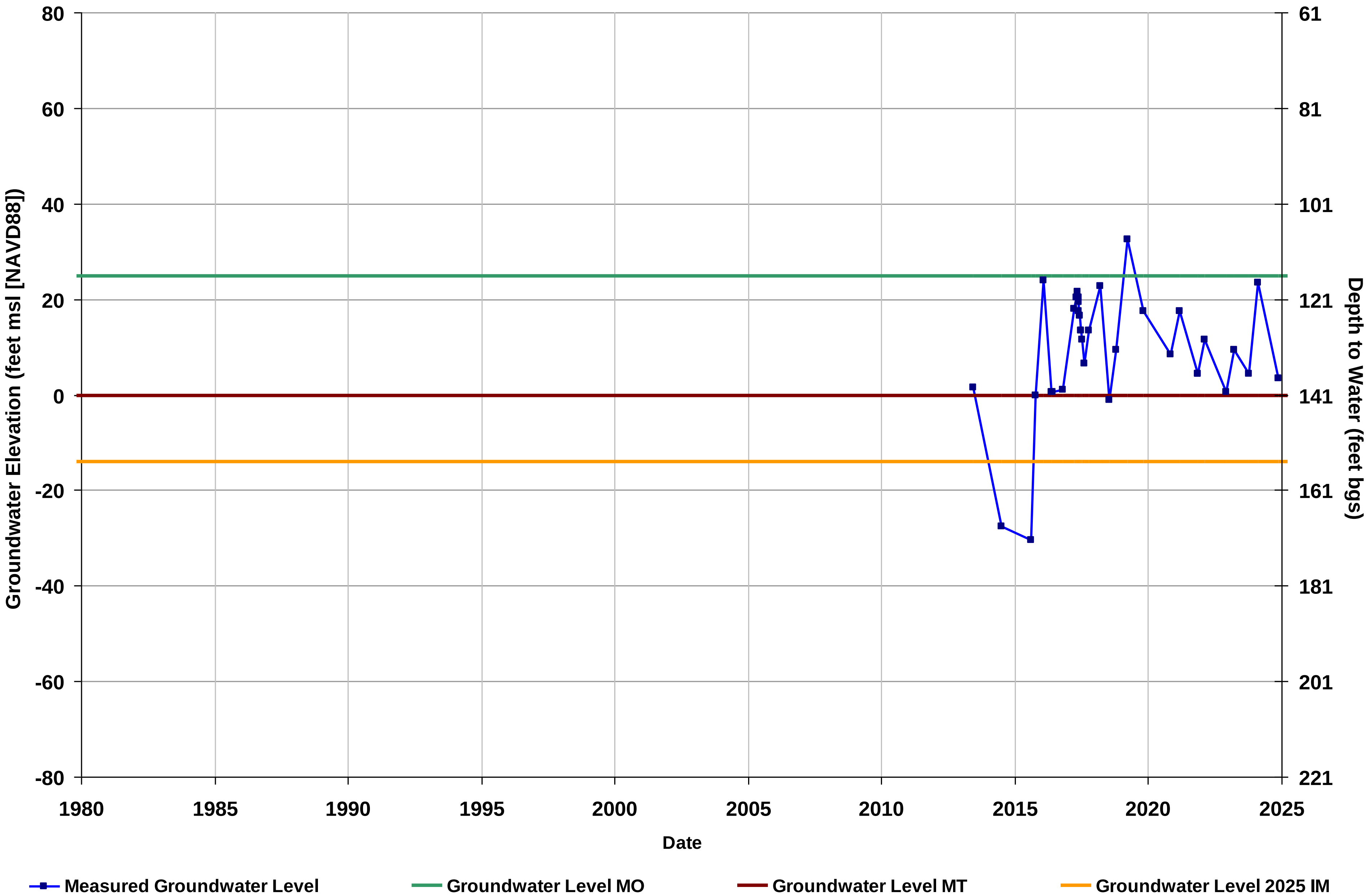


Well Name: TRT RMS-3
Depth Zone: Composite
Subbasin: Chowchilla
GSA: Triangle T Water District

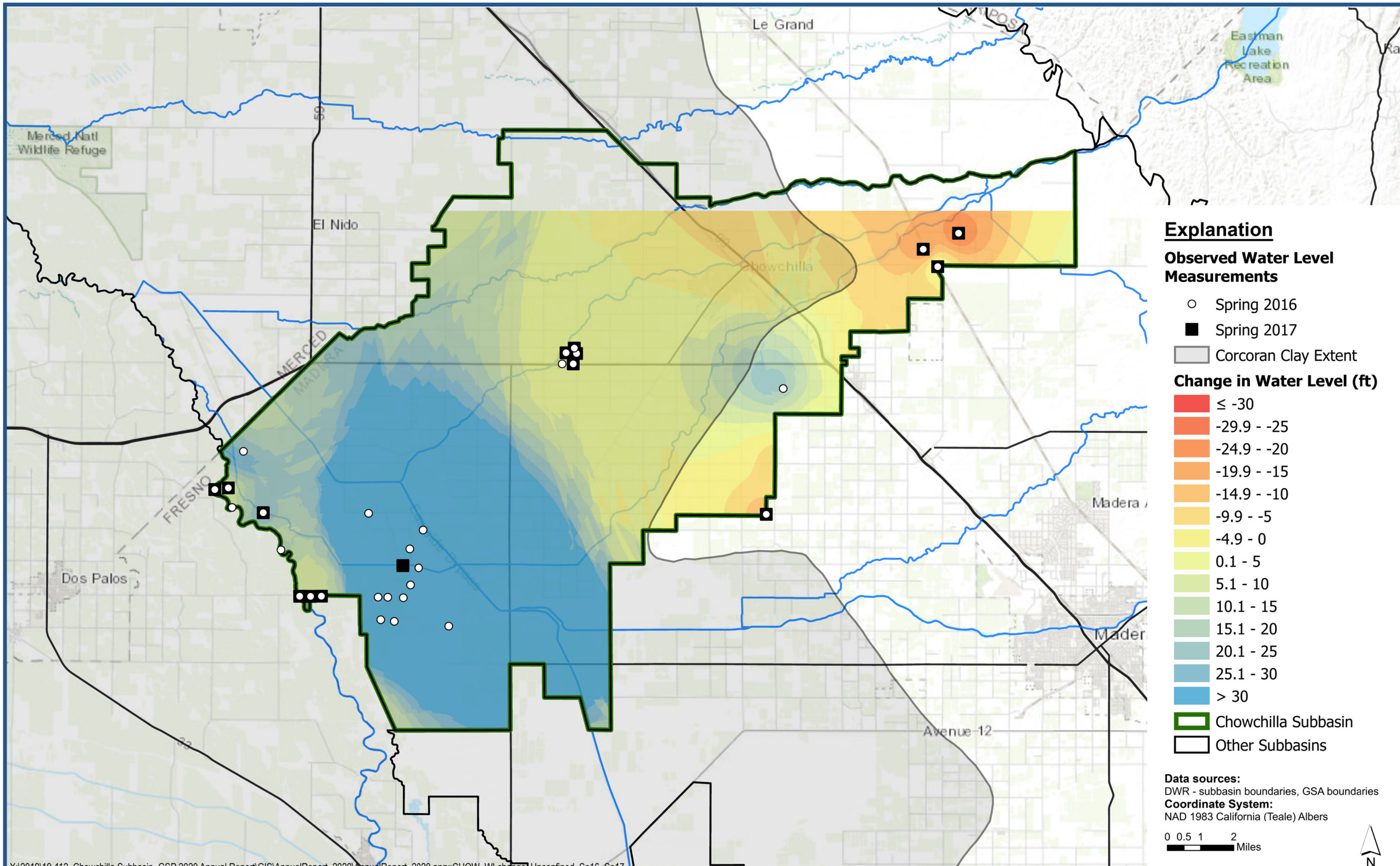
Total Depth (ft bgs): 799
Perf. Top (ft bgs): 168
Perf. Bottom (ft bgs): 790
GSE (ft, msl): 137

Well Name: TRT RMS-4
Depth Zone: Upper
Subbasin: Chowchilla
GSA: Triangle T Water District

Total Depth (ft bgs): 840
Perf. Top (ft bgs): 190
Perf. Bottom (ft bgs): 260
GSE (ft, msl): 141



Appendix C. Maps of Change in Groundwater Levels and Change in Groundwater Storage in 2016 through 2024, Separated by Principal Aquifer.



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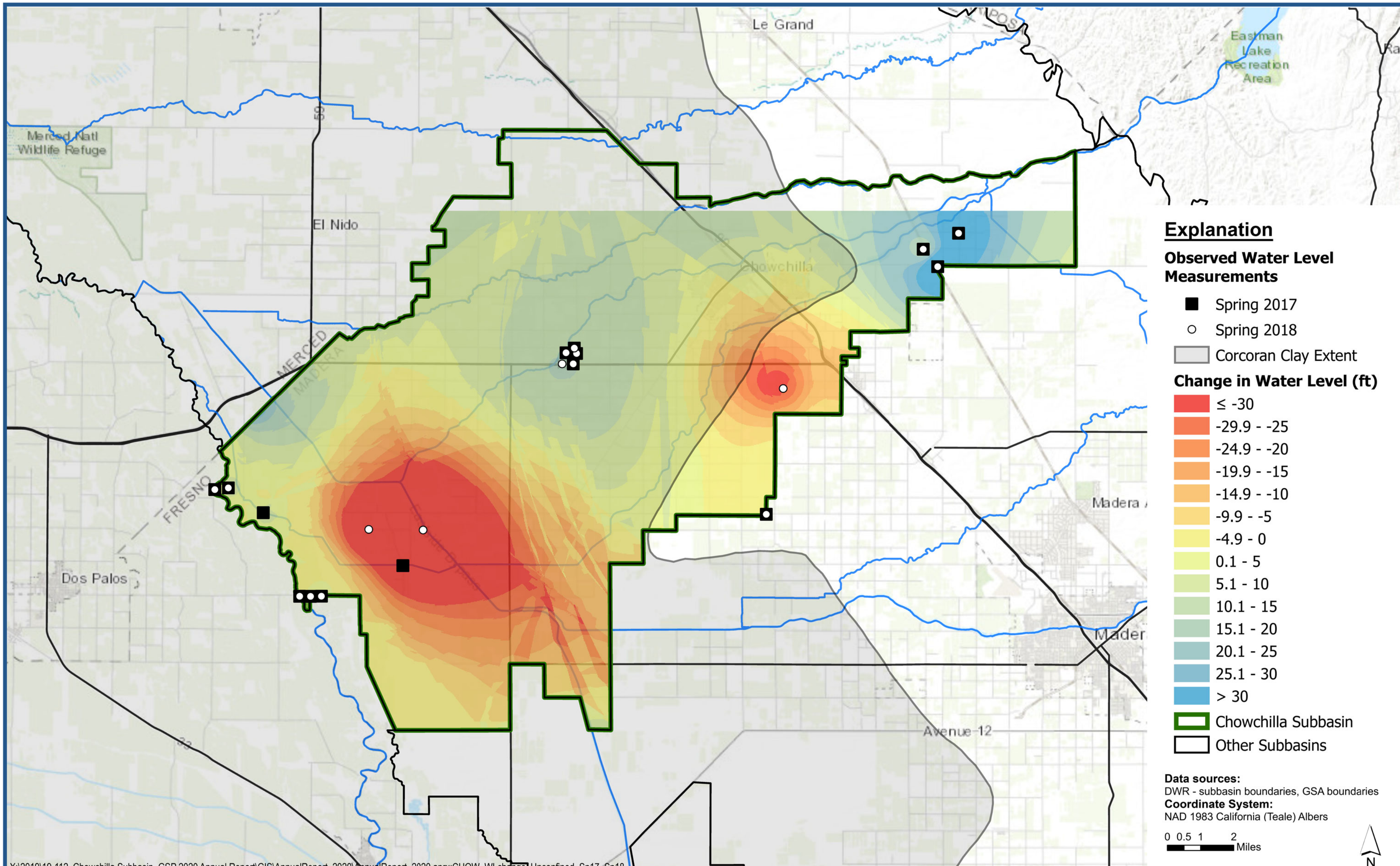
Change in Groundwater Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2016 through Spring 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-1



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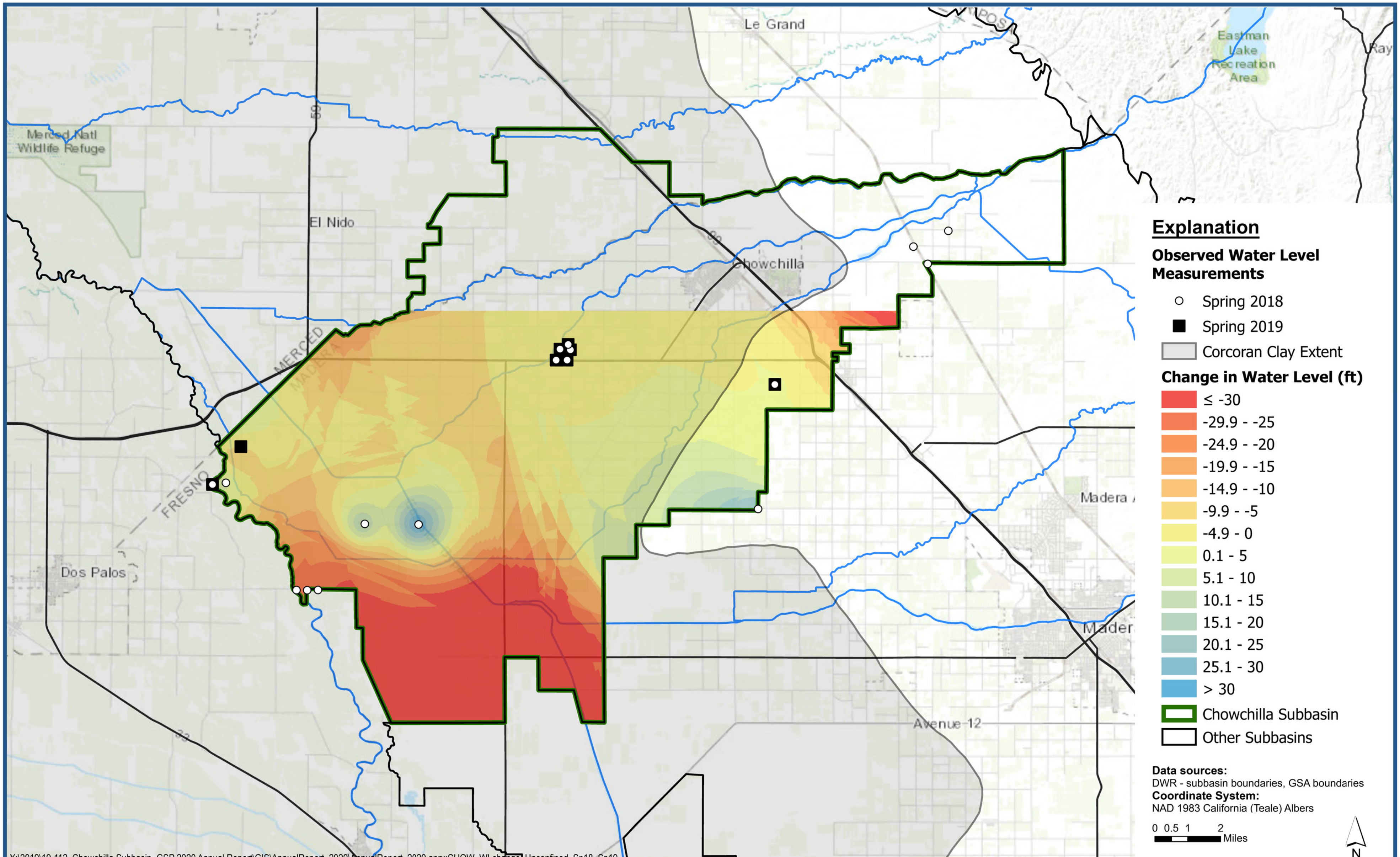
Change in Groundwater Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2017 through Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-2



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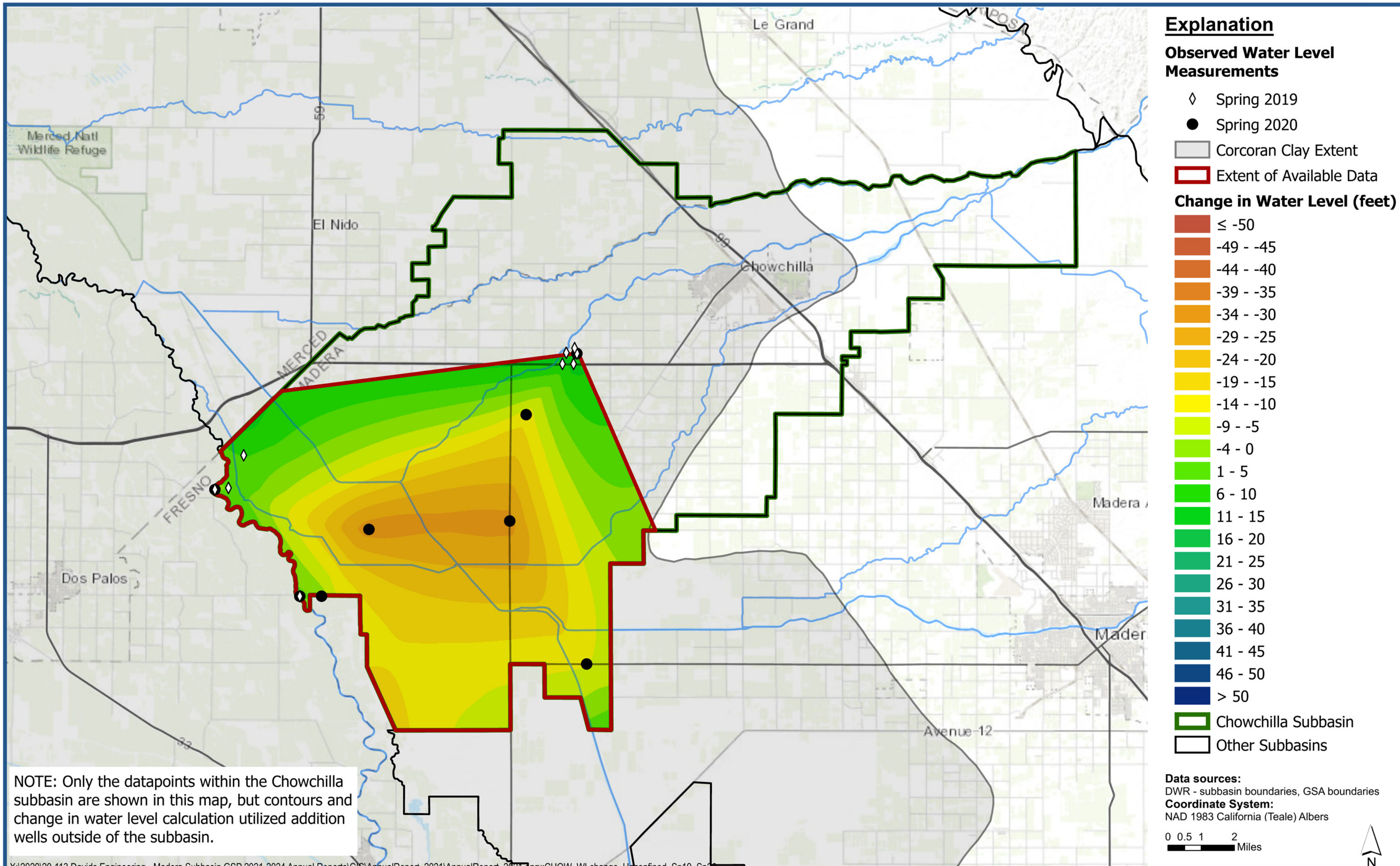
Change in Groundwater Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2018 through Spring 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure 5-1



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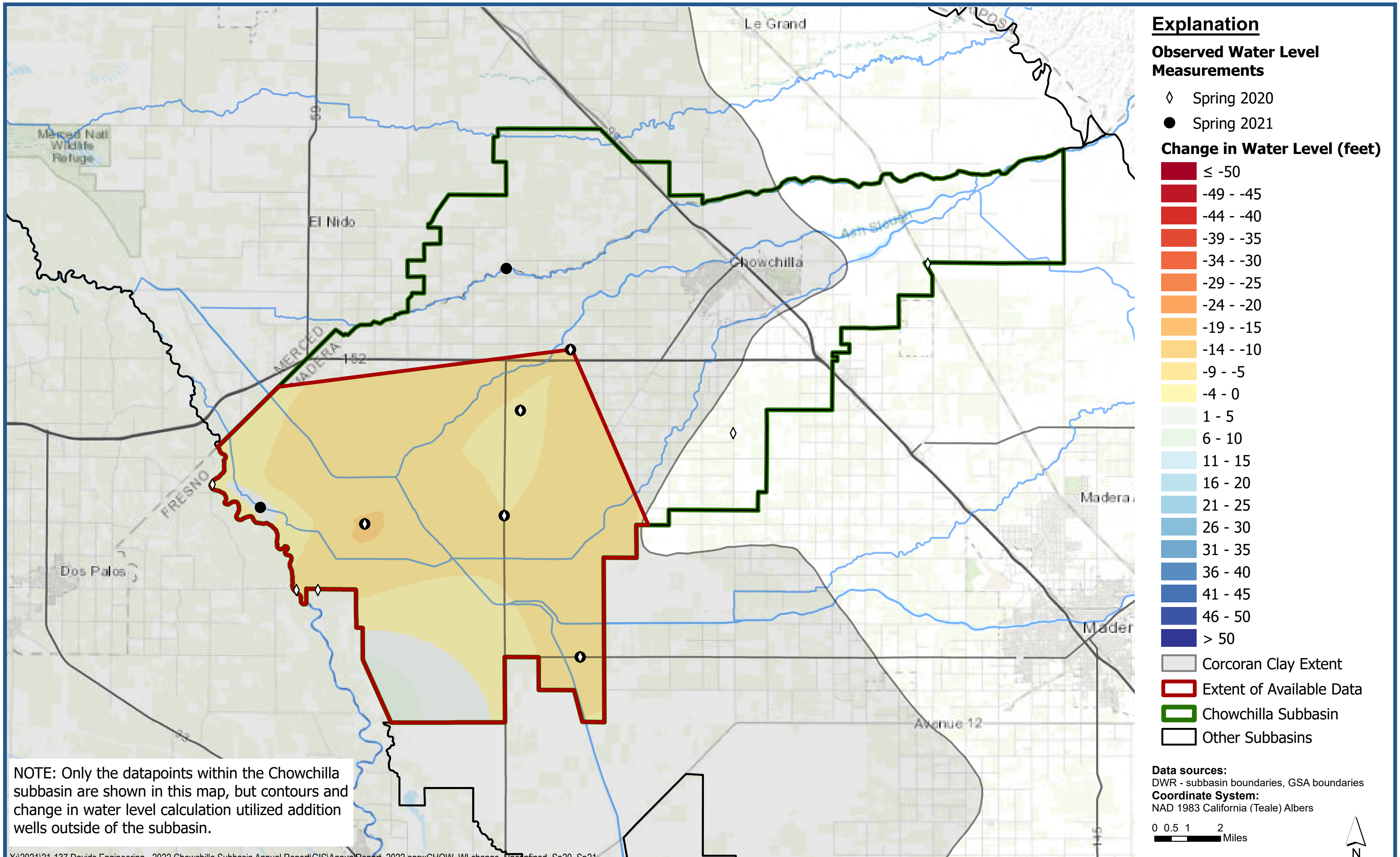
Change in Water Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2019 through Spring 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 5-1



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Change in Water Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2020 through Spring 2021

Chowchilla Subbasin
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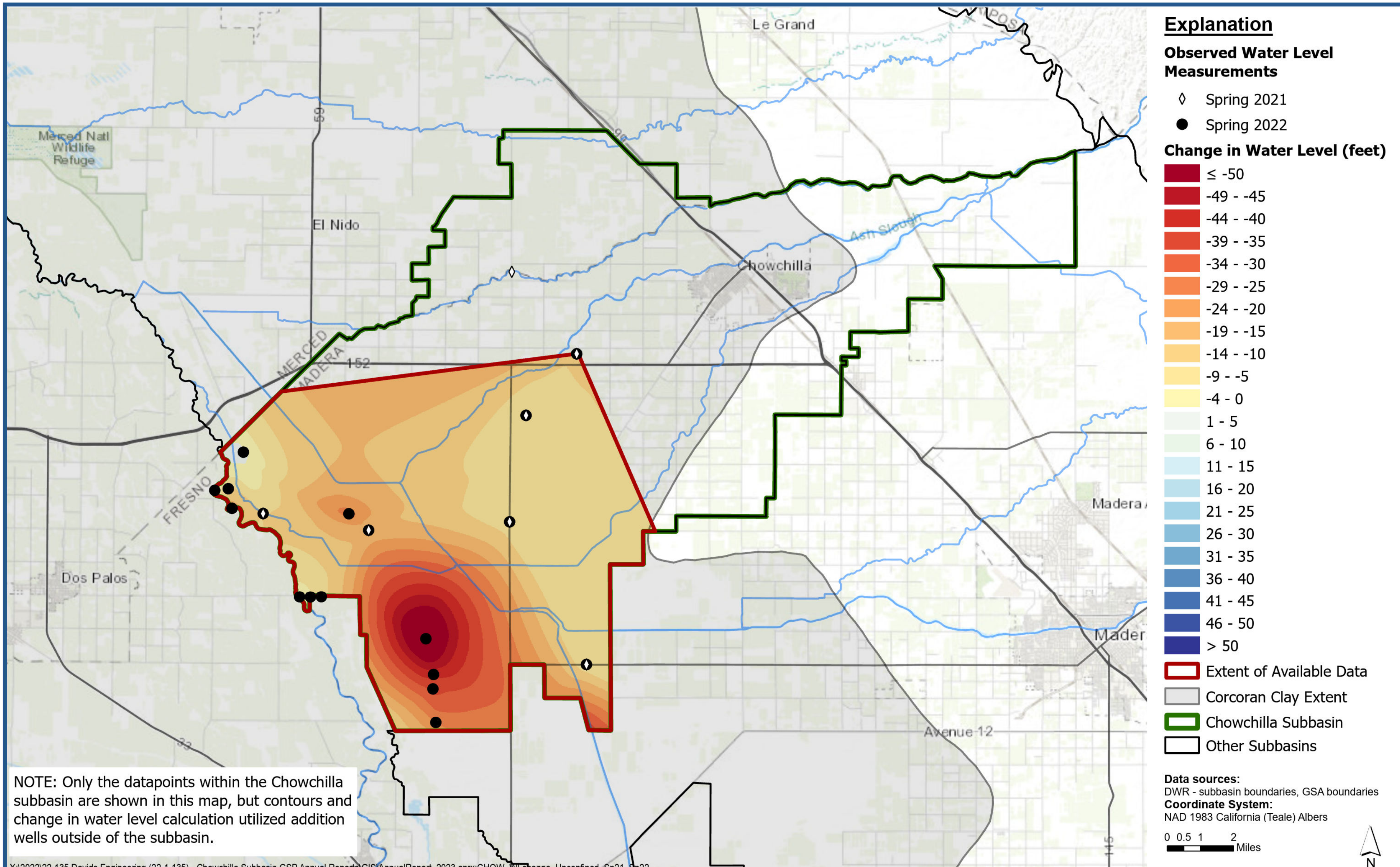
Figure 5-1



Change in Water Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2021 through Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 5-1

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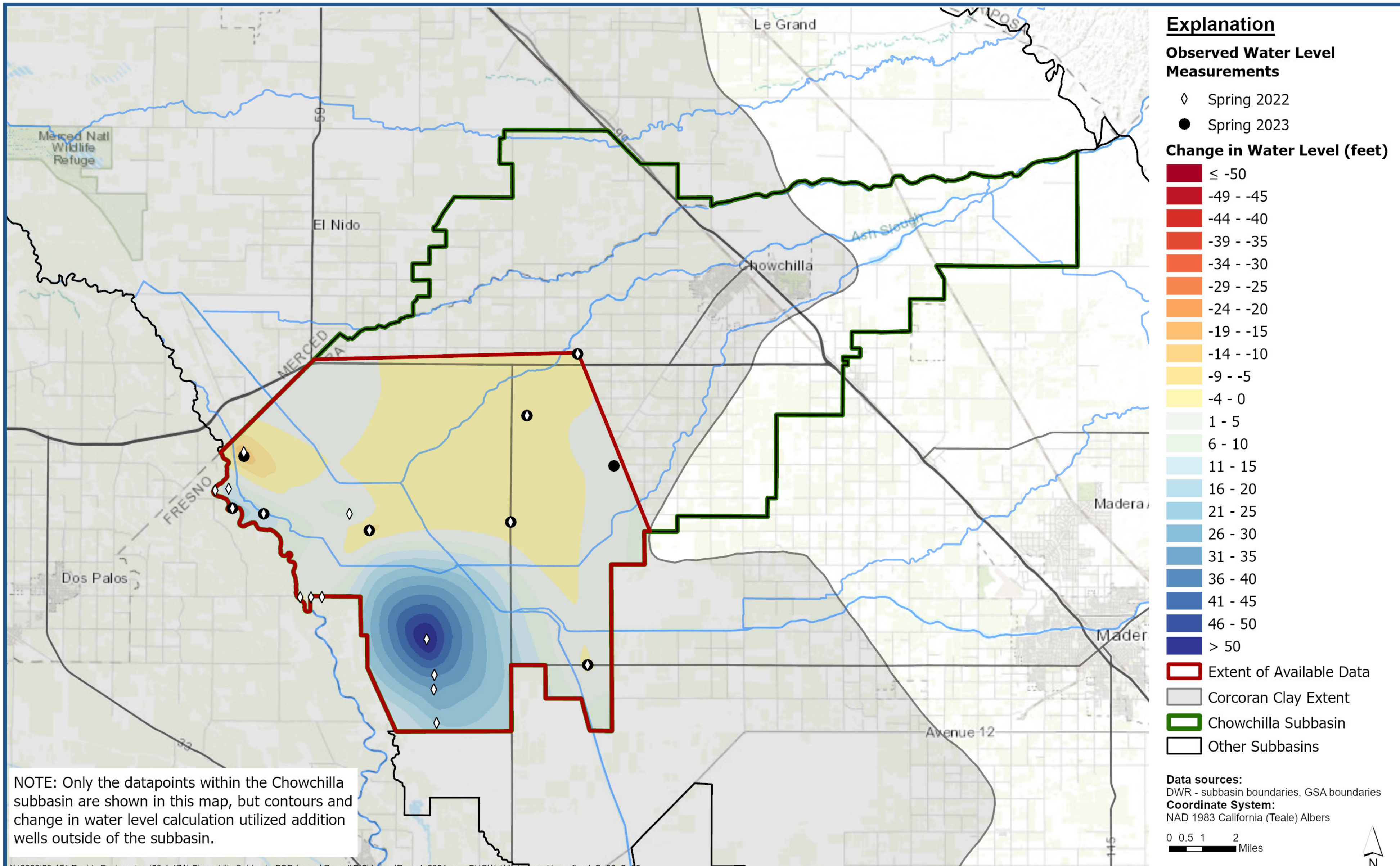

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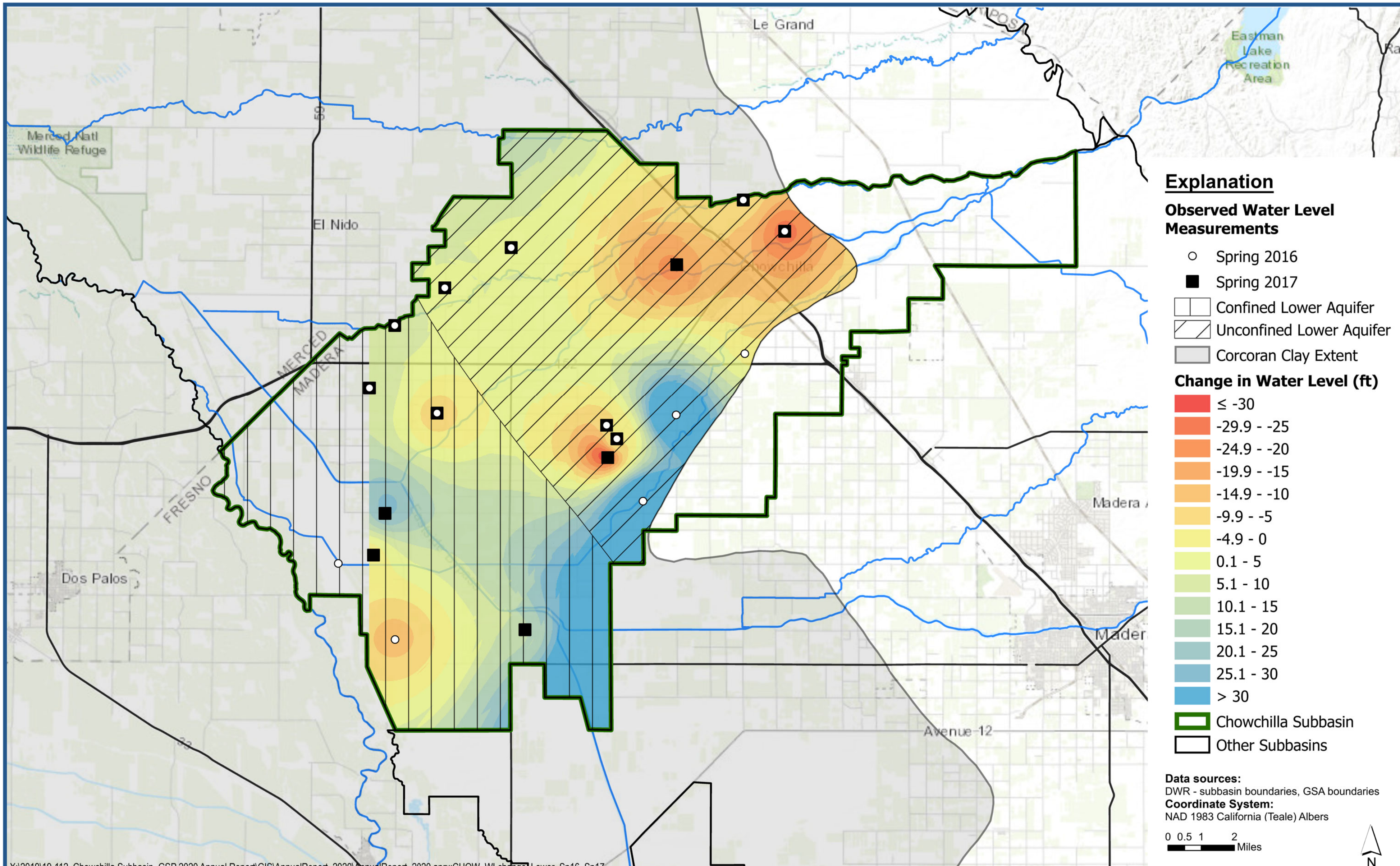
Change in Water Level in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2022 through Spring 2023

Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

Figure 5-1



DAVIDS ENGINEERING, INC

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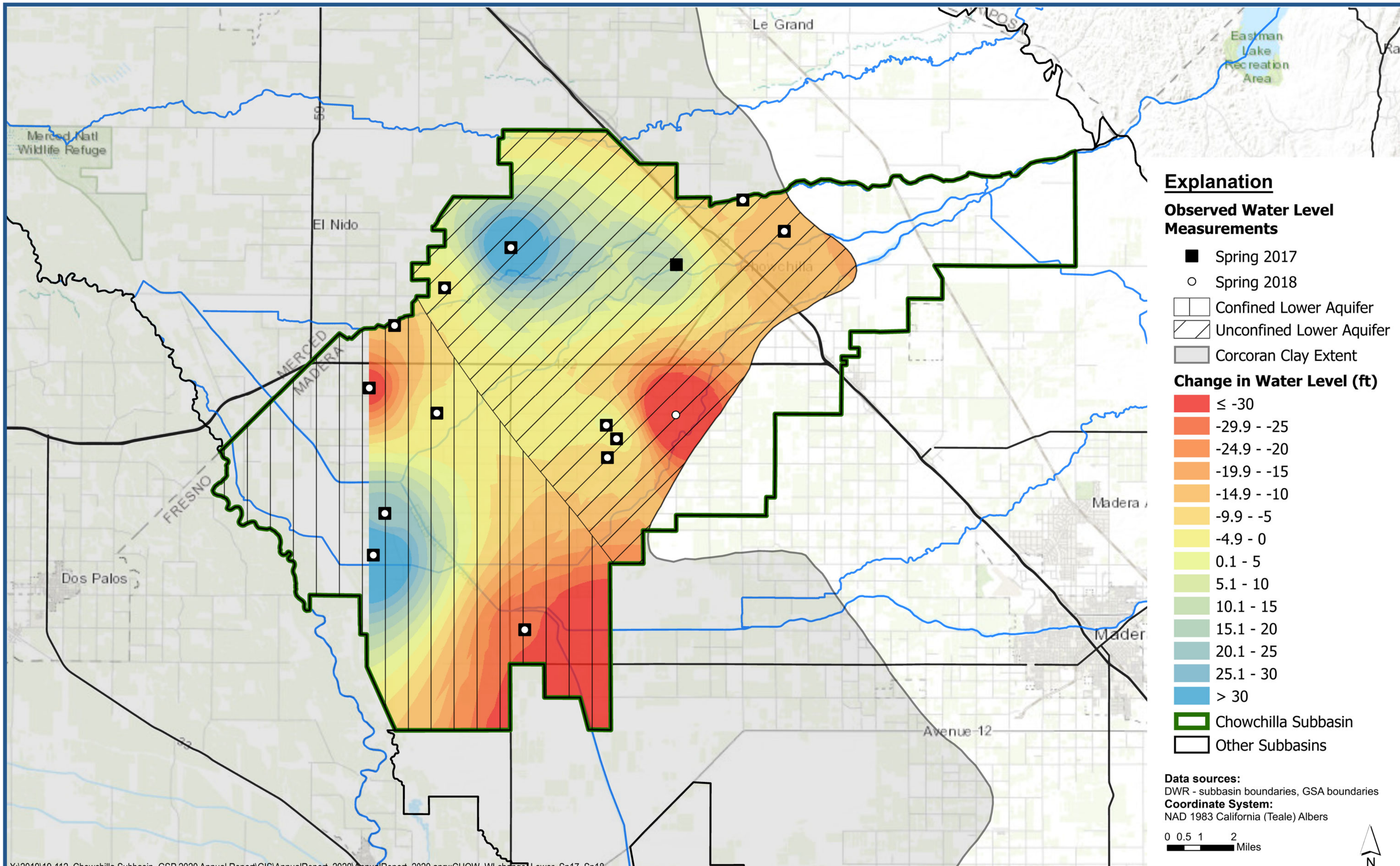
Change in Groundwater Level in the Lower Aquifer - Spring 2016 through Spring 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-3



DAVIDS ENGINEERING, INC

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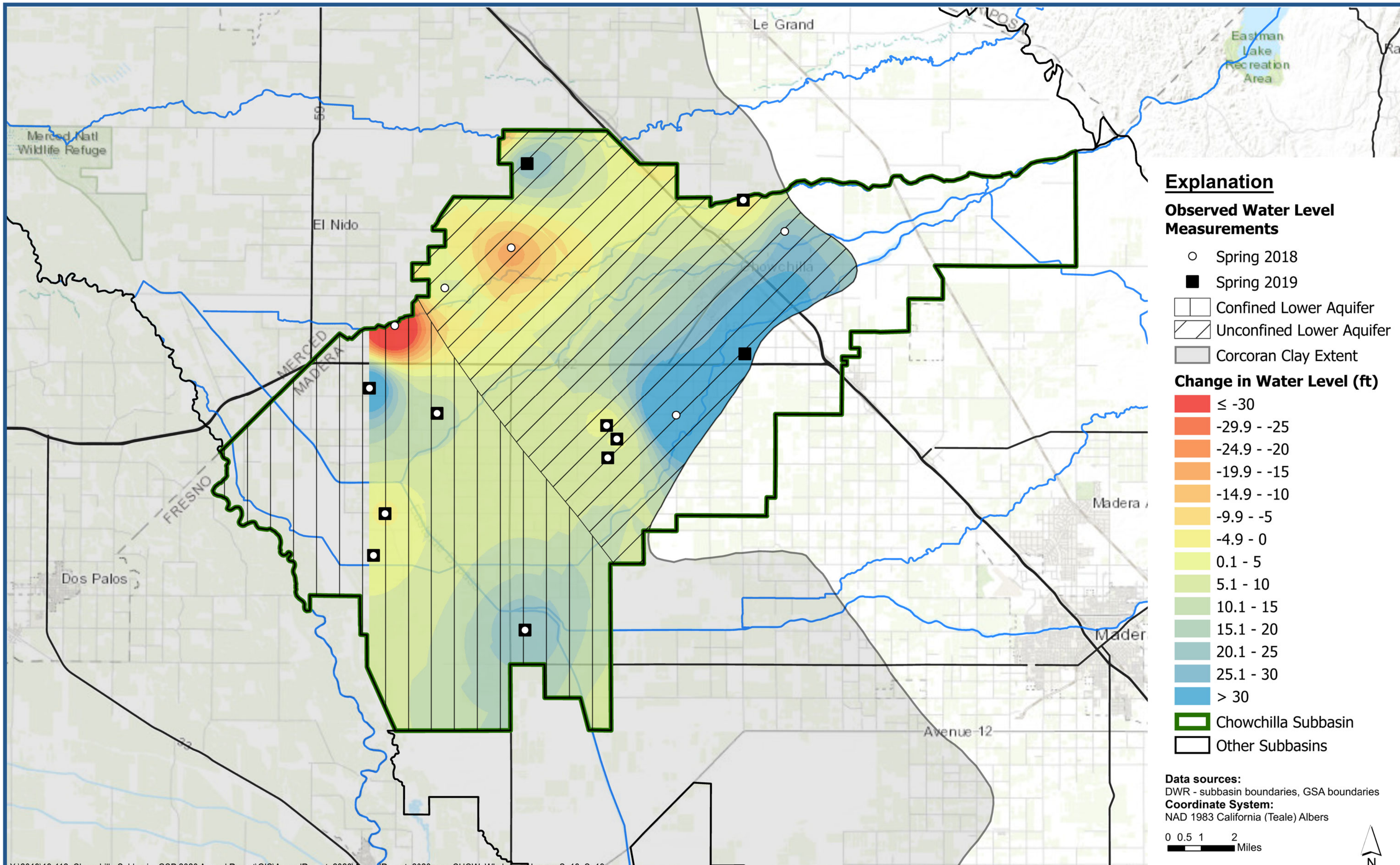
Change in Groundwater Level in the Lower Aquifer - Spring 2017 through Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-4



DAVIDS ENGINEERING, INC

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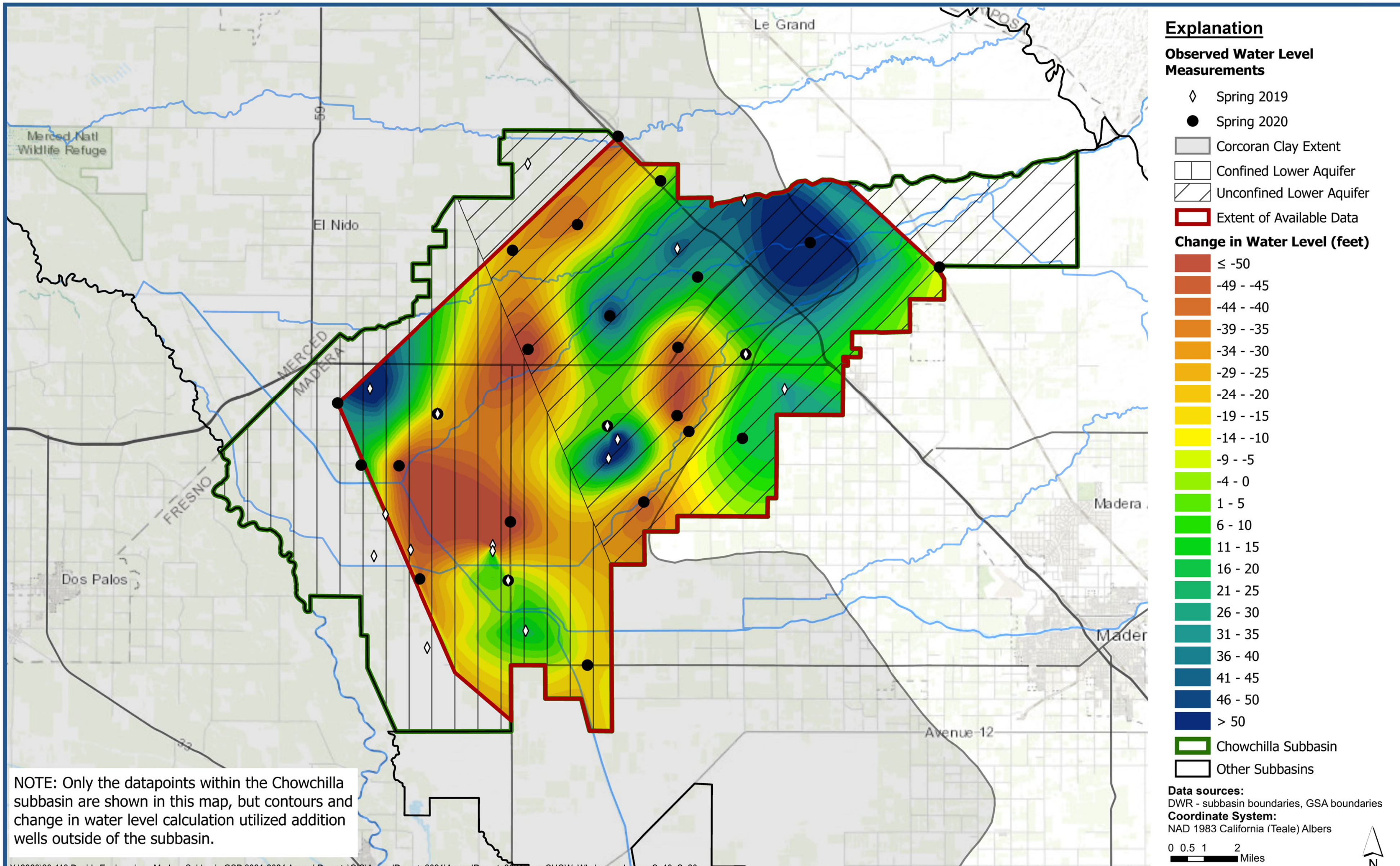
Change in Groundwater Level in the Lower Aquifer - Spring 2018 through Spring 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure 5-2



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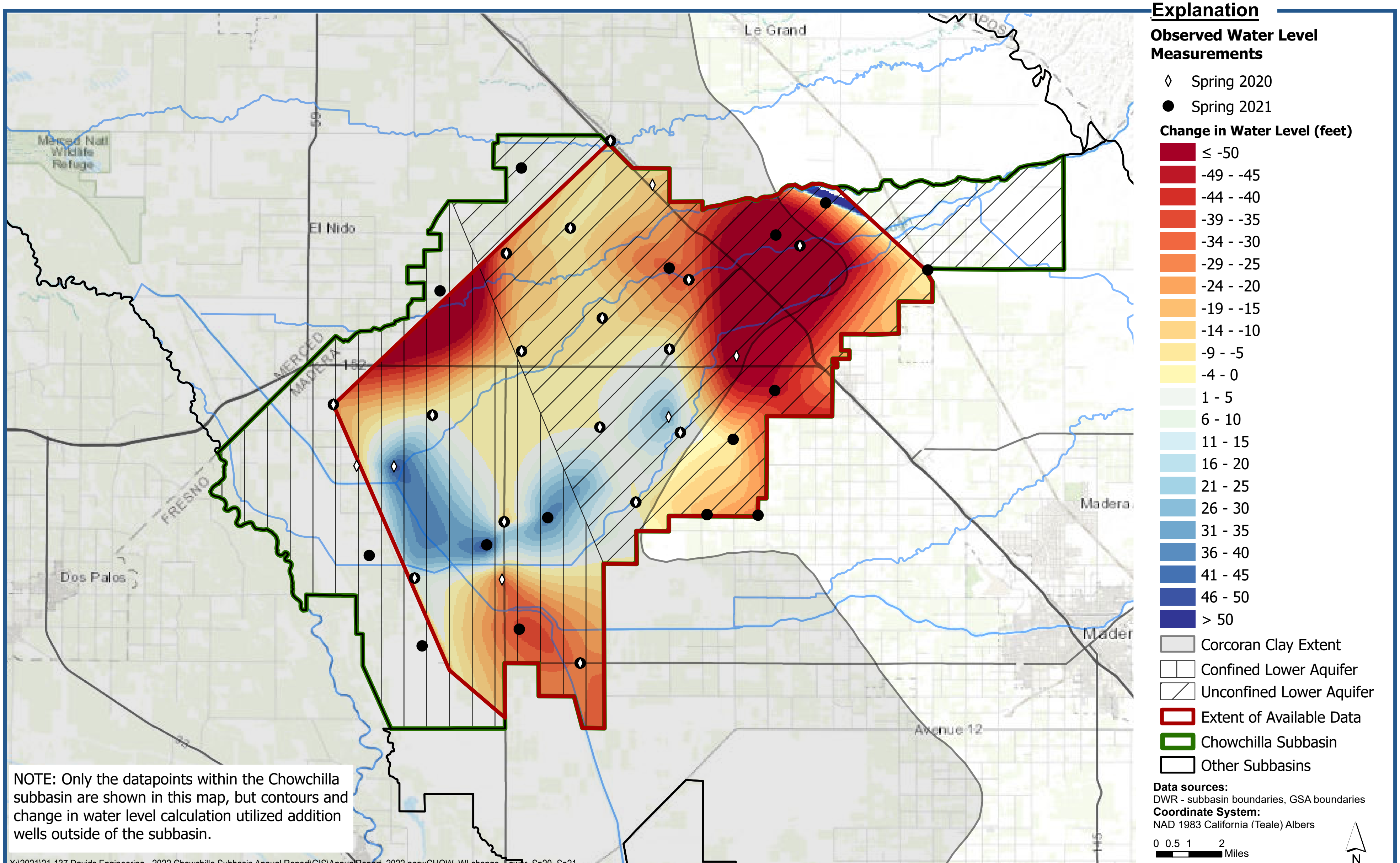
Change in Water Level in the Lower Aquifer - Spring 2019 through Spring 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 5-2



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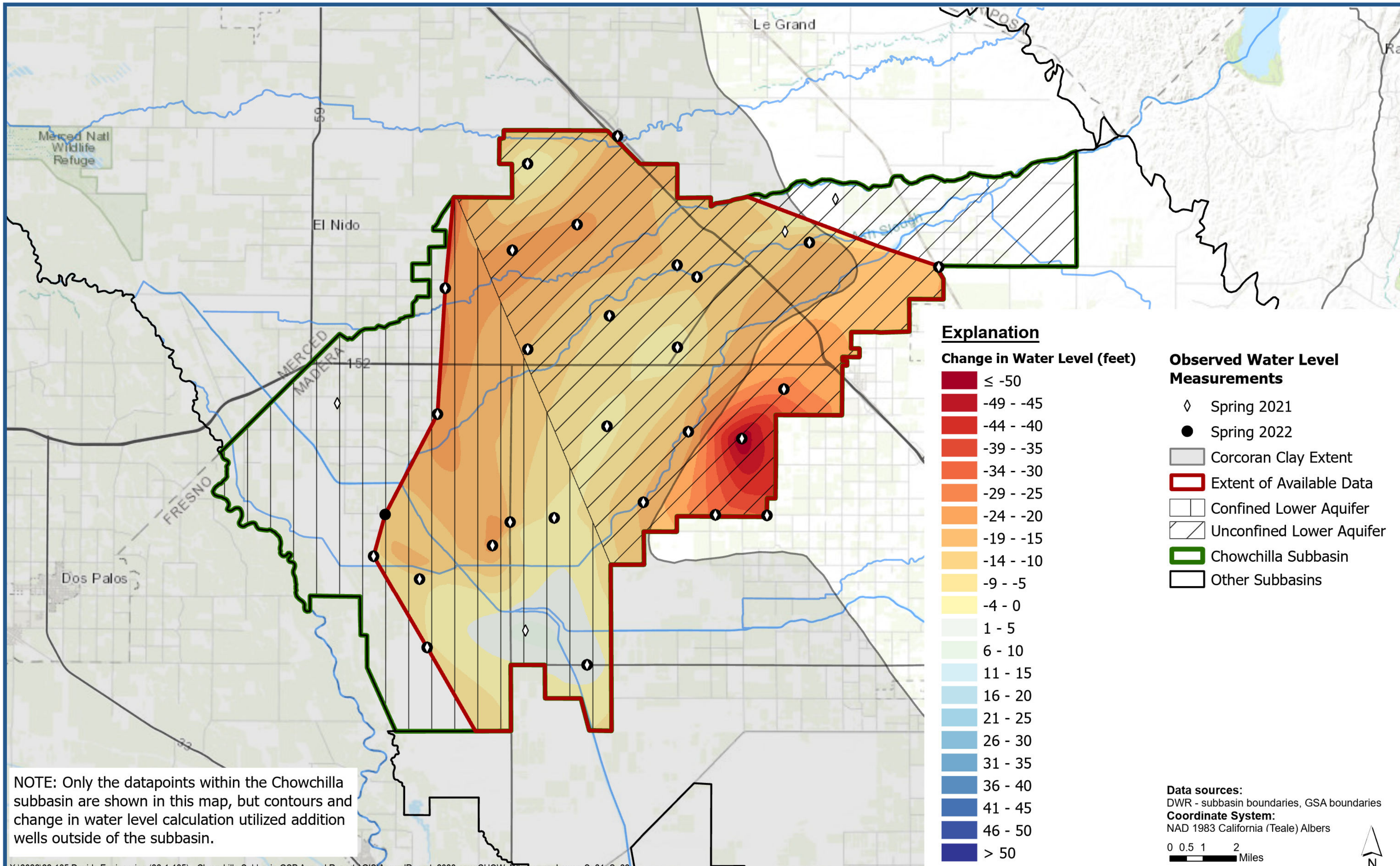
Change in Water Level in the Lower Aquifer - Spring 2020 through Spring 2021

Chowchilla Subbasin
Groundwater Sustainability Plan 2022 Annual Report

Figure 5-2



DAVIDS ENGINEERING, INC

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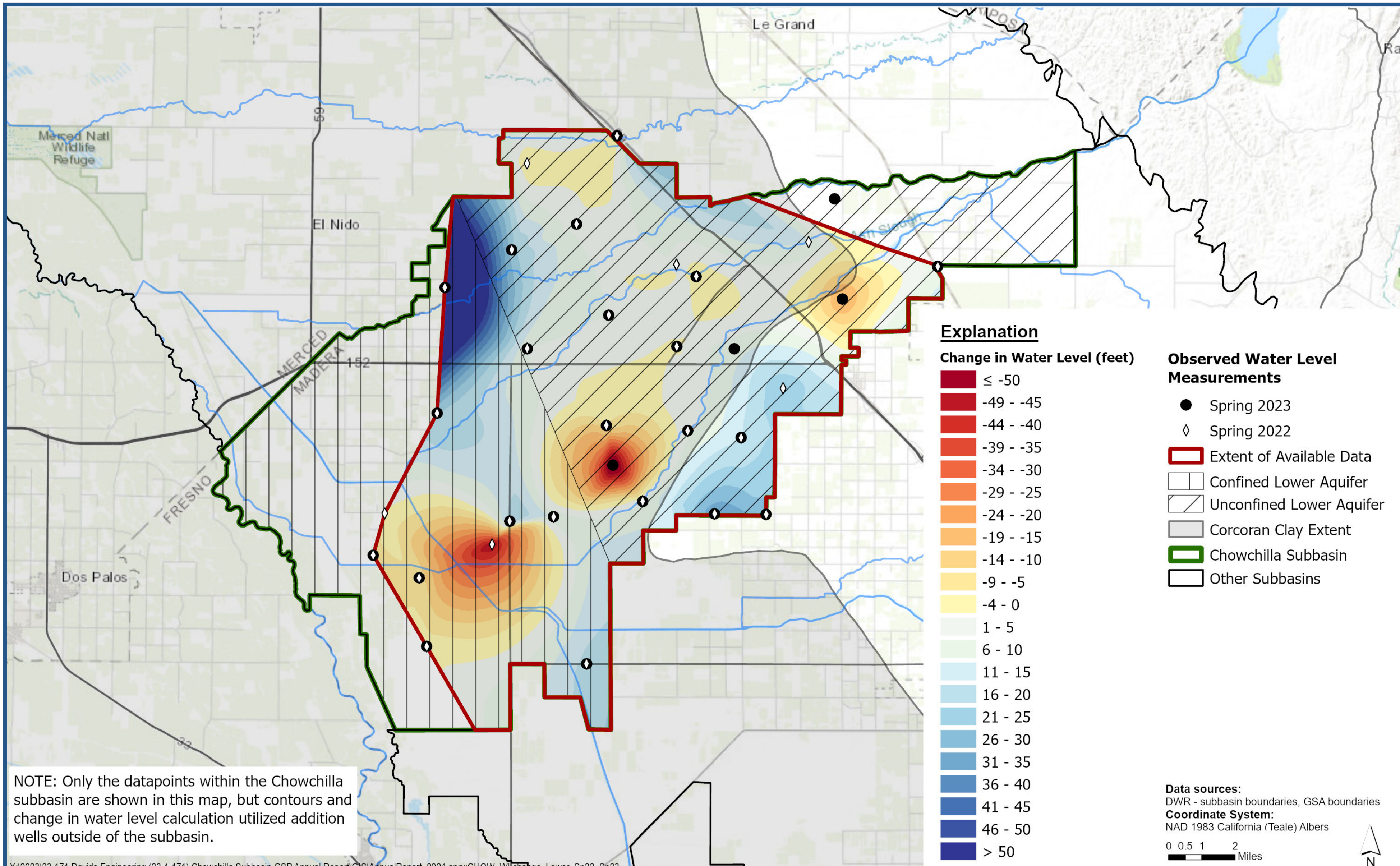
Change in Water Level in the Lower Aquifer - Spring 2021 through Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 5-2



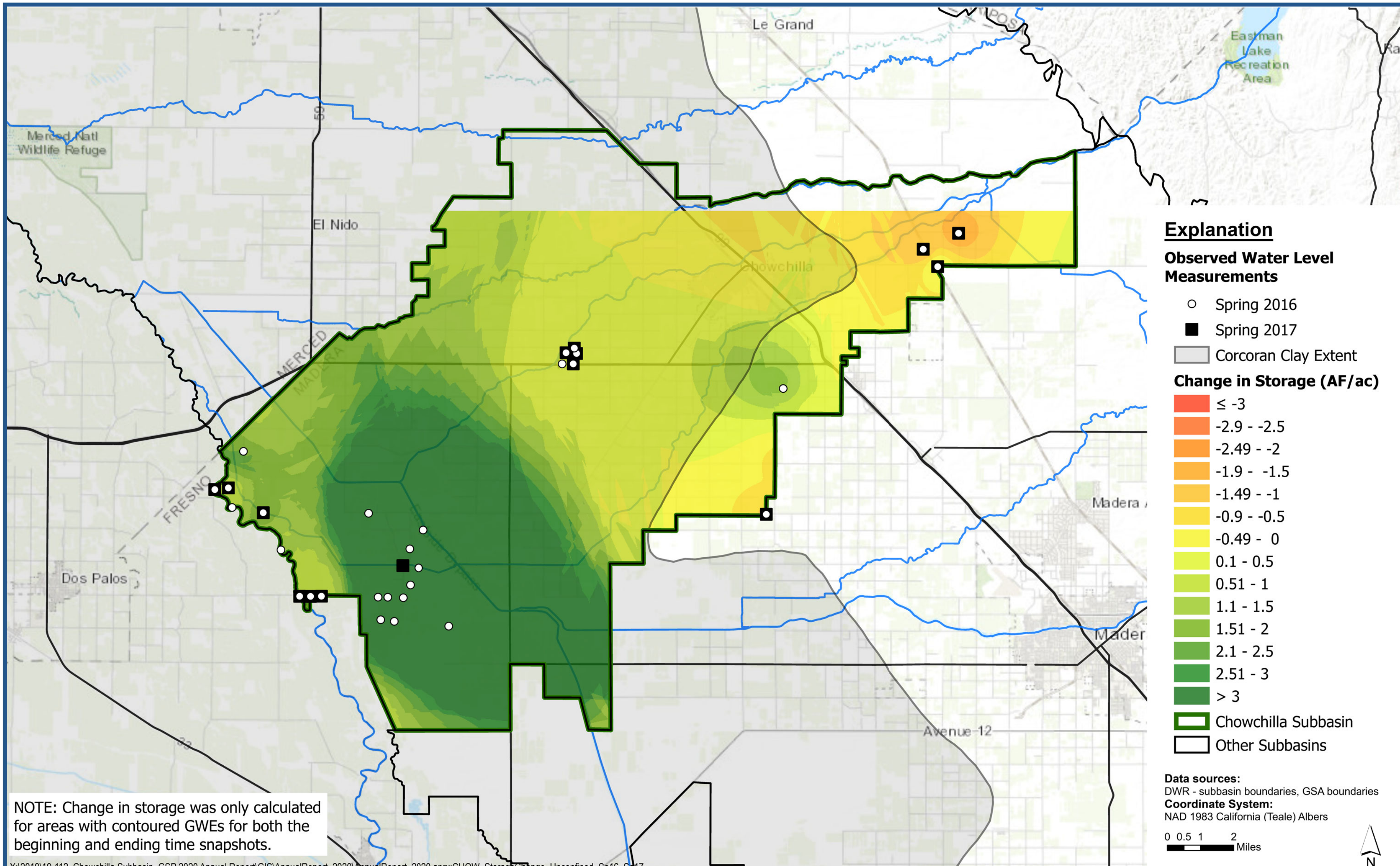
DAVIDS ENGINEERING, INC

Luhdorff & Scalmanini Consulting Engineers

Change in Water Level in the Lower Aquifer - Spring 2022 through Spring 2023

Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

Figure 5-2



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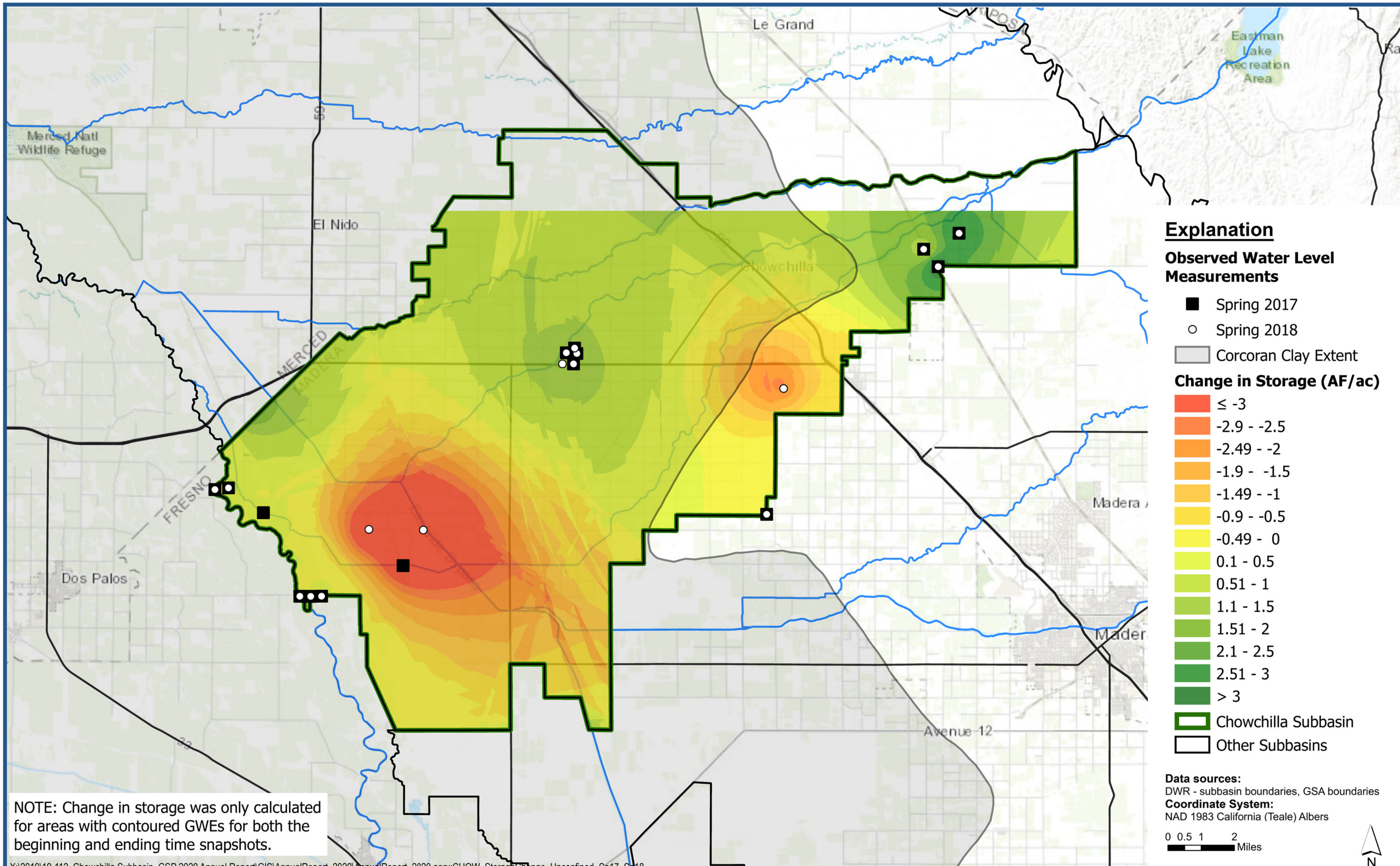
Change in Groundwater Storage in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2016 through Spring 2017

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-5



DAVIDS ENGINEERING, INC

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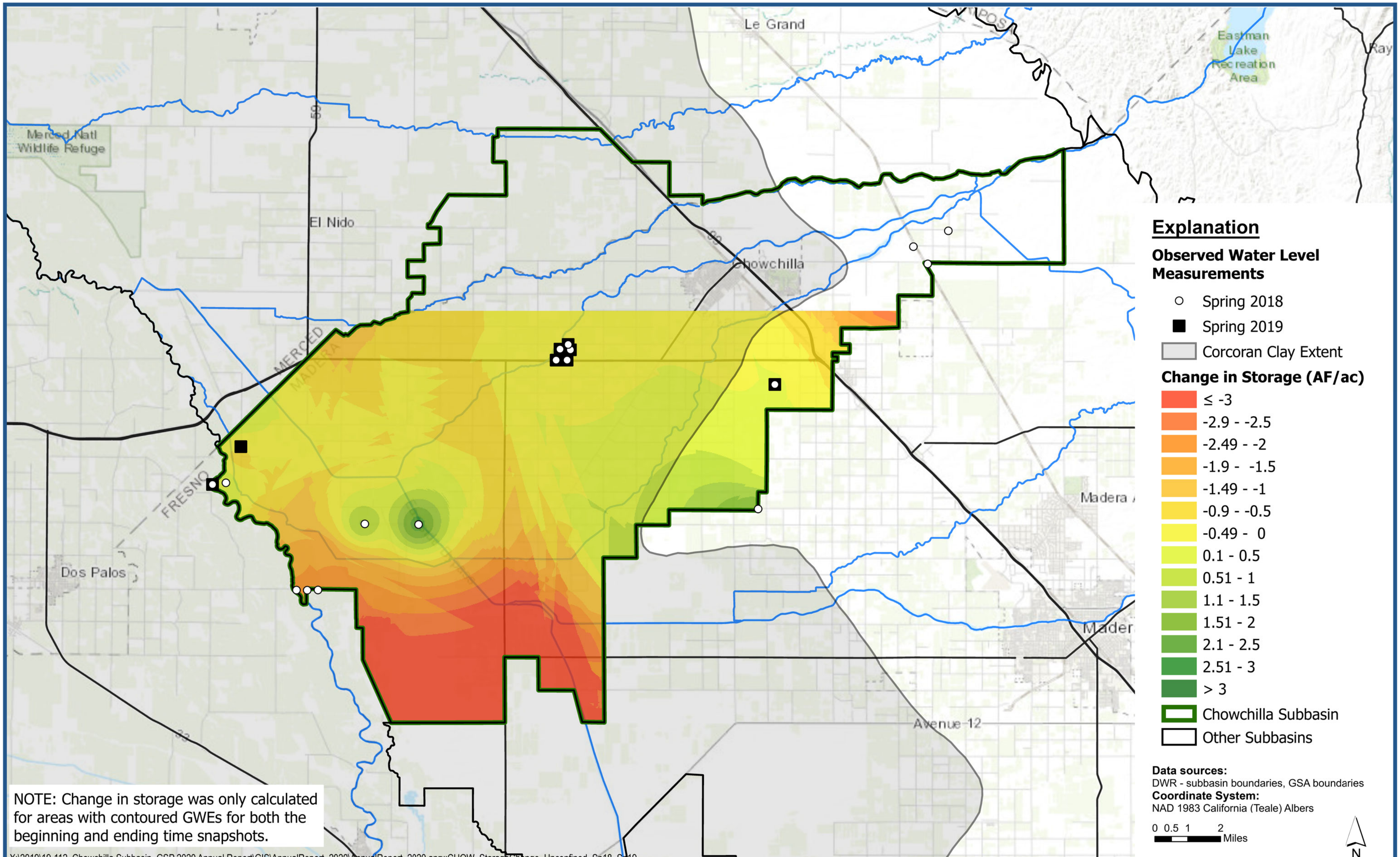
Change in Groundwater Storage in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2017 through Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-6



DAVIDS ENGINEERING, INC

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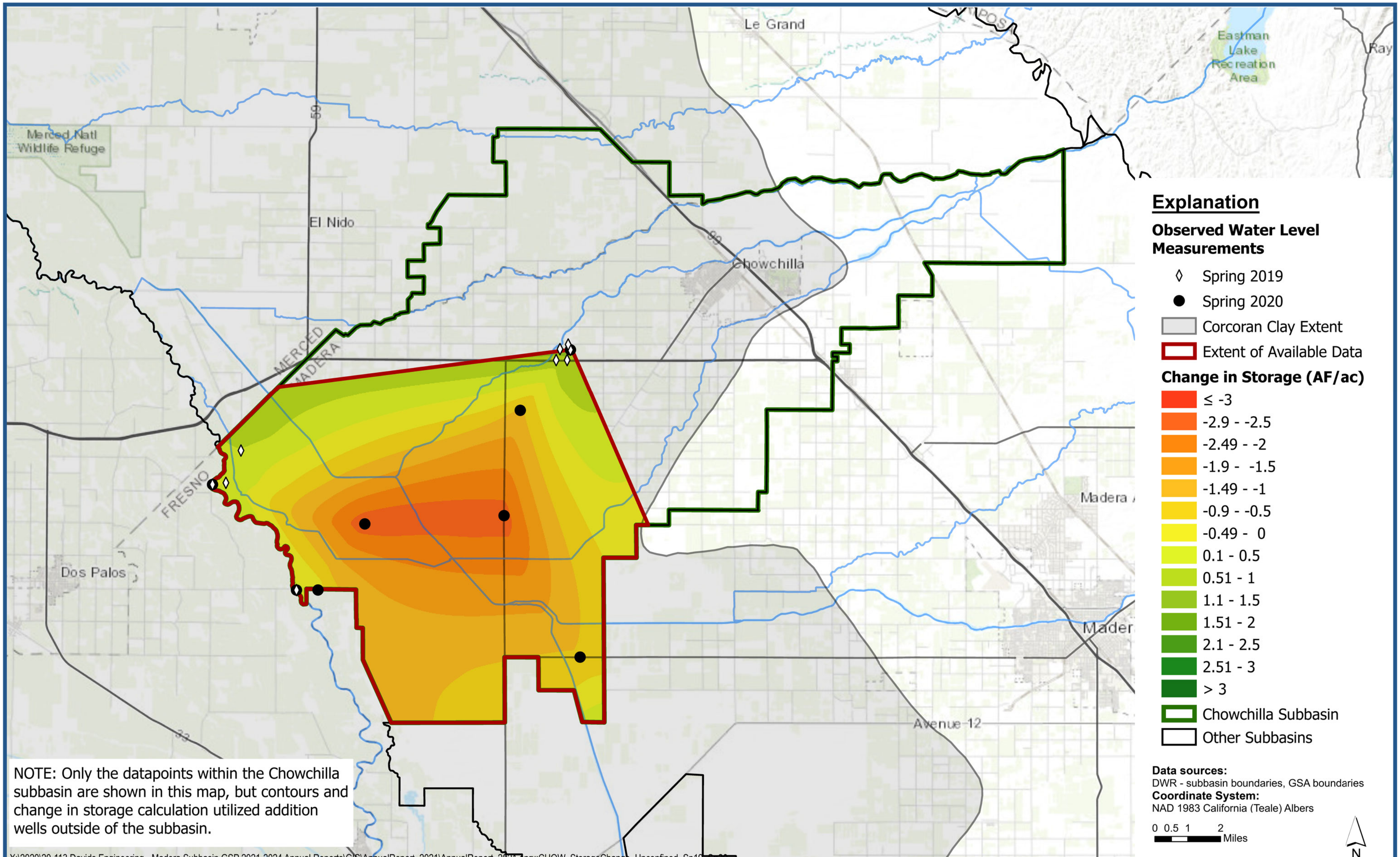
Change in Groundwater Storage in the Upper Aquifer/Undifferentiated Unconfined Zone - Spring 2018 through Spring 2019

Chowchilla Subbasin

Groundwater Sustainability Plan 2020 Annual Report

Figure 5-3



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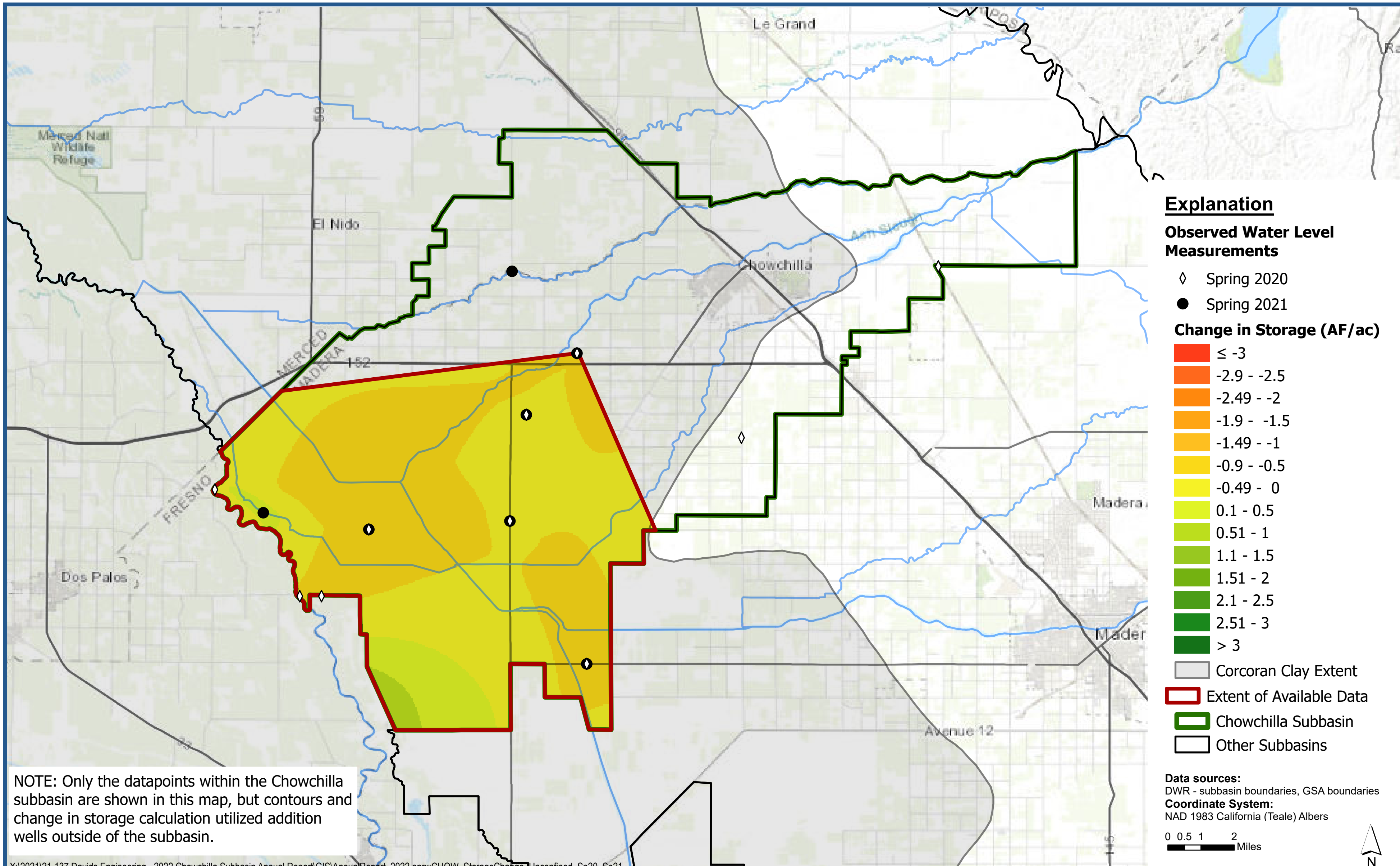
Change in Groundwater Storage in the Upper Aquifer/ Undifferentiated Unconfined Zone - Spring 2019 through Spring 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 5-3



DAVIDS ENGINEERING, INC

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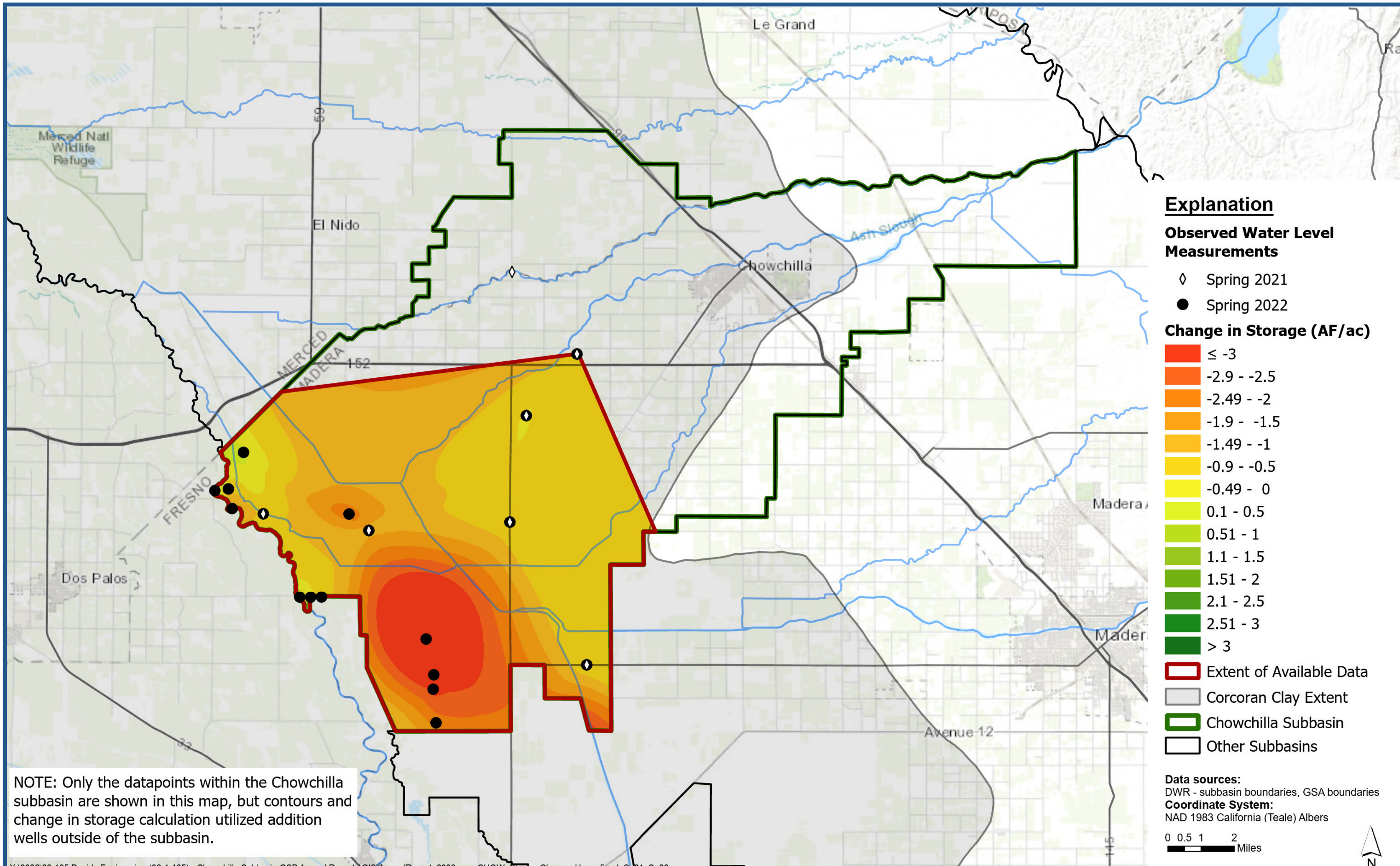
Change in Groundwater Storage in the Upper Aquifer/ Undifferentiated Unconfined Zone - Spring 2020 through Spring 2021

Chowchilla Subbasin
Groundwater Sustainability Plan 2022 Annual Report

Figure 5-3



DAVIDS ENGINEERING, INC

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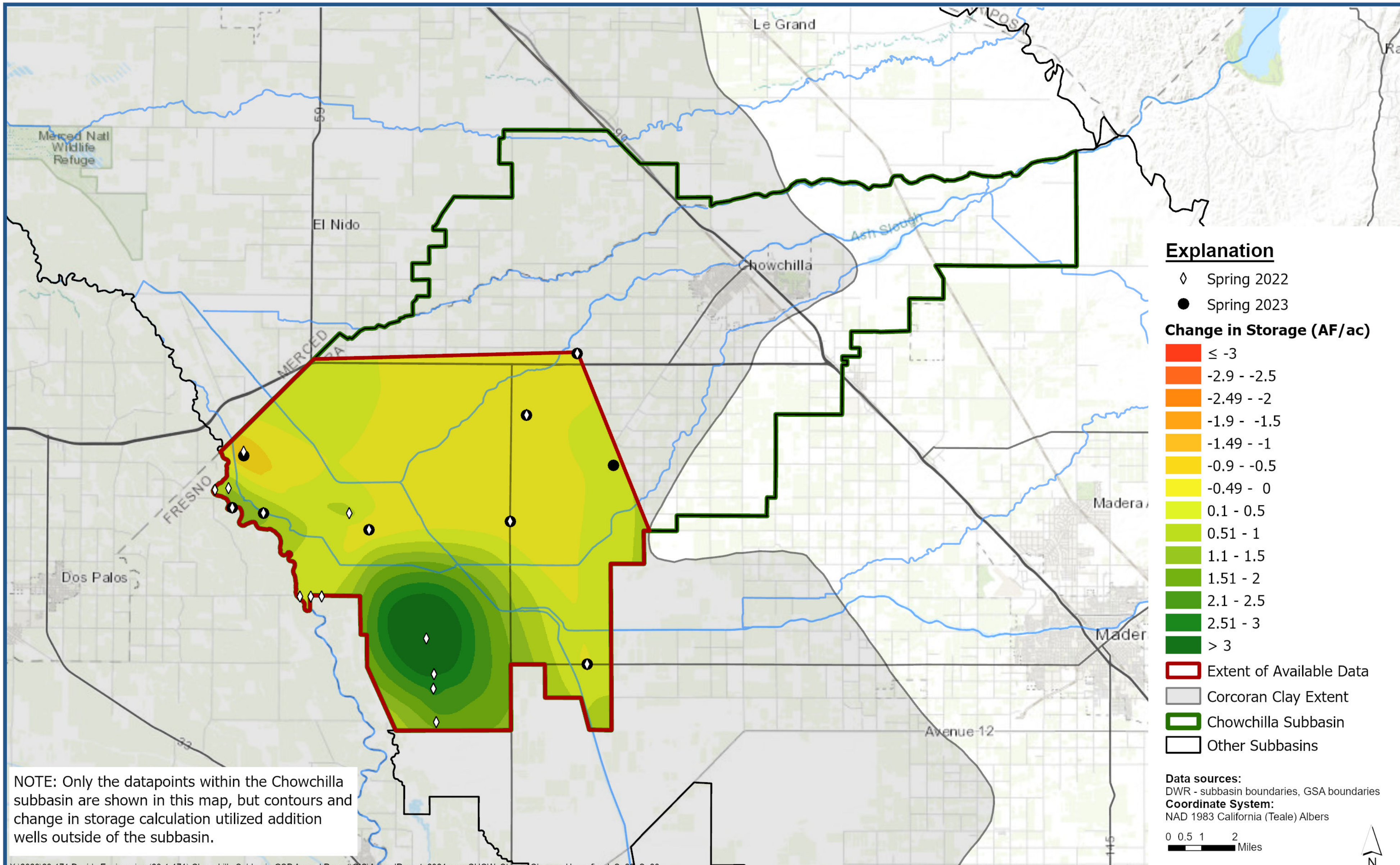
Change in Groundwater Storage in the Upper Aquifer/ Undifferentiated Unconfined Zone - Spring 2021 through Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 5-3



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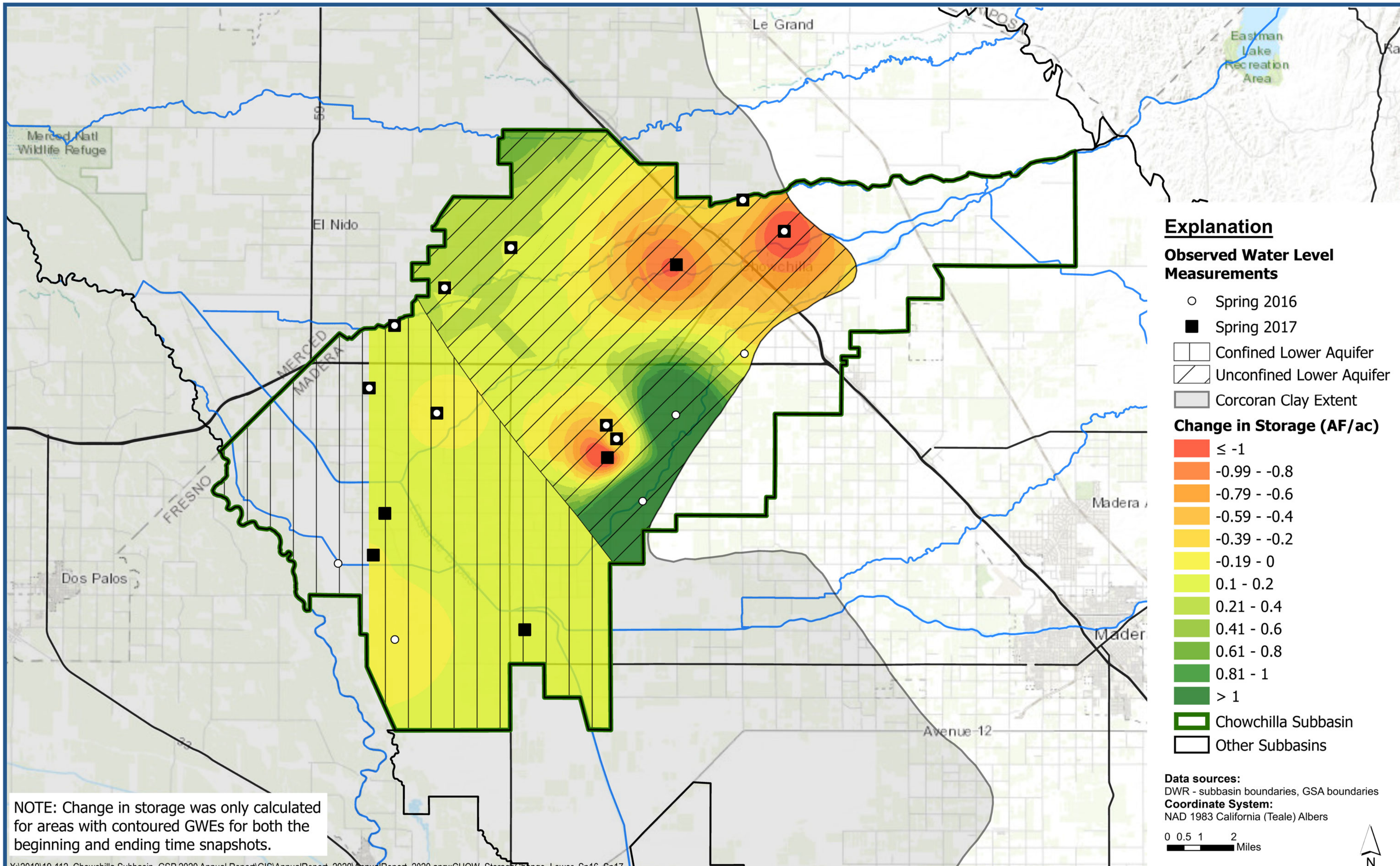
Change in Groundwater Storage in the Upper Aquifer/ Undifferentiated Unconfined Zone - Spring 2022 through Spring 2023

Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

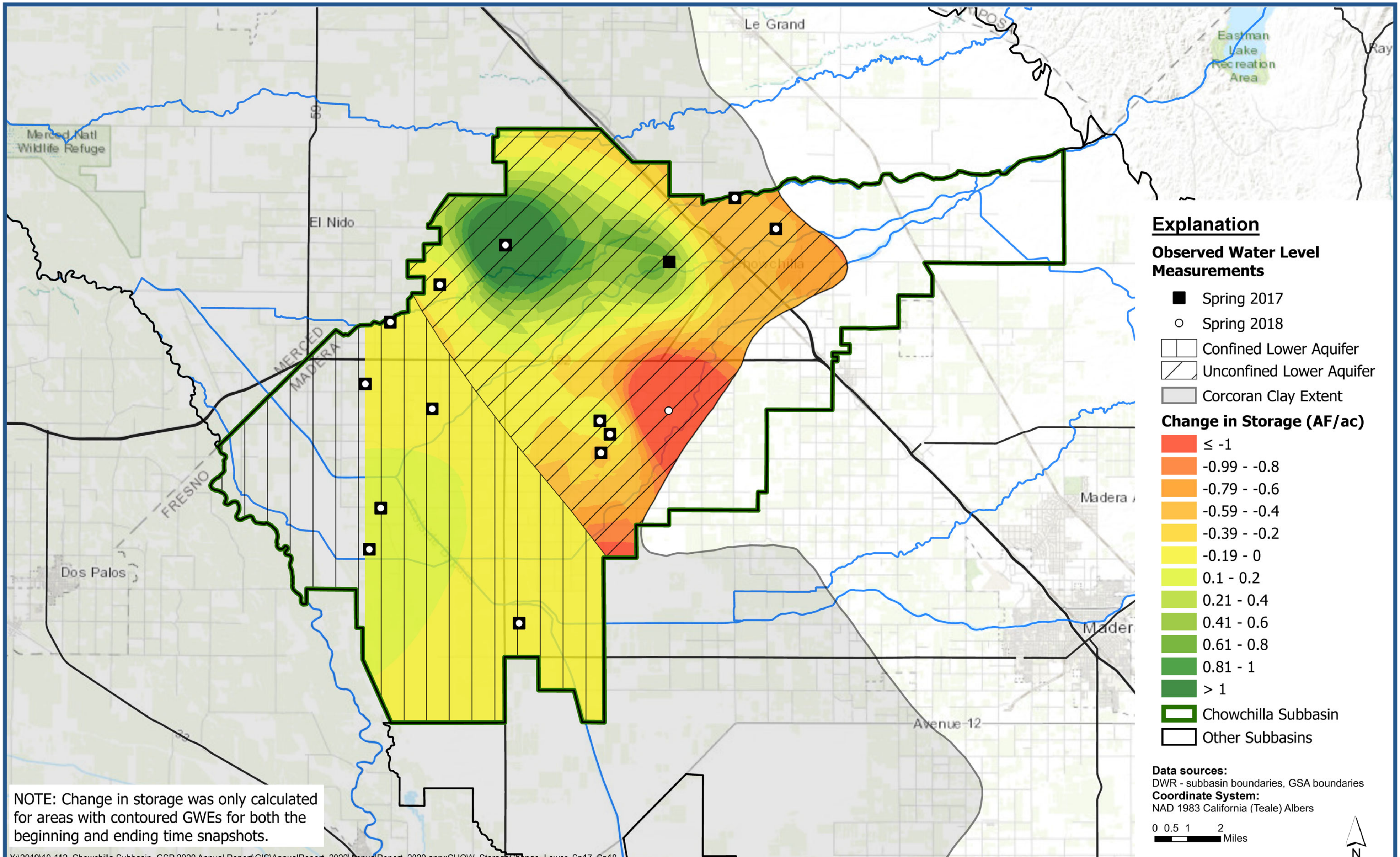
Figure 5-3



Change in Groundwater Storage in the Lower Aquifer - Spring 2016 through Spring 2017

Figure C-7

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report



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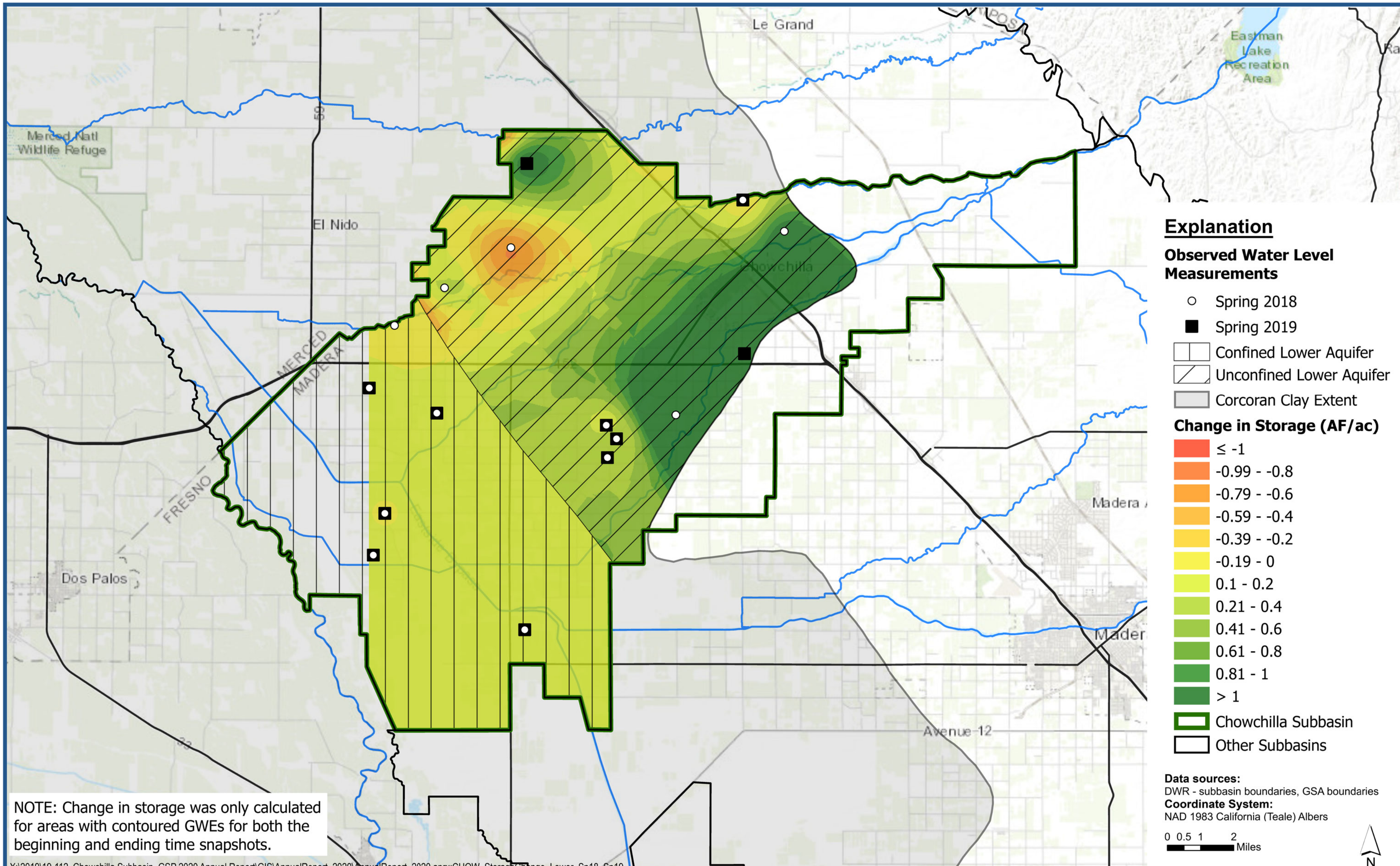
Change in Groundwater Storage in the Lower Aquifer - Spring 2017 through Spring 2018

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure C-8



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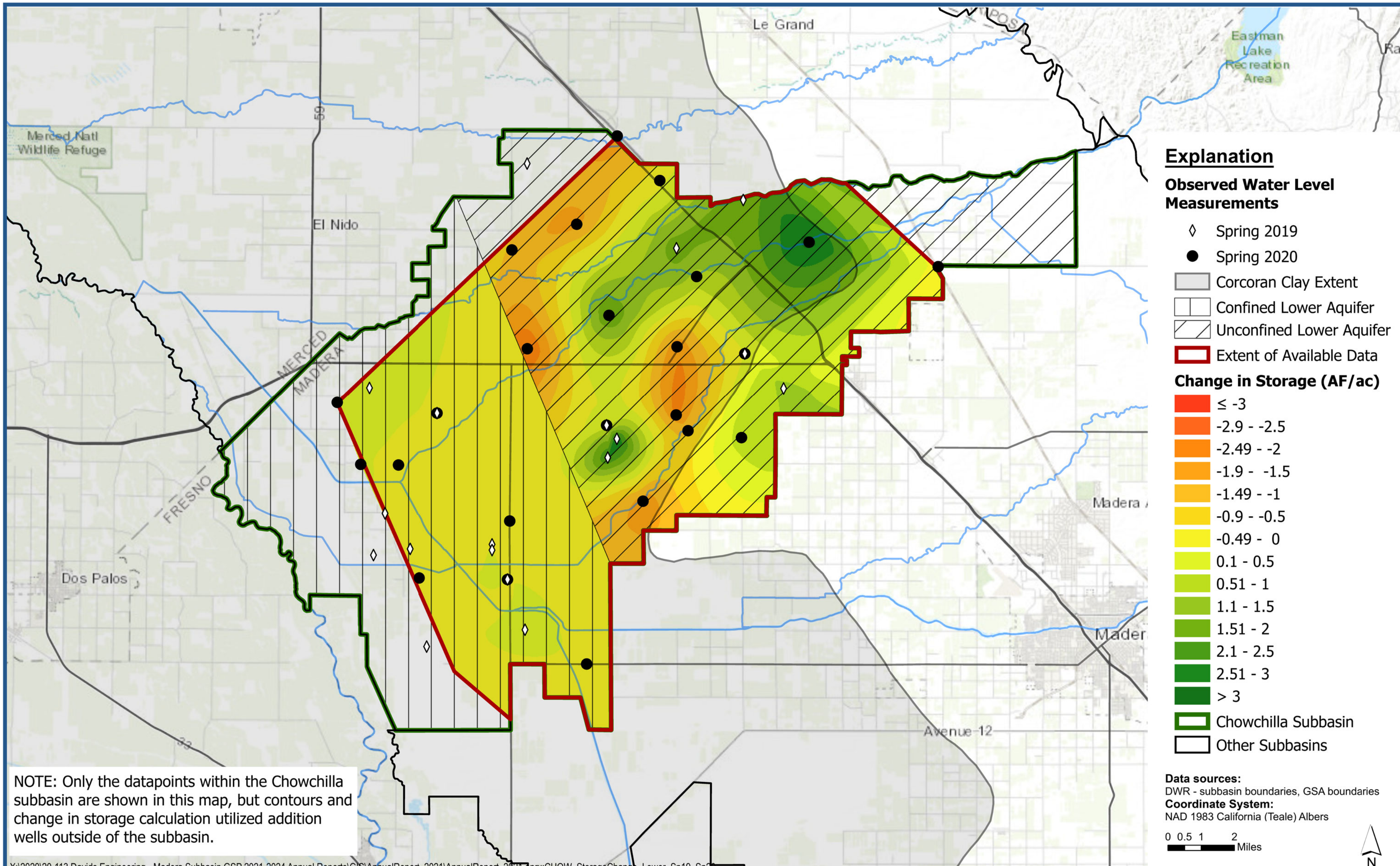
Change in Groundwater Storage in the Lower Aquifer - Spring 2018 through Spring 2019

Chowchilla Subbasin
Groundwater Sustainability Plan 2020 Annual Report

Figure 5-4



DAVIDS ENGINEERING, INC

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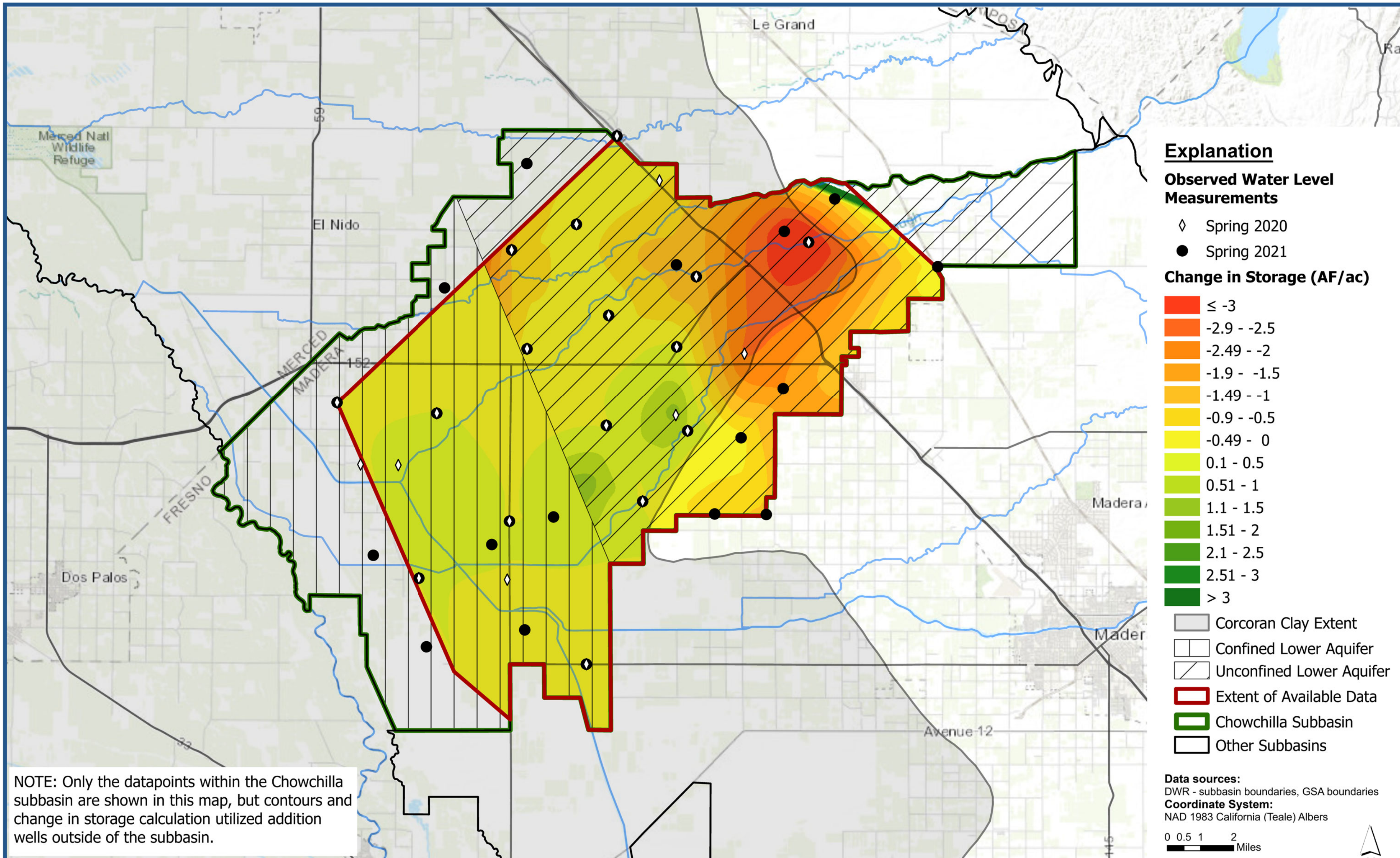
Change in Groundwater Storage in the Lower Aquifer - Spring 2019 through Spring 2020

Chowchilla Subbasin
Groundwater Sustainability Plan 2021 Annual Report

Figure 5-4



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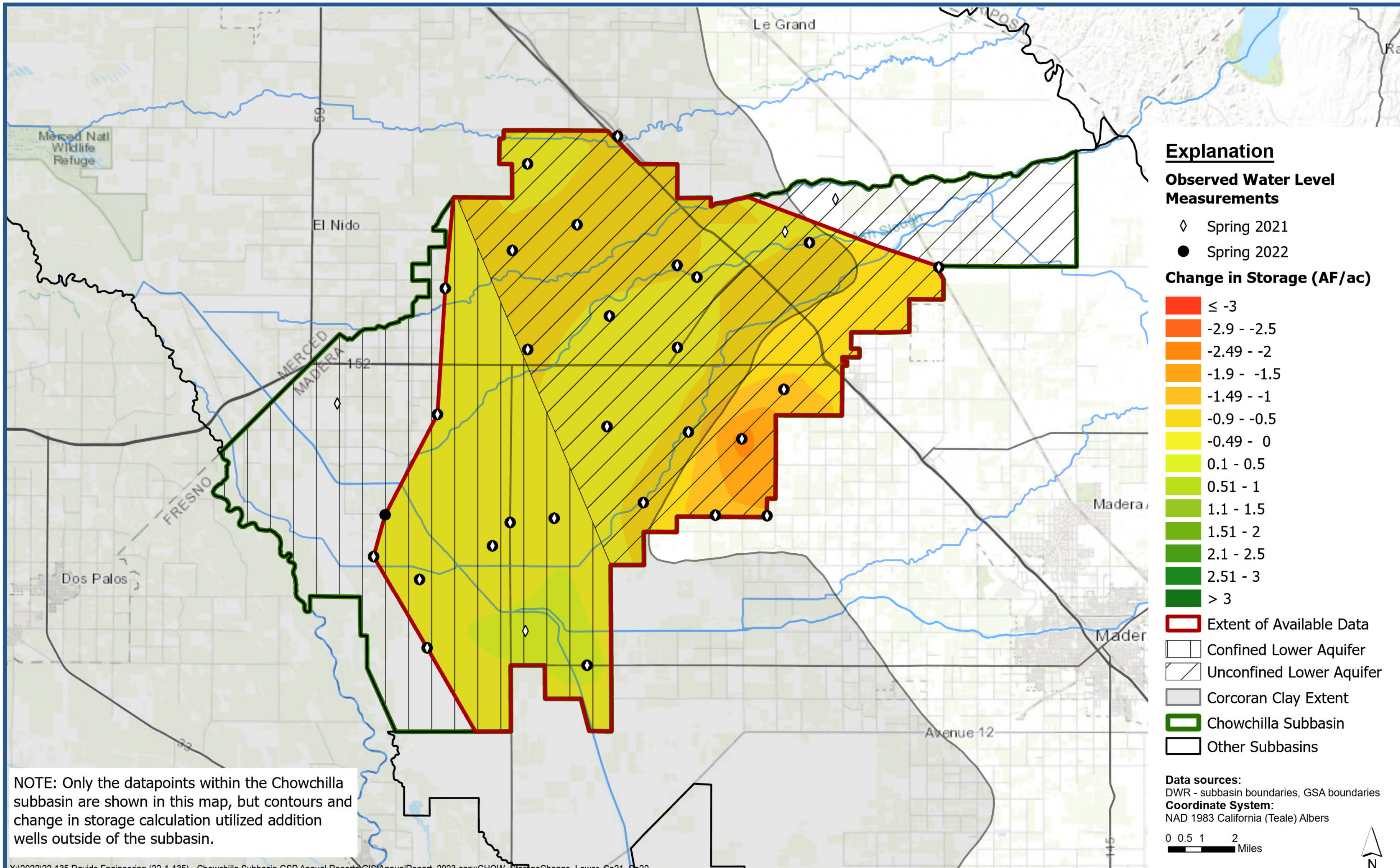
Change in Groundwater Storage in the Lower Aquifer - Spring 2020 through Spring 2021

Chowchilla Subbasin
Groundwater Sustainability Plan 2022 Annual Report

Figure 5-4



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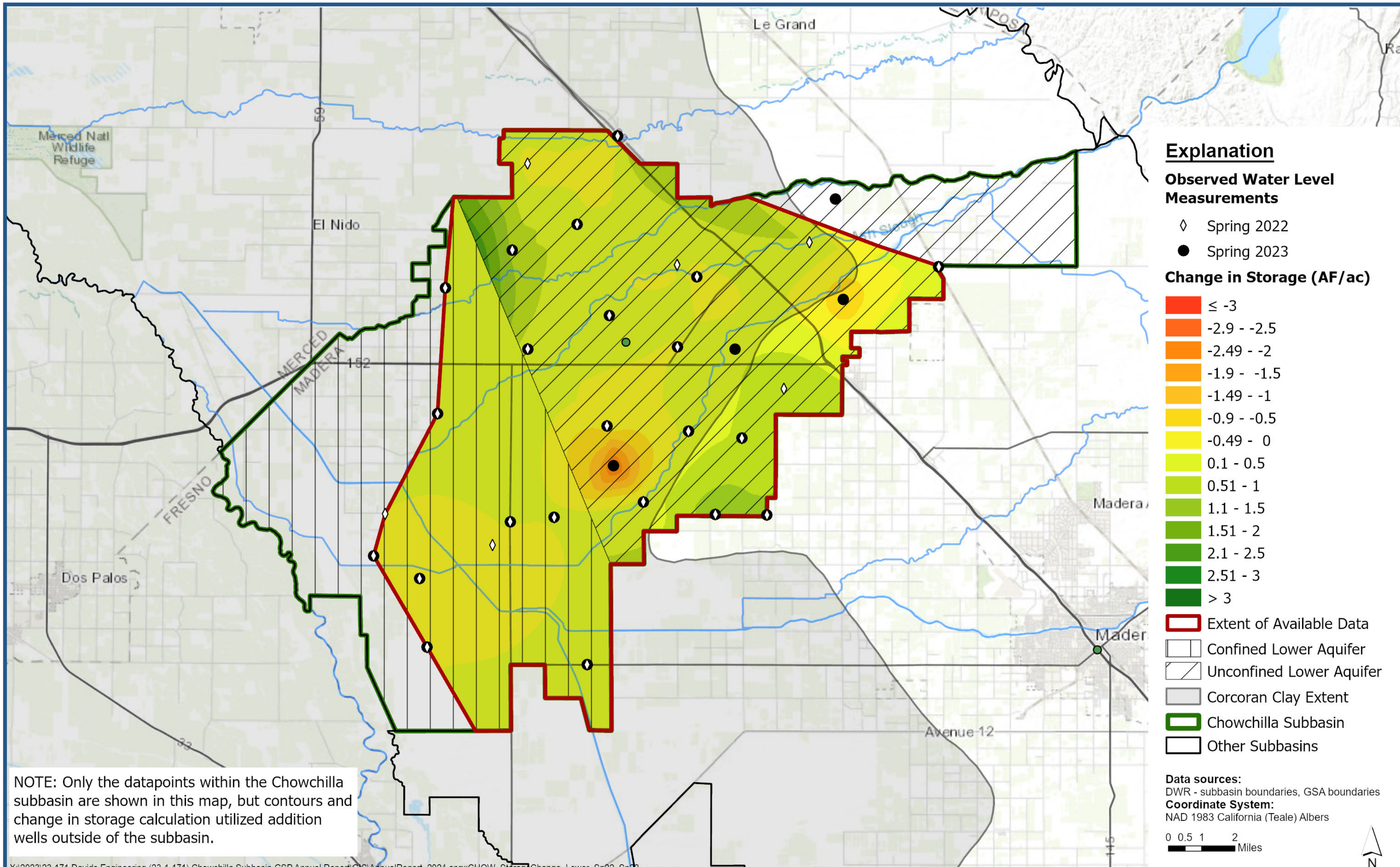
Change in Groundwater Storage in the Lower Aquifer - Spring 2021 through Spring 2022

Chowchilla Subbasin
Groundwater Sustainability Plan 2023 Annual Report

Figure 5-4



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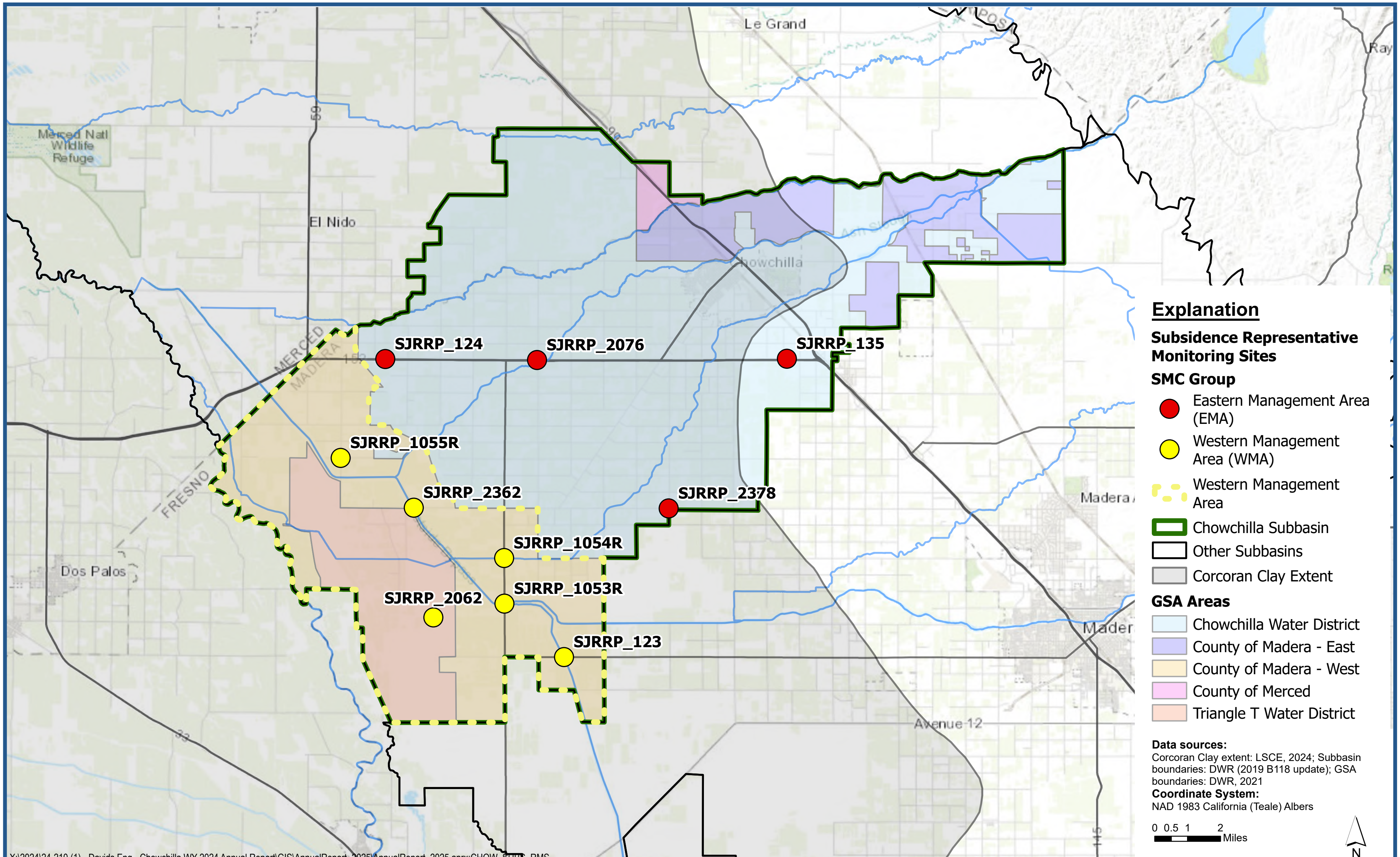
Change in Groundwater Storage in the Lower Aquifer - Spring 2022 through Spring 2023

Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

Figure 5-4

Appendix D. Maps of Annual and Cumulative Subsidence in 2015 through 2024.



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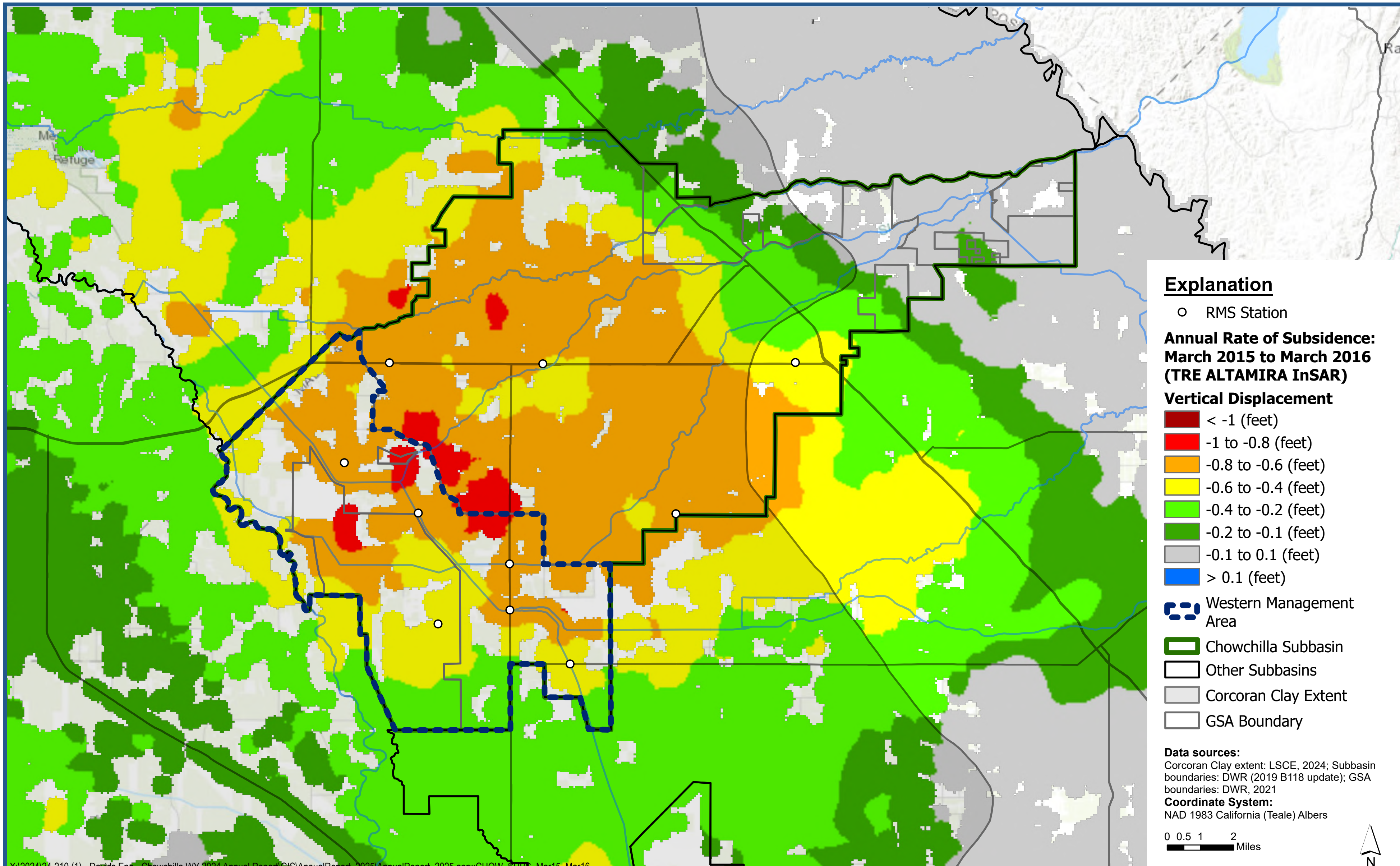
Land Subsidence Sustainable Indicator Stations

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

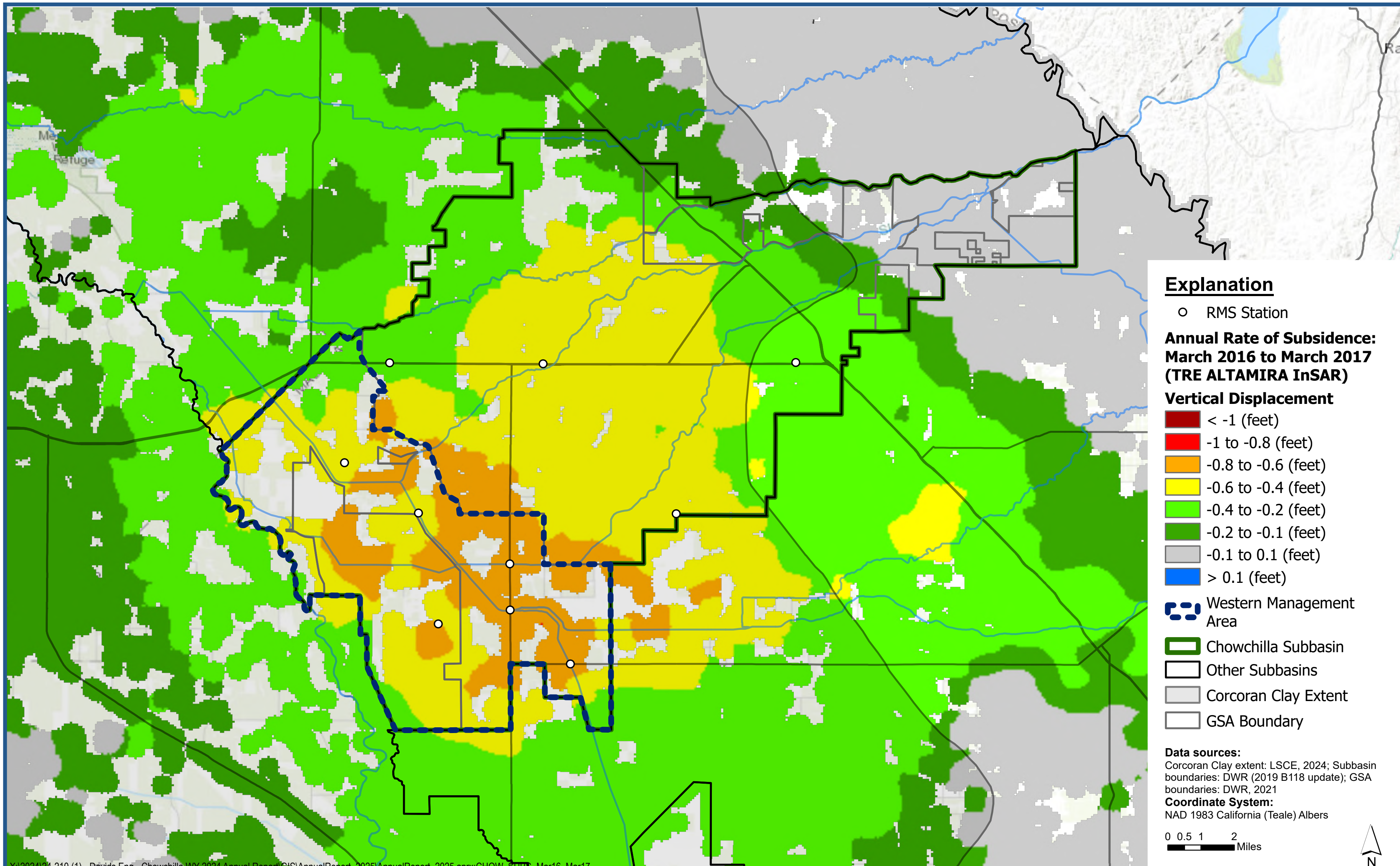
Figure D-1



Annual Rate of Subsidence: March 2015 to March 2016 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-2



Annual Rate of Subsidence: March 2016 to March 2017 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-3

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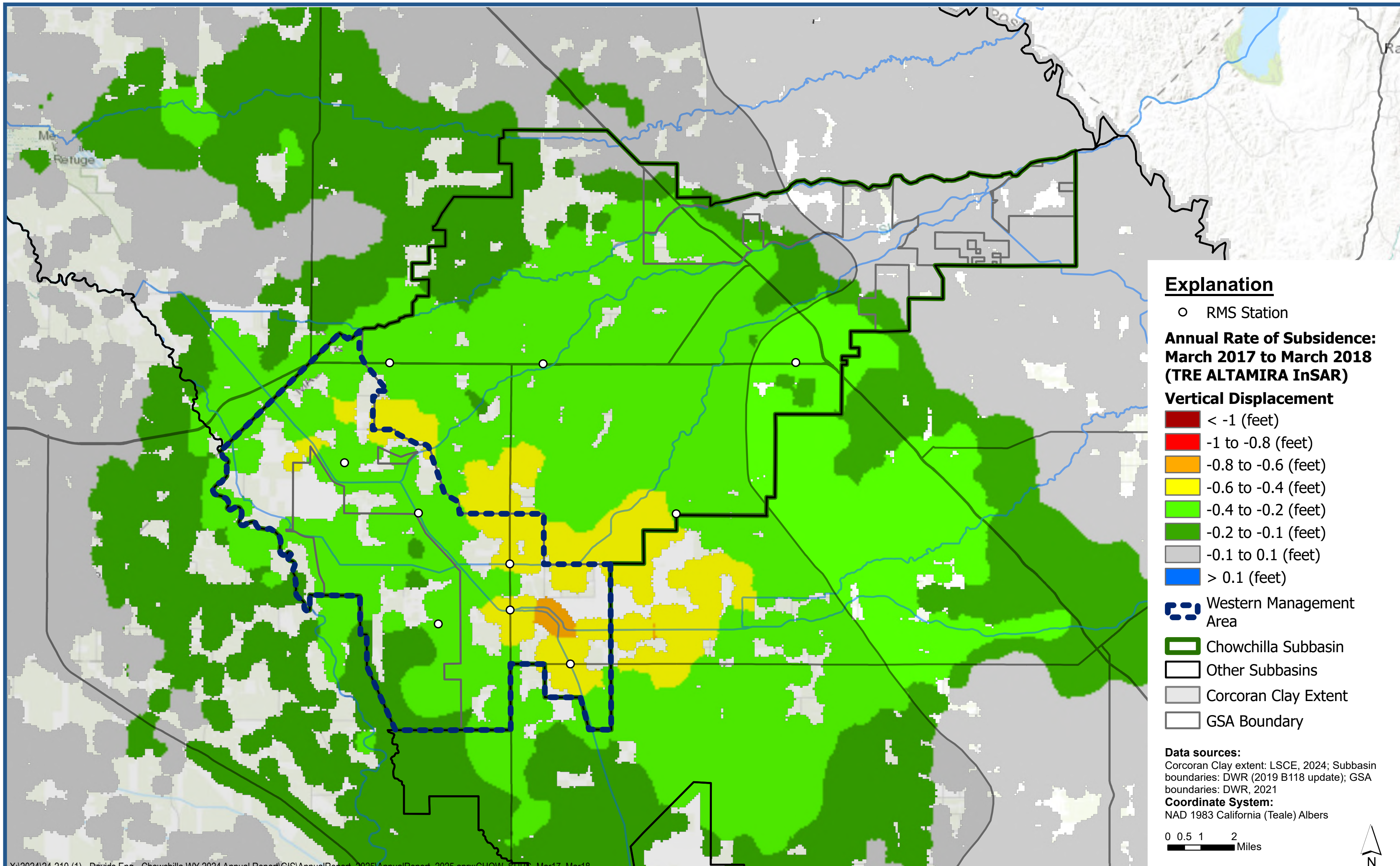

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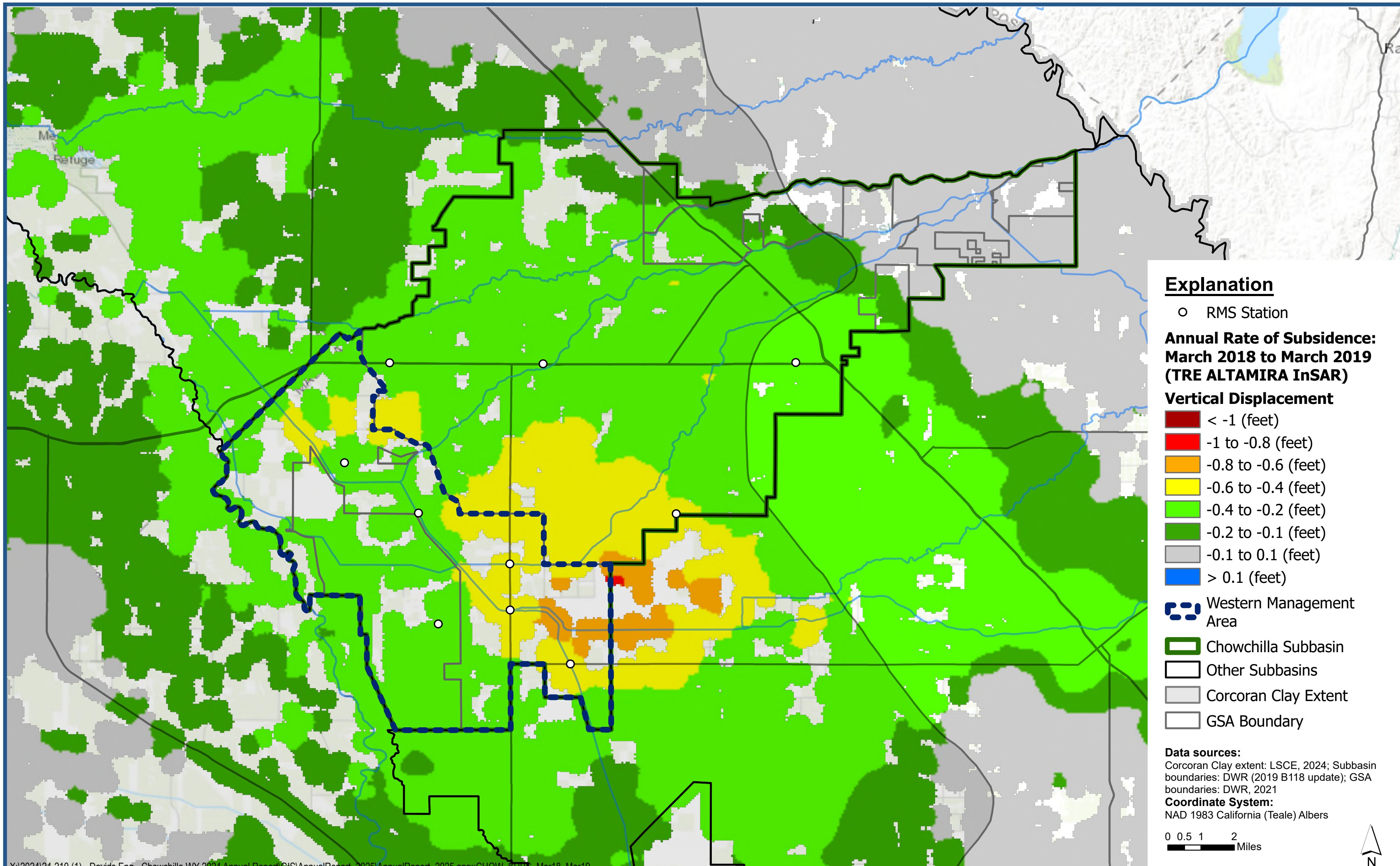
Annual Rate of Subsidence: March 2017 to March 2018 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-4



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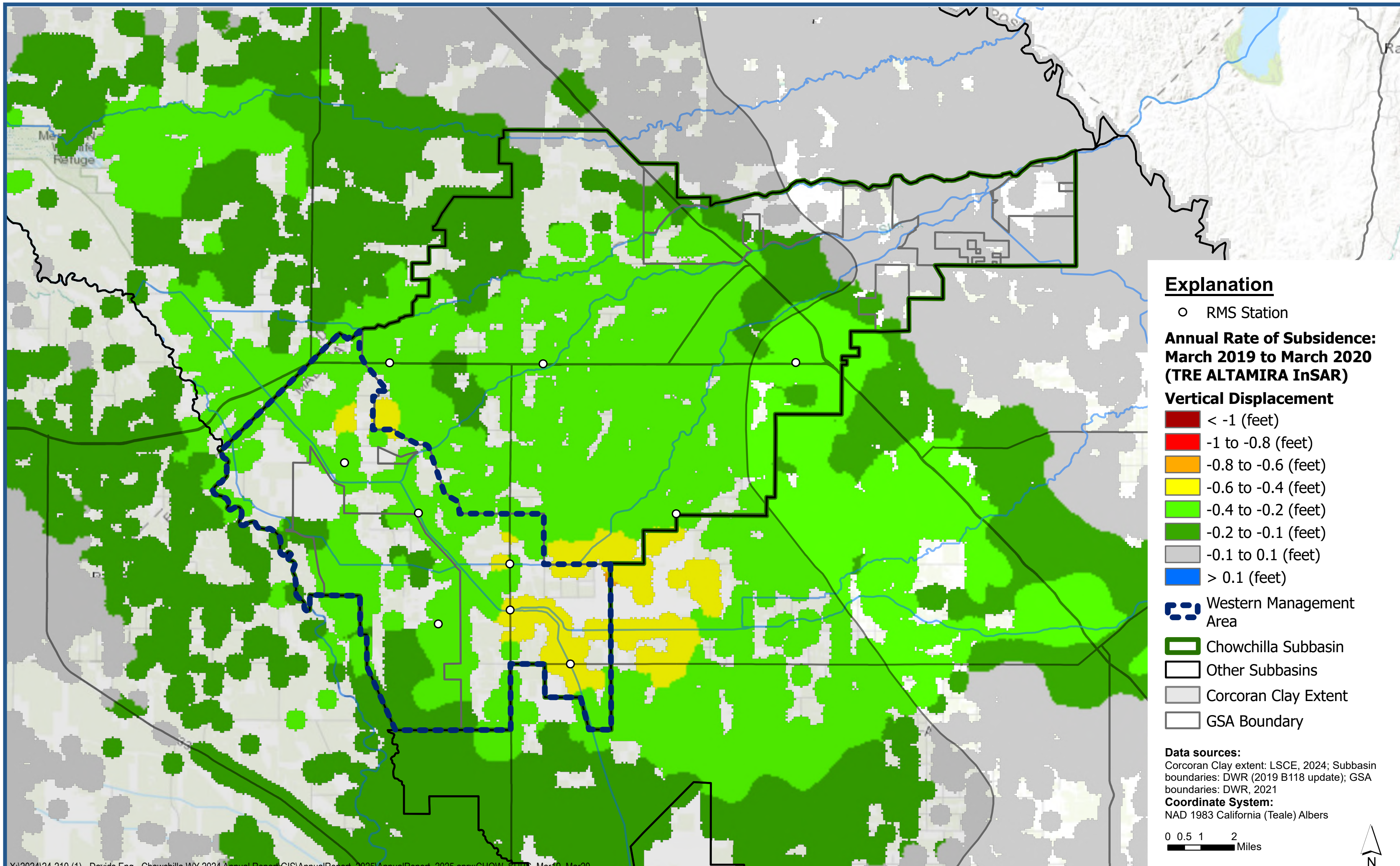
Annual Rate of Subsidence: March 2018 to March 2019 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-5



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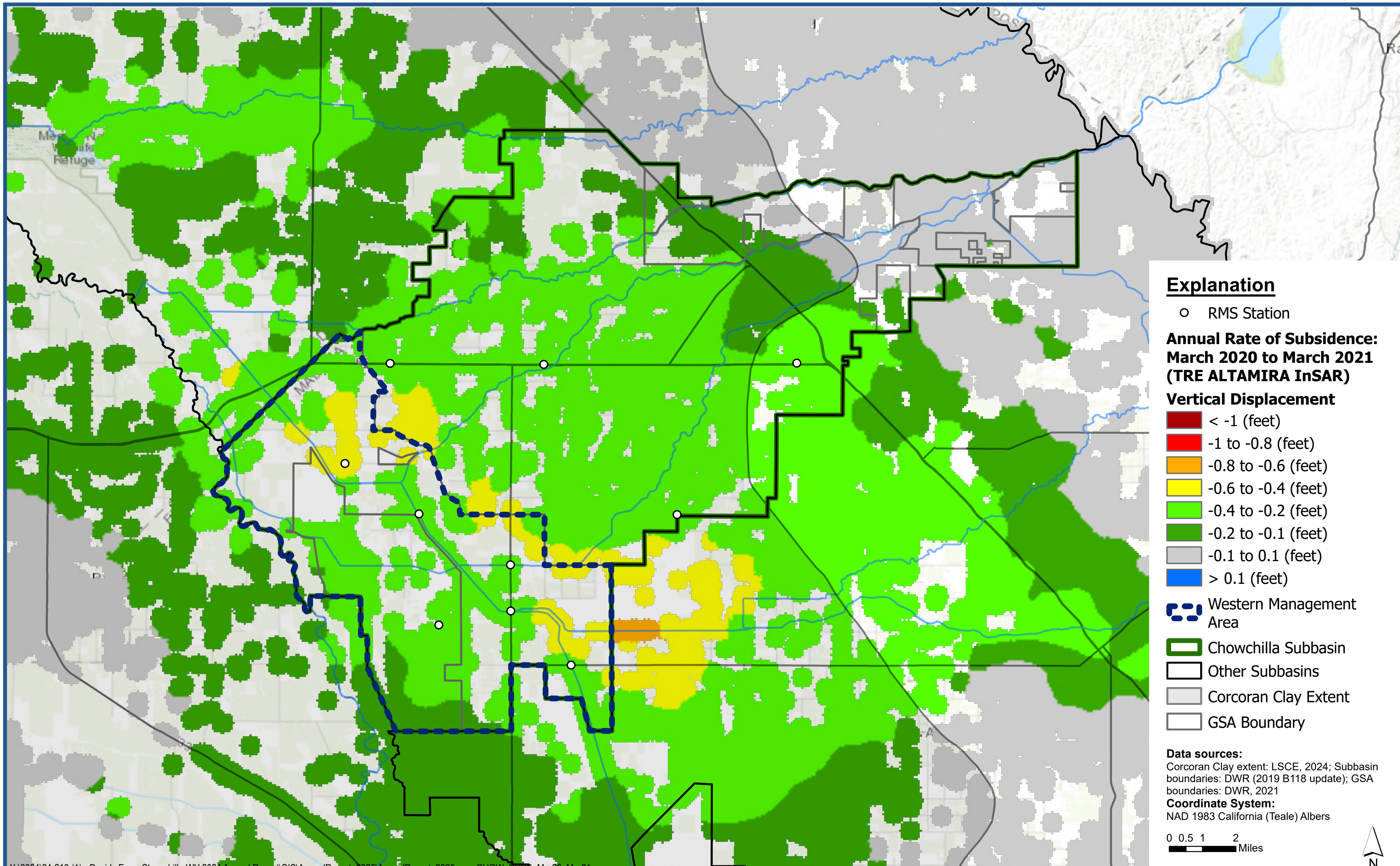
Annual Rate of Subsidence: March 2019 to March 2020 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-6



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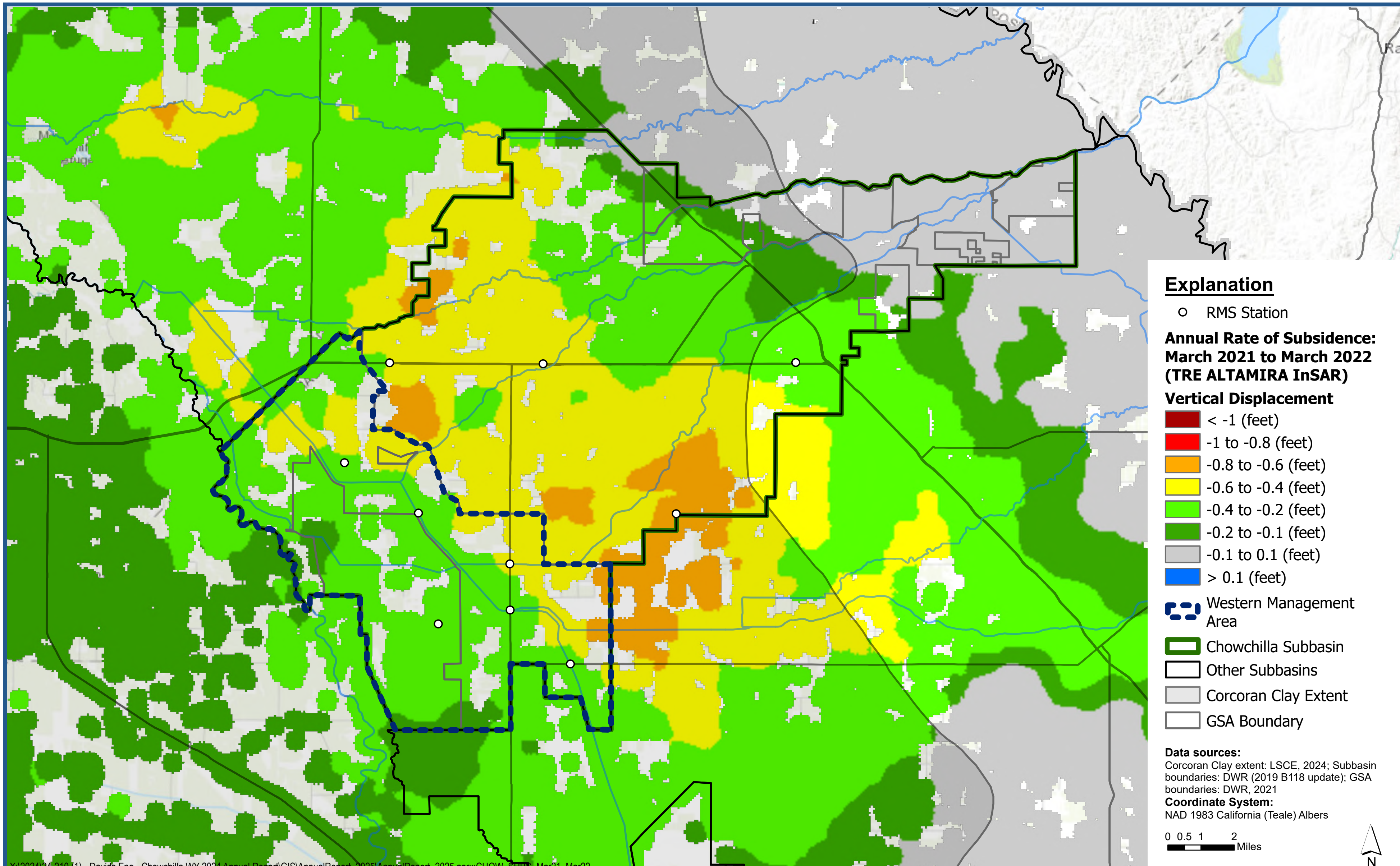
Annual Rate of Subsidence: March 2020 to March 2021 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-7



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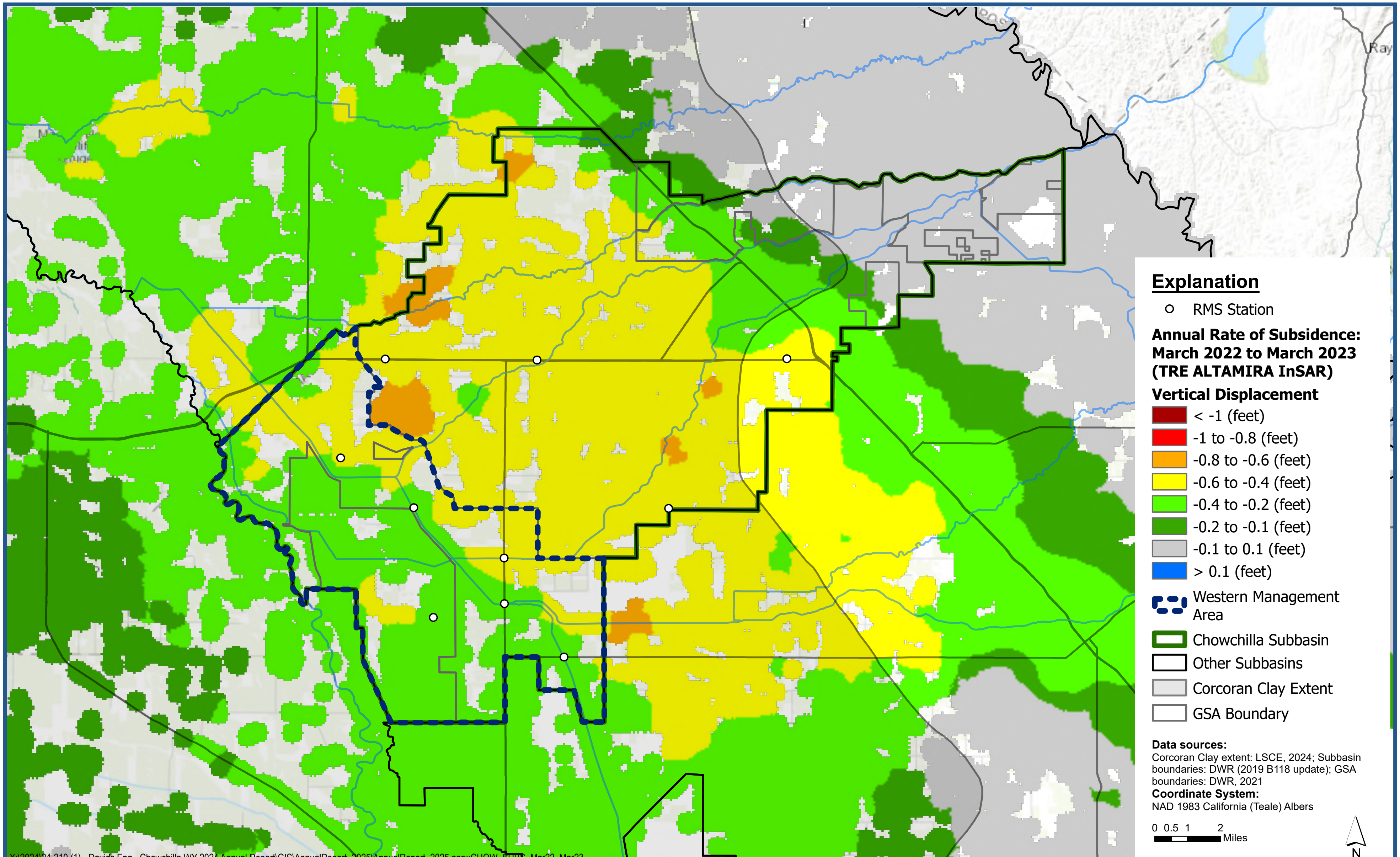
Annual Rate of Subsidence: March 2021 to March 2022 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-8



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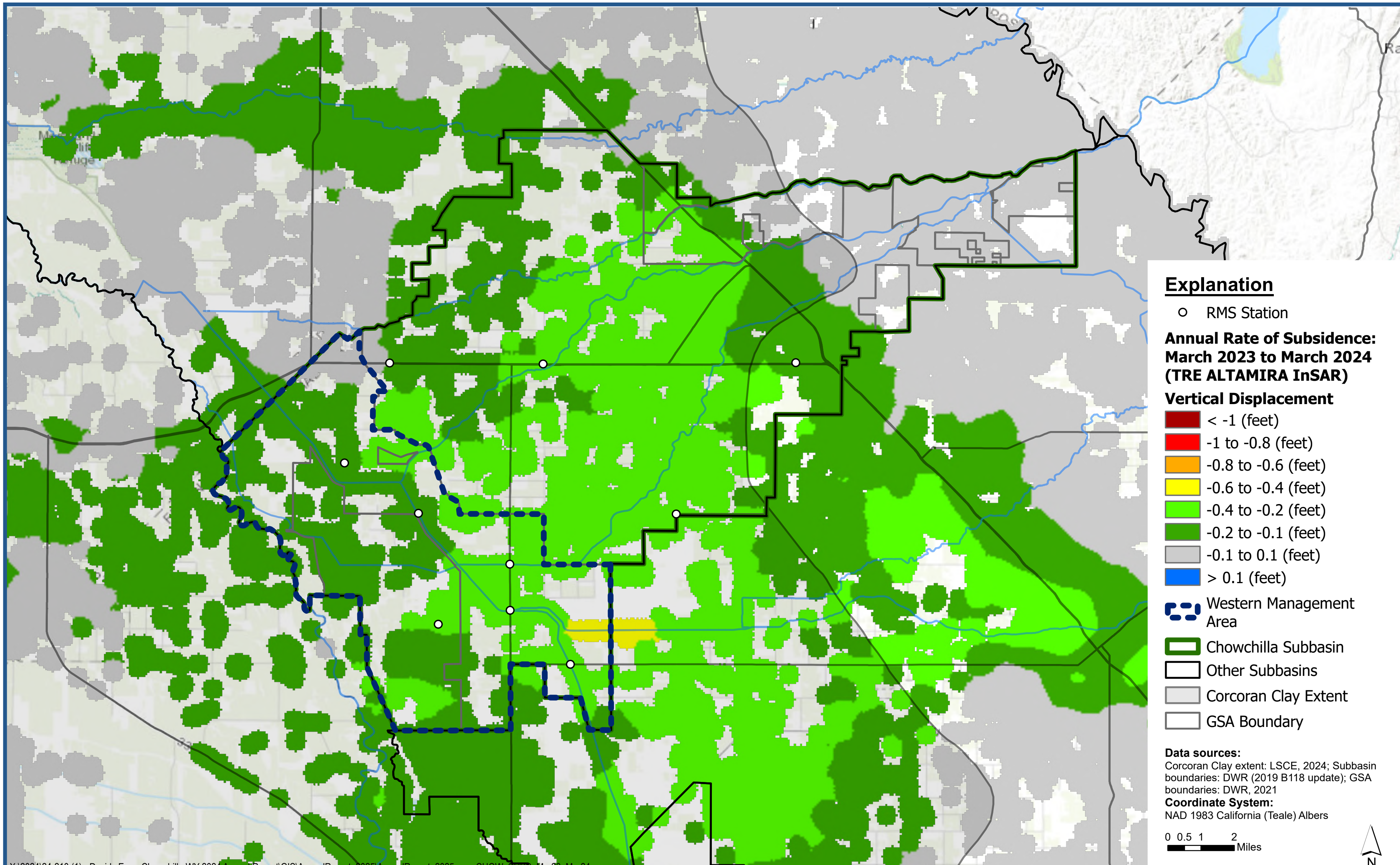
Annual Rate of Subsidence: March 2022 to March 2023 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-9



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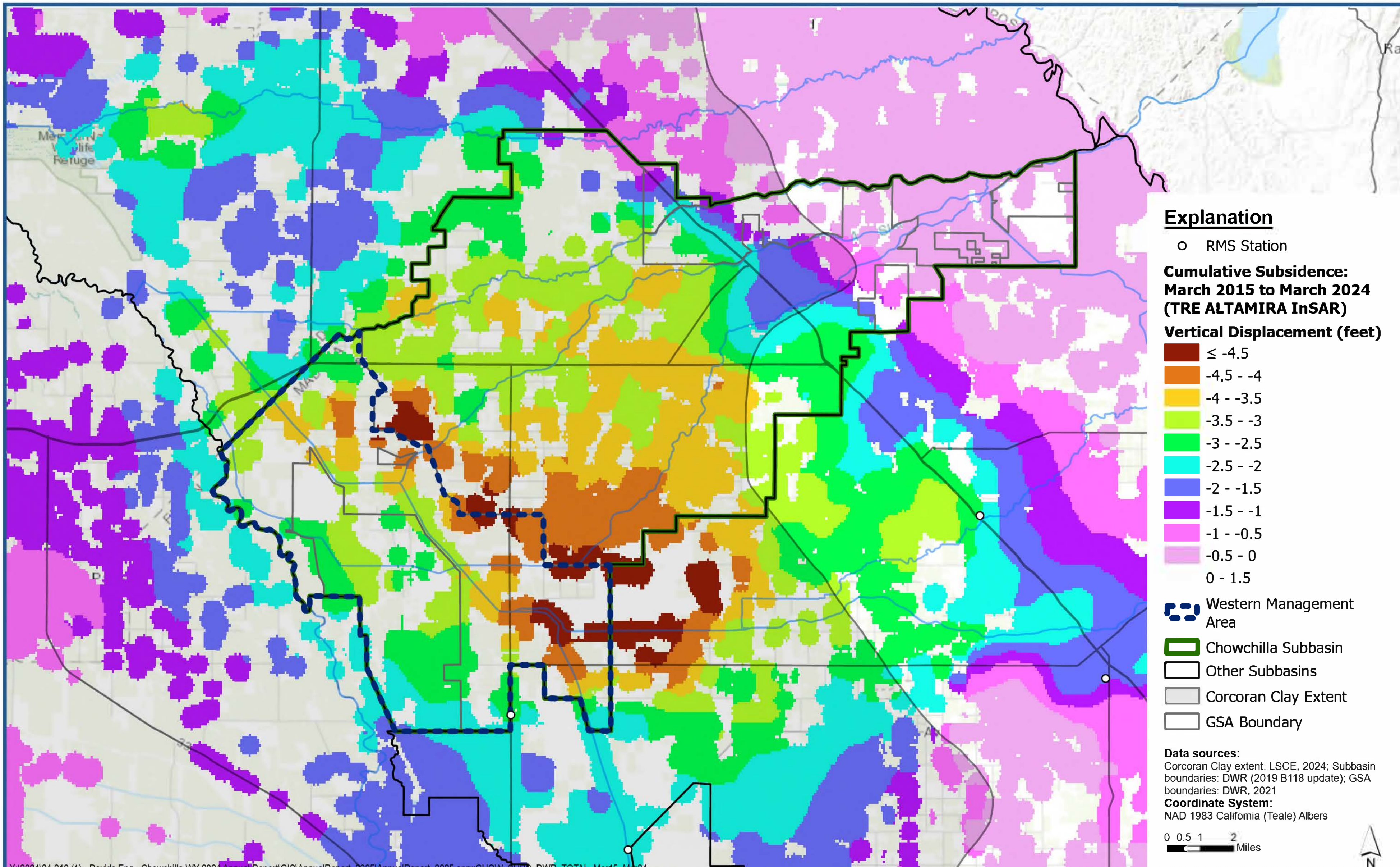
Annual Rate of Subsidence: March 2023 to March 2024 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-10



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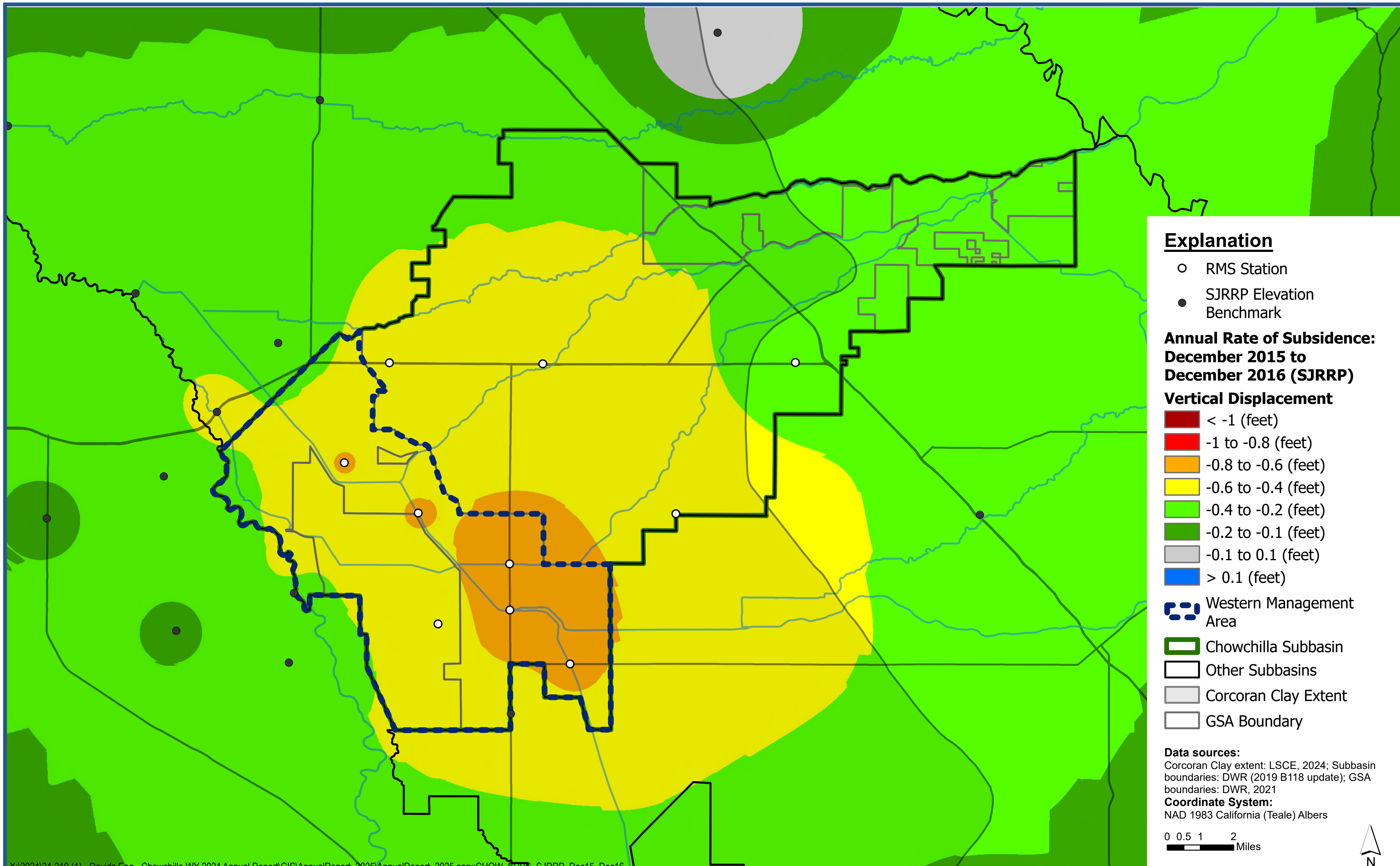
Total Subsidence: March 2015 through March 2024 (TRE ALTAMIRA InSAR)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-11



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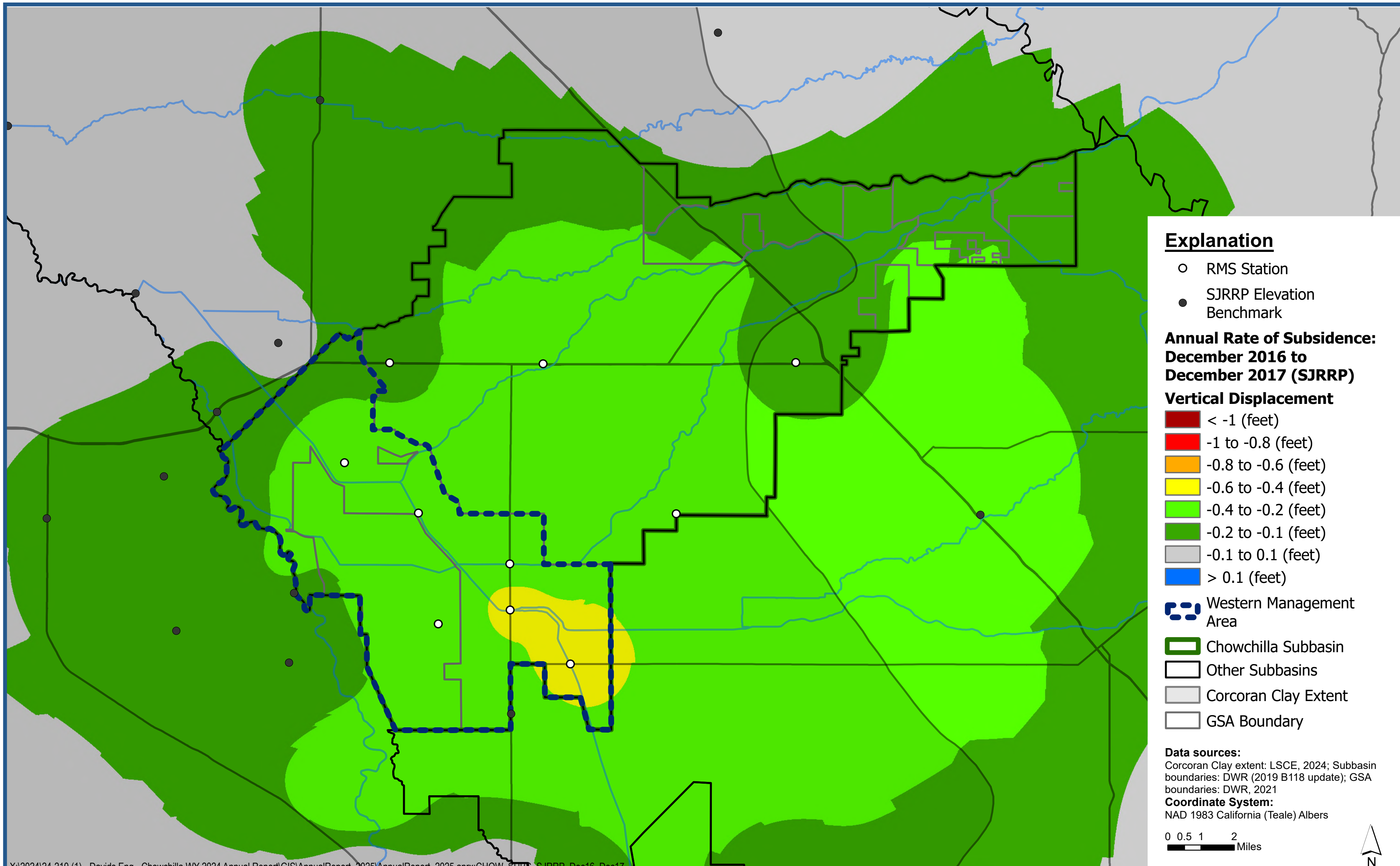
Annual Rate of Subsidence: December 2015 to December 2016 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2024 Annual Report

Figure D-12



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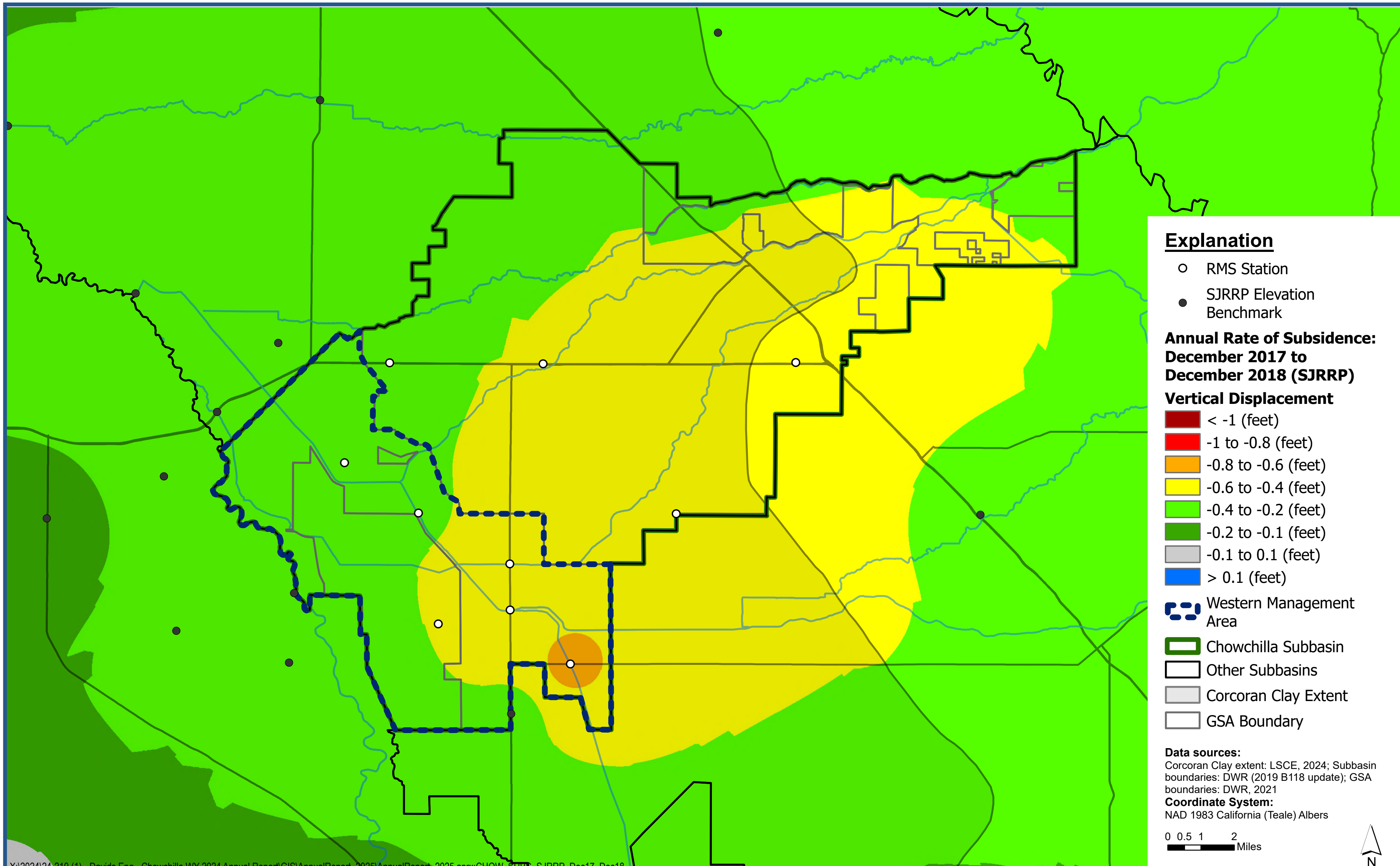
Annual Rate of Subsidence: December 2016 to December 2017 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-13



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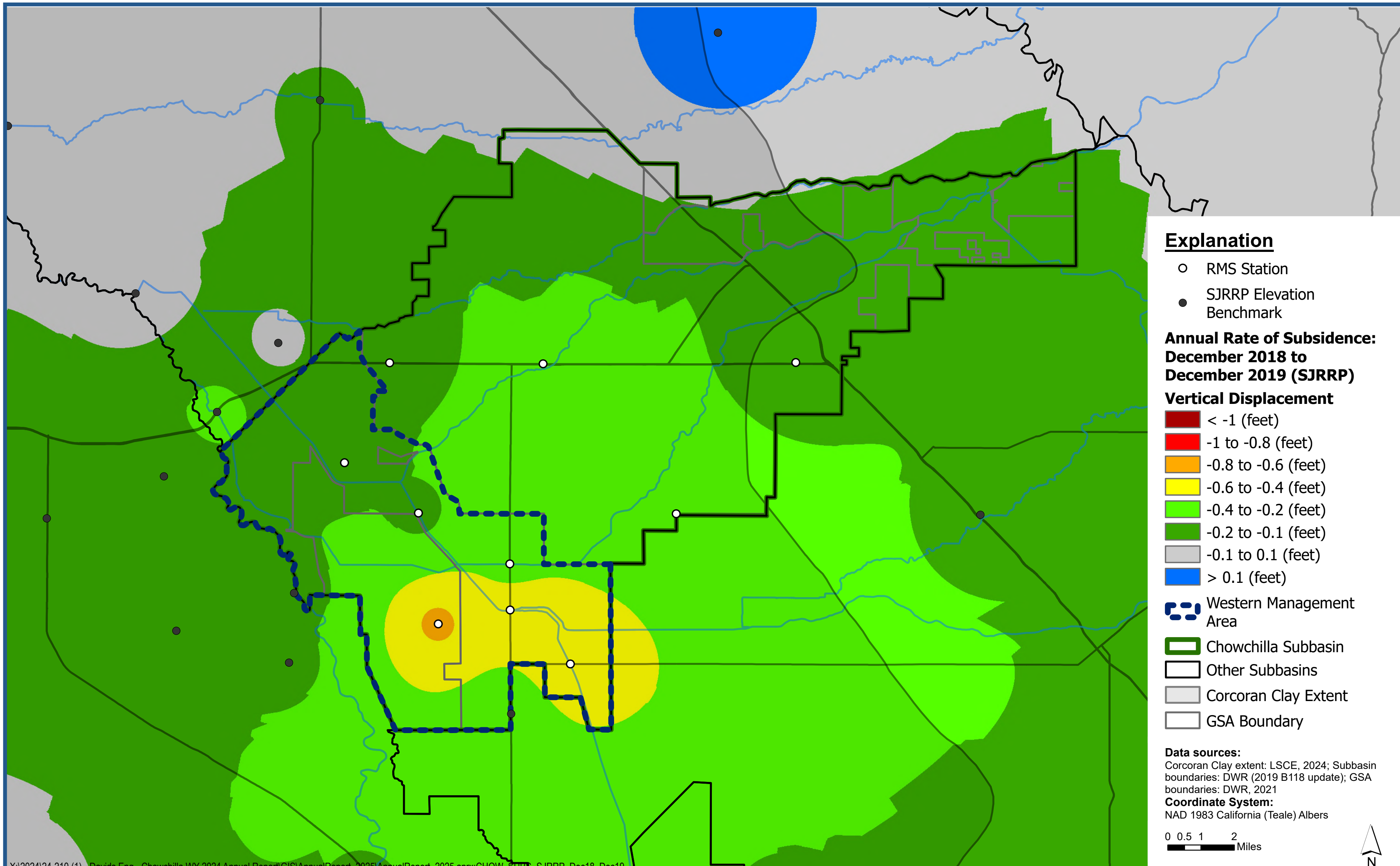
Annual Rate of Subsidence: December 2017 to December 2018 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-14



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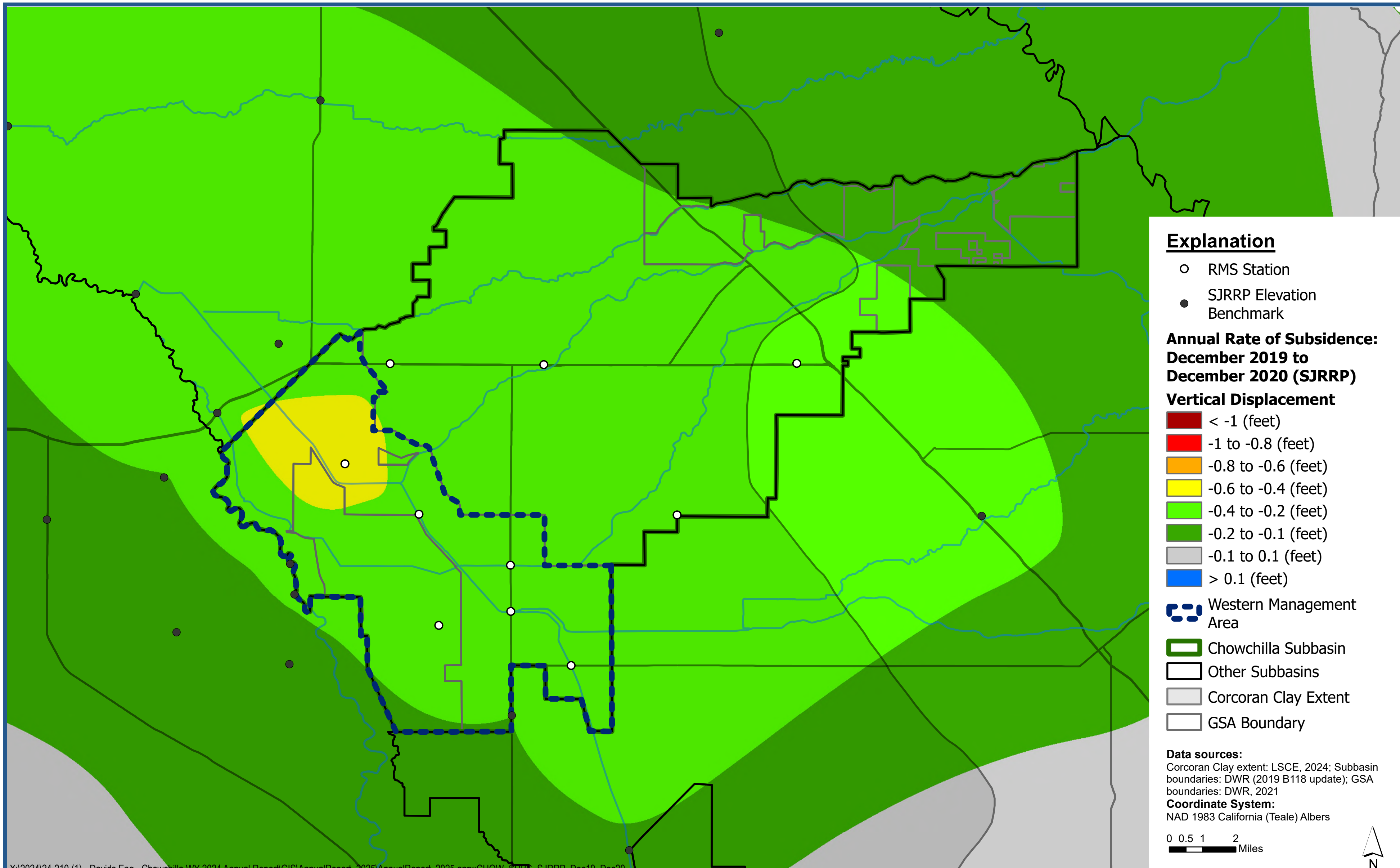
Annual Rate of Subsidence: December 2018 to December 2019 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-15



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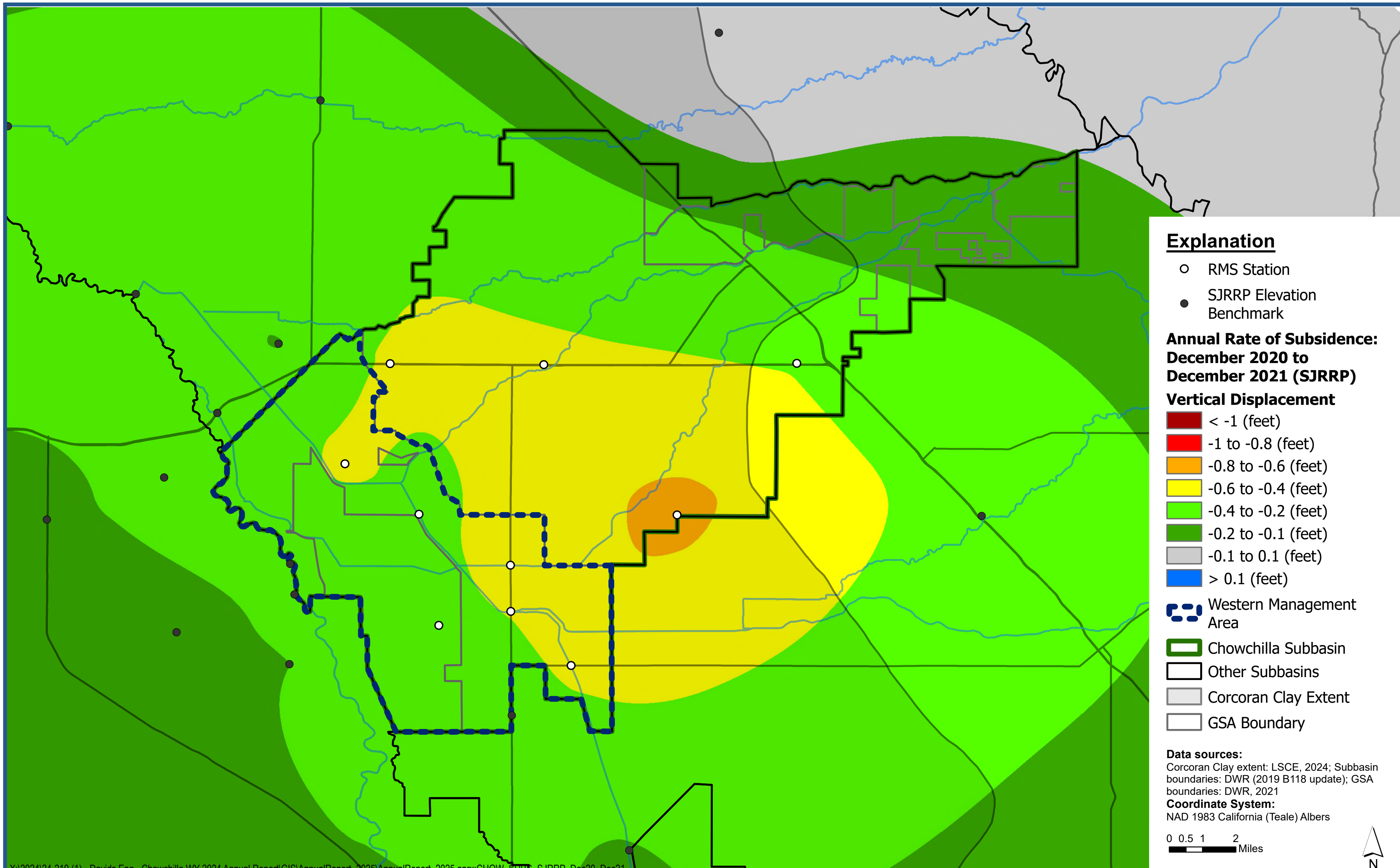
Annual Rate of Subsidence: December 2019 to December 2020 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-16



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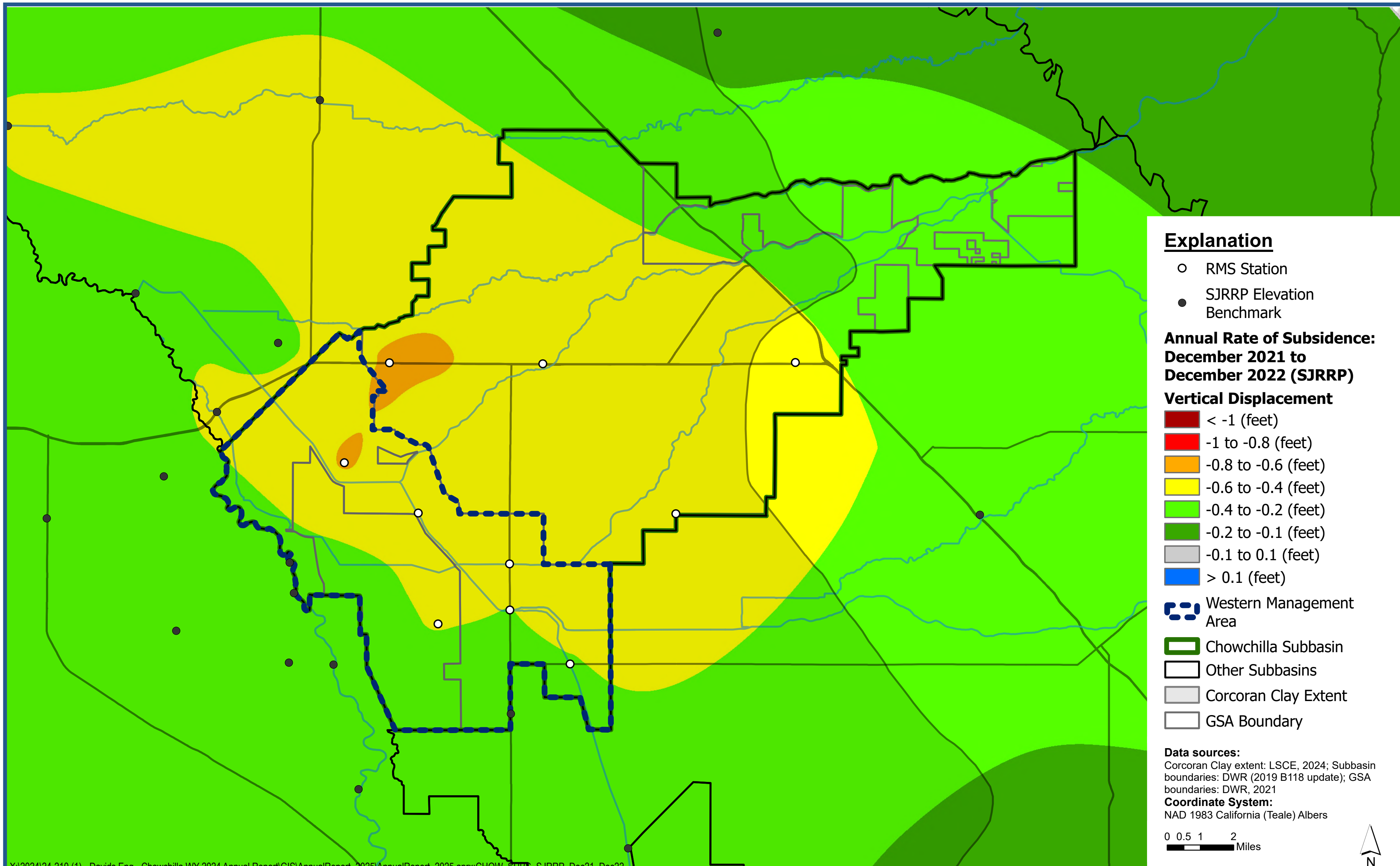
Annual Rate of Subsidence: December 2020 to December 2021 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-17



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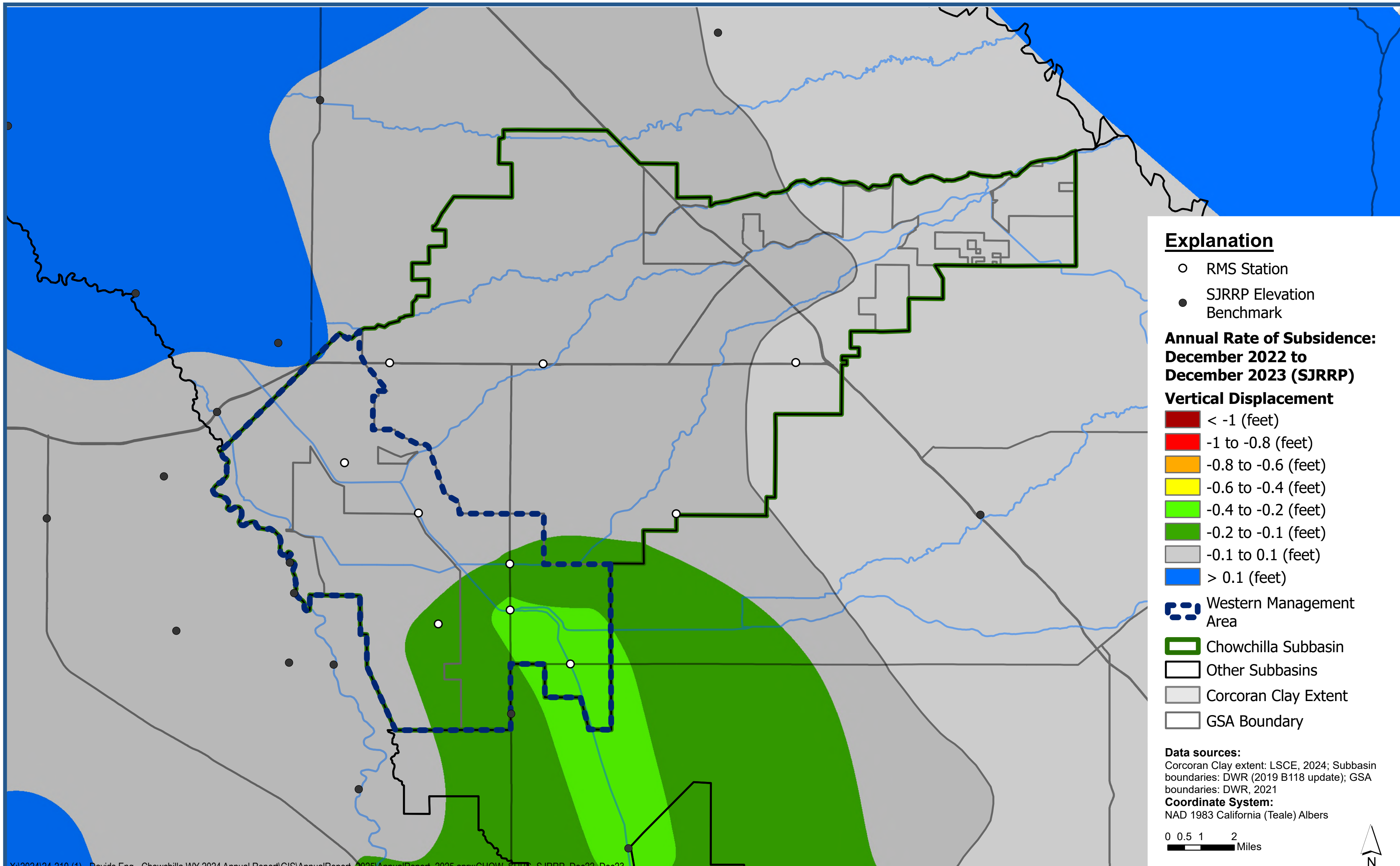
Annual Rate of Subsidence: December 2021 to December 2022 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-18



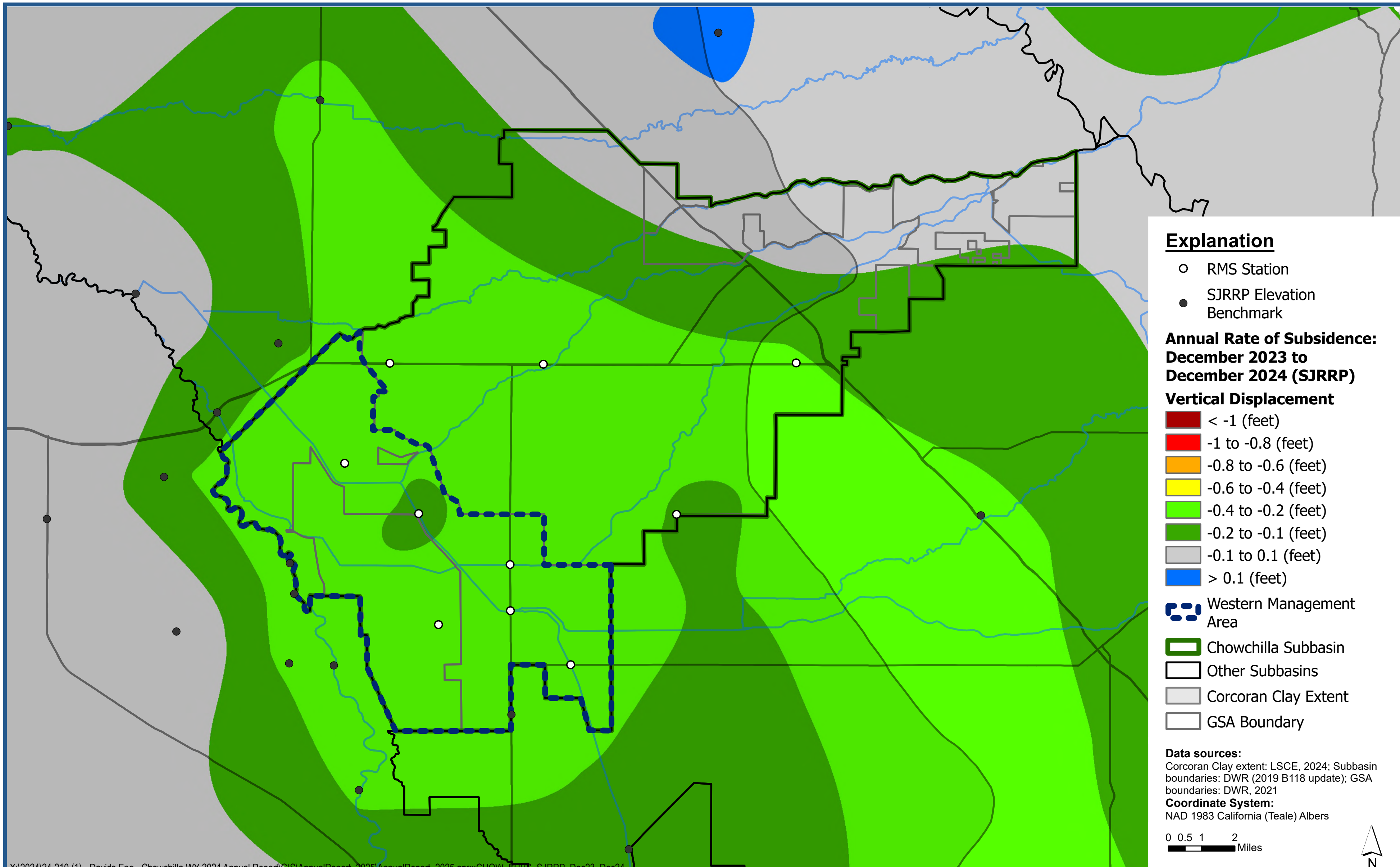
DAVIDS ENGINEERING, INC

Luhdorff & Scalmanini
Consulting Engineers

Annual Rate of Subsidence: December 2022 to December 2023 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-19



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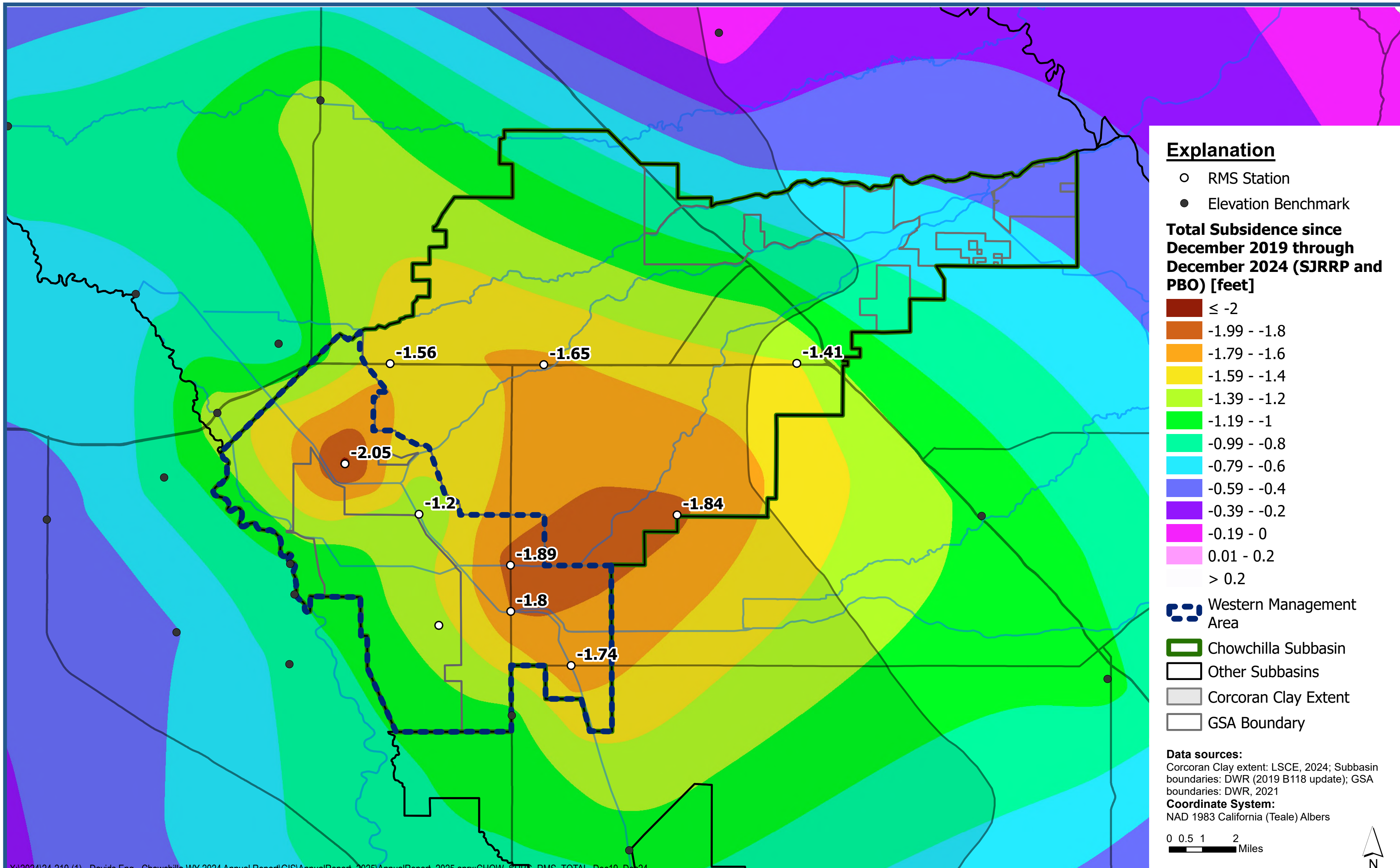
Luhdorff & Scalmanini Consulting Engineers

Annual Rate of Subsidence: December 2023 to December 2024 (SJRRP Elevation Benchmark)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-20



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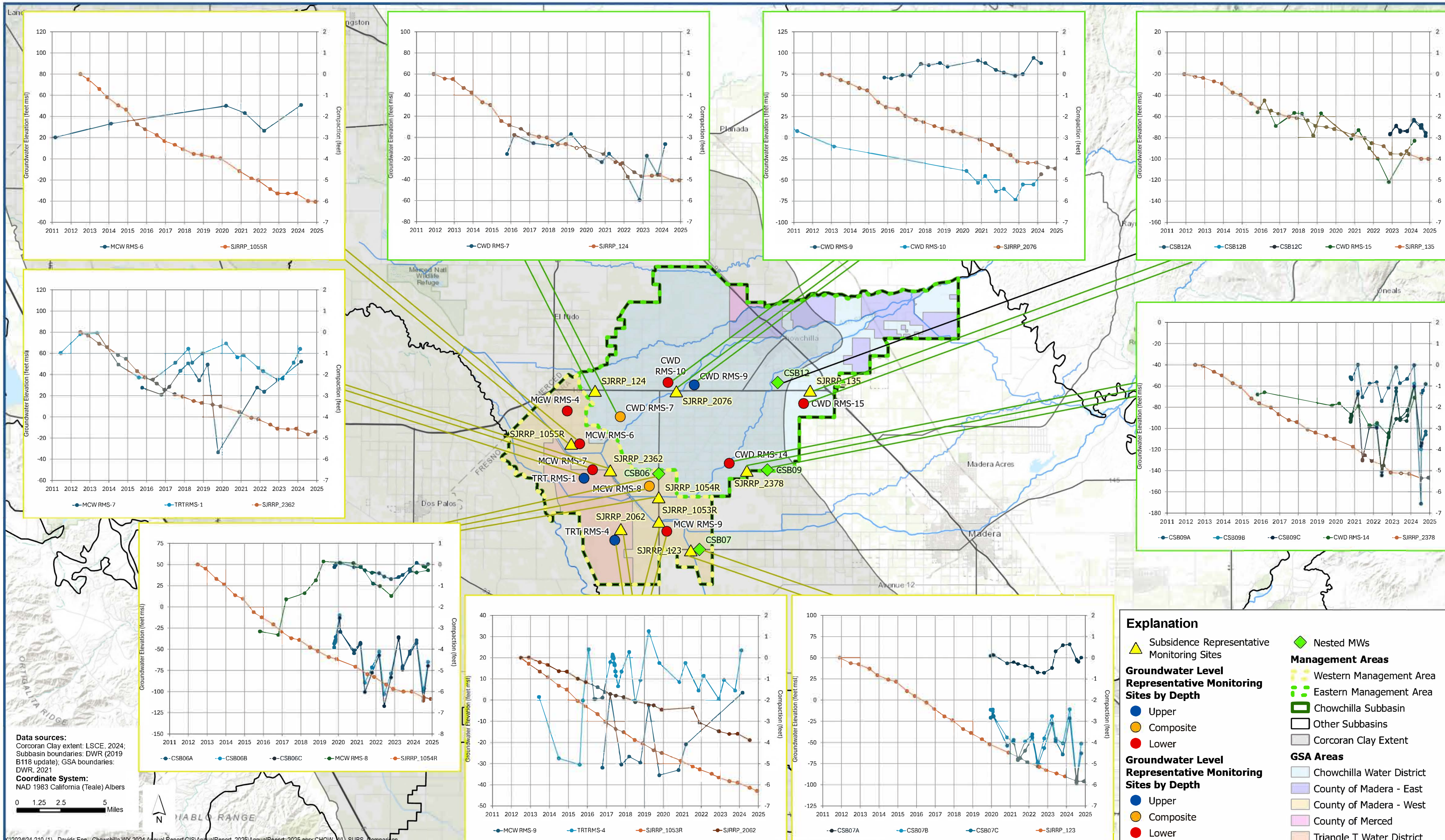
Total Subsidence: December 2019 through December 2024 (SJRRP Elevation Benchmarks & PBO Continuous GPS Station)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure D-21



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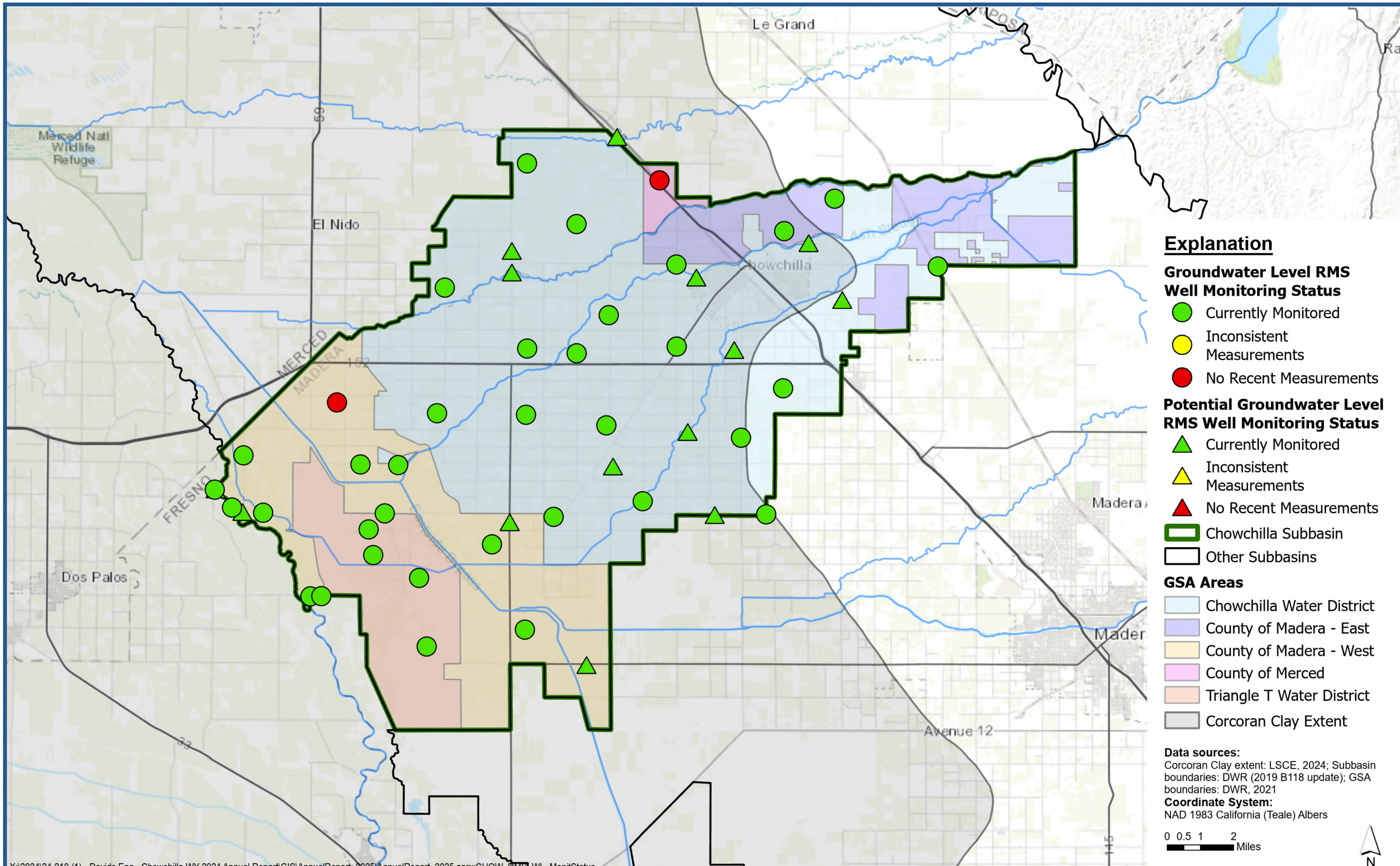
Comparison of Water Levels and Compaction at Land Subsidence RMS Stations

Figure D-22

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Appendix E. Status of Monitoring Efforts for RMS Wells in Chowchilla Subbasin.



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Monitoring Status of Groundwater Level RMS Network

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure E-1

Appendix E. Table 1 - Status of Monitoring Efforts for Water Level RMS Wells in Chowchilla Subbasin

Subbasin	GSA	RMS ID	Fall 2024 Monitoring Status	Most Recent Successful WL Msmt	Most Recent Successful WL Msmt (Season)
Chowchilla	Chowchilla Water District	CWD RMS-1	Currently Monitored - Questionable Measurement	3/12/2024	Spring 2024
Chowchilla	Chowchilla Water District	CWD RMS-2	Currently Monitored - Questionable Measurement	3/12/2024	Spring 2024
Chowchilla	Chowchilla Water District	CWD RMS-3	Currently Monitored	10/22/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-4	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-5	Currently Monitored - Questionable Measurement	3/12/2024	Spring 2024
Chowchilla	Chowchilla Water District	CWD RMS-6	Currently Monitored - Questionable Measurement	3/12/2024	Spring 2024
Chowchilla	Chowchilla Water District	CWD RMS-7	Currently Monitored - Questionable Measurement	3/12/2024	Spring 2024
Chowchilla	Chowchilla Water District	CWD RMS-8	Currently Monitored	10/11/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-9	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-10	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-11	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-12	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-13	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-14	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-15	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-16	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	Chowchilla Water District	CWD RMS-17	Currently Monitored - Questionable Measurement	3/14/2024	Spring 2024
Chowchilla	County of Madera - East	MCE RMS-1	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	County of Madera - East	MCE RMS-2	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	County of Madera - West	MCW RMS-1	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	County of Madera - West	MCW RMS-2	Currently Monitored - Questionable Measurement	3/5/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-3	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	County of Madera - West	MCW RMS-4	N9 - Temporarily inaccessible	3/15/2021	Spring 2021

Appendix E. Table 1 - Status of Monitoring Efforts for Water Level RMS Wells in Chowchilla Subbasin

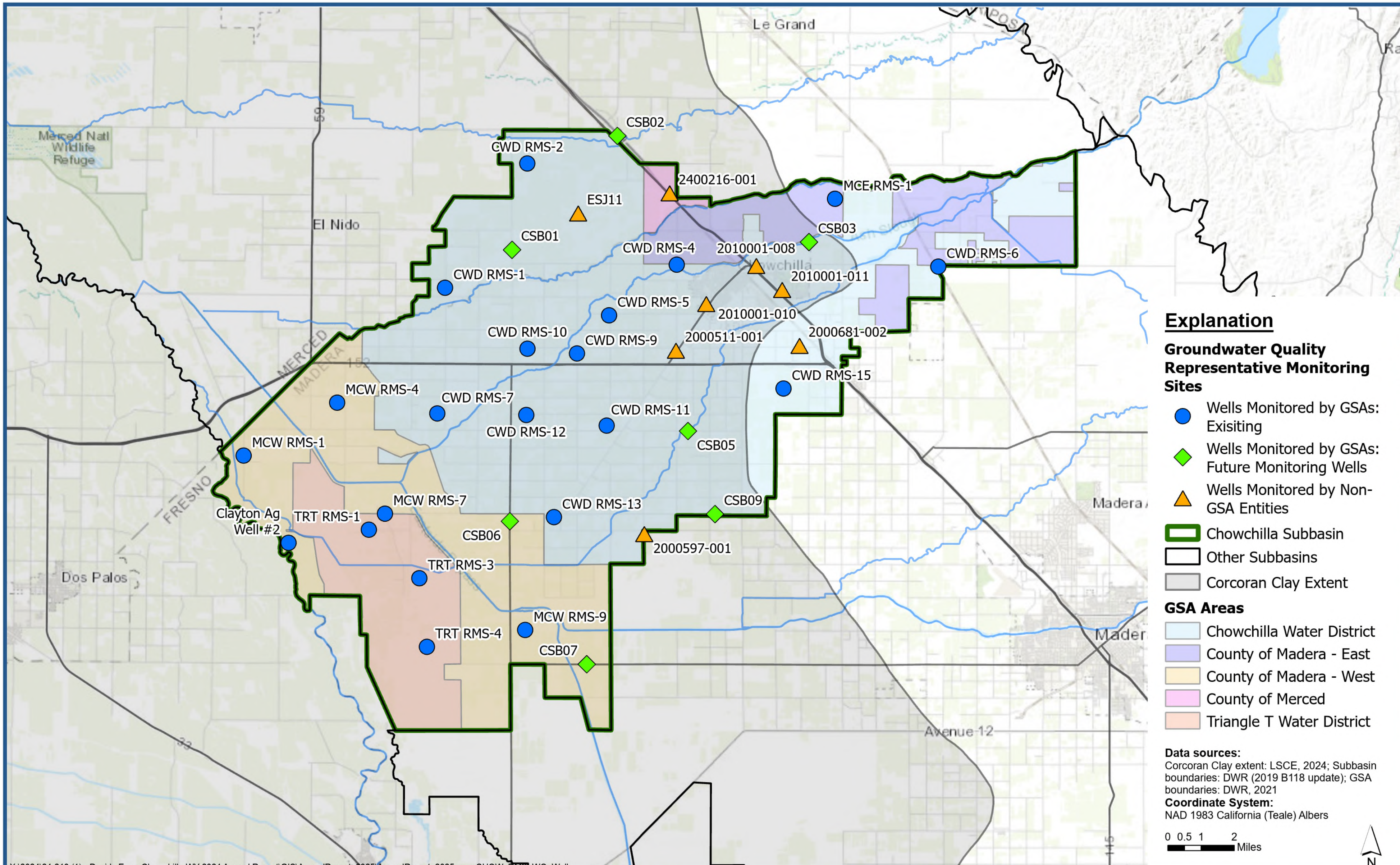
Subbasin	GSA	RMS ID	Fall 2024 Monitoring Status	Most Recent Successful WL Msmt	Most Recent Successful WL Msmt (Season)
Chowchilla	County of Madera - West	MCW RMS-5	N7 - Special/other	3/8/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-6	N7 - Special/other	3/8/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-7	N7 - Special/other	3/8/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-8	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	MCW RMS-9	N9 - Temporarily inaccessible	3/7/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-10	Currently Monitored	10/8/2024	Fall 2024
Chowchilla	County of Madera - West	MCW RMS-11	Contacted well owner. Fall measurements unavailable at time of report.	2/14/2024	Spring 2024
Chowchilla	County of Madera - West	MCW RMS-12	Contacted well owner. Fall measurements unavailable at time of report.	2/14/2024	Spring 2024
Chowchilla	County of Merced	MER RMS-1	Attempts are being made to reengage with well owner	3/12/2020	Spring 2020
Chowchilla	Triangle T Water District	TRT RMS-1	Currently Monitored	11/18/2024	Fall 2024
Chowchilla	Triangle T Water District	TRT RMS-2	Currently Monitored	11/18/2024	Fall 2024
Chowchilla	Triangle T Water District	TRT RMS-3	Currently Monitored	11/18/2024	Fall 2024
Chowchilla	Triangle T Water District	TRT RMS-4	Currently Monitored	11/18/2024	Fall 2024

Appendix E. Table 2 - Status of Monitoring Efforts for Potential Water Level RMS Wells in Chowchilla Subbasin

Subbasin	GSA	RMS ID	Fall 2024 Monitoring Status	Most Recent Successful WL Msmt	Most Recent Successful WL Msmt (Season)
Chowchilla	Chowchilla Water District	CSB01A	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB01B	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB01C	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB02A	NM - Well is Dry	7/26/2024	Summer 2024
Chowchilla	Chowchilla Water District	CSB02B	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB02C	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB03A	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB03B	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB03C	Currently Monitored	10/14/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB05A	Currently Monitored	10/17/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB05B	Currently Monitored	10/17/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB05C	Currently Monitored	10/17/2024	Fall 2024
Chowchilla	County of Madera - West	CSB06A	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	CSB06B	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	CSB06C	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	CSB07A	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	CSB07B	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	County of Madera - West	CSB07C	Currently Monitored	10/16/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB08A	NM - Well is Dry	n/a	n/a
Chowchilla	Chowchilla Water District	CSB08B	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB08C	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB09A	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB09B	Currently Monitored	10/18/2024	Fall 2024

Appendix E. Table 2 - Status of Monitoring Efforts for Potential Water Level RMS Wells in Chowchilla Subbasin

Subbasin	GSA	RMS ID	Fall 2024 Monitoring Status	Most Recent Successful WL Msmt	Most Recent Successful WL Msmt (Season)
Chowchilla	Chowchilla Water District	CSB09C	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB10	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB11A	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB11B	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB11C	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB12A	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB12B	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB12C	Currently Monitored	10/18/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB13A	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB13B	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	Chowchilla Water District	CSB13C	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	County of Madera	CSB14	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	County of Madera	CSB15	Currently Monitored	10/15/2024	Fall 2024
Chowchilla	County of Madera	CSB16	Currently Monitored	10/15/2024	Fall 2024



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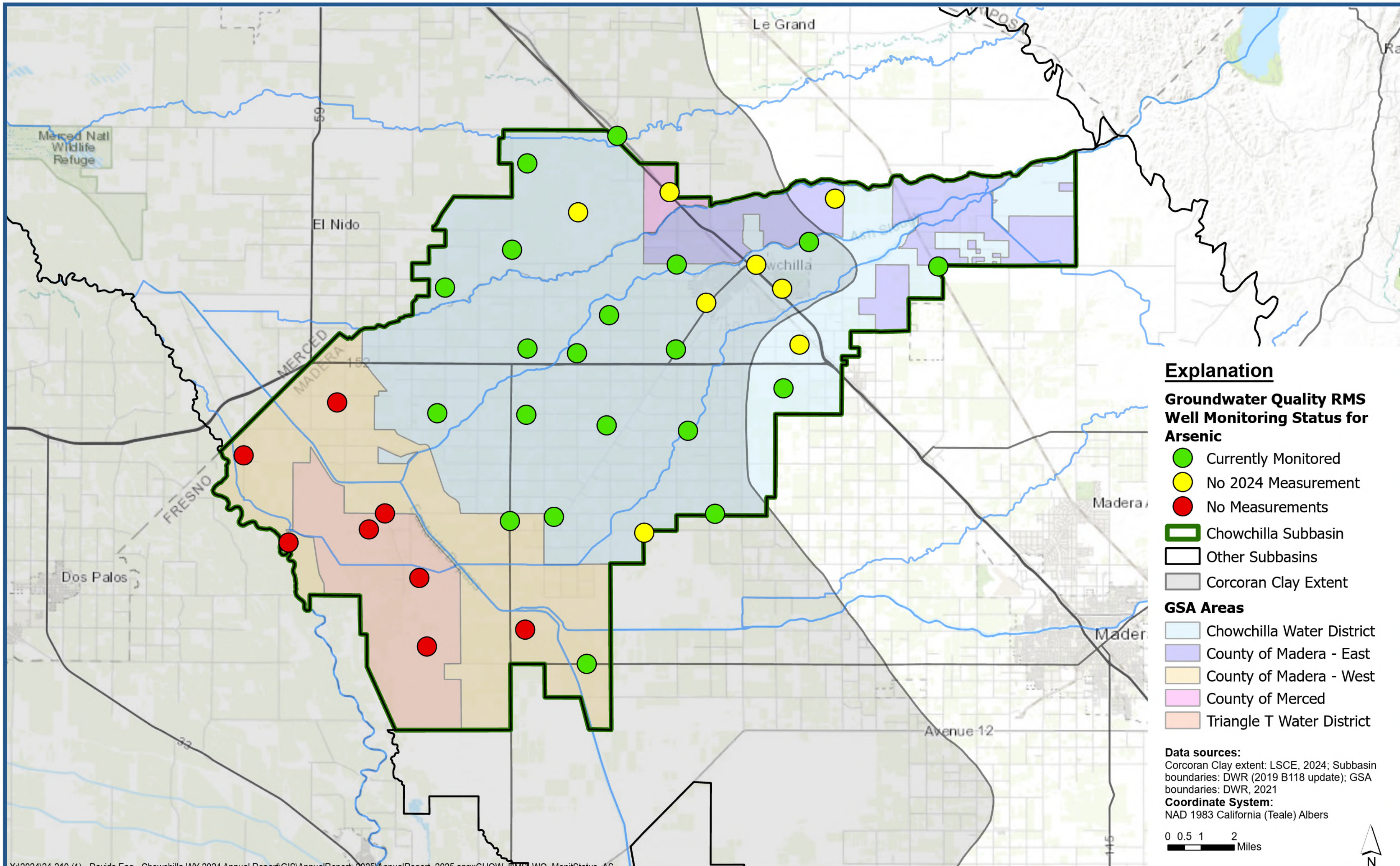
Groundwater Quality Sustainable Indicator Wells

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

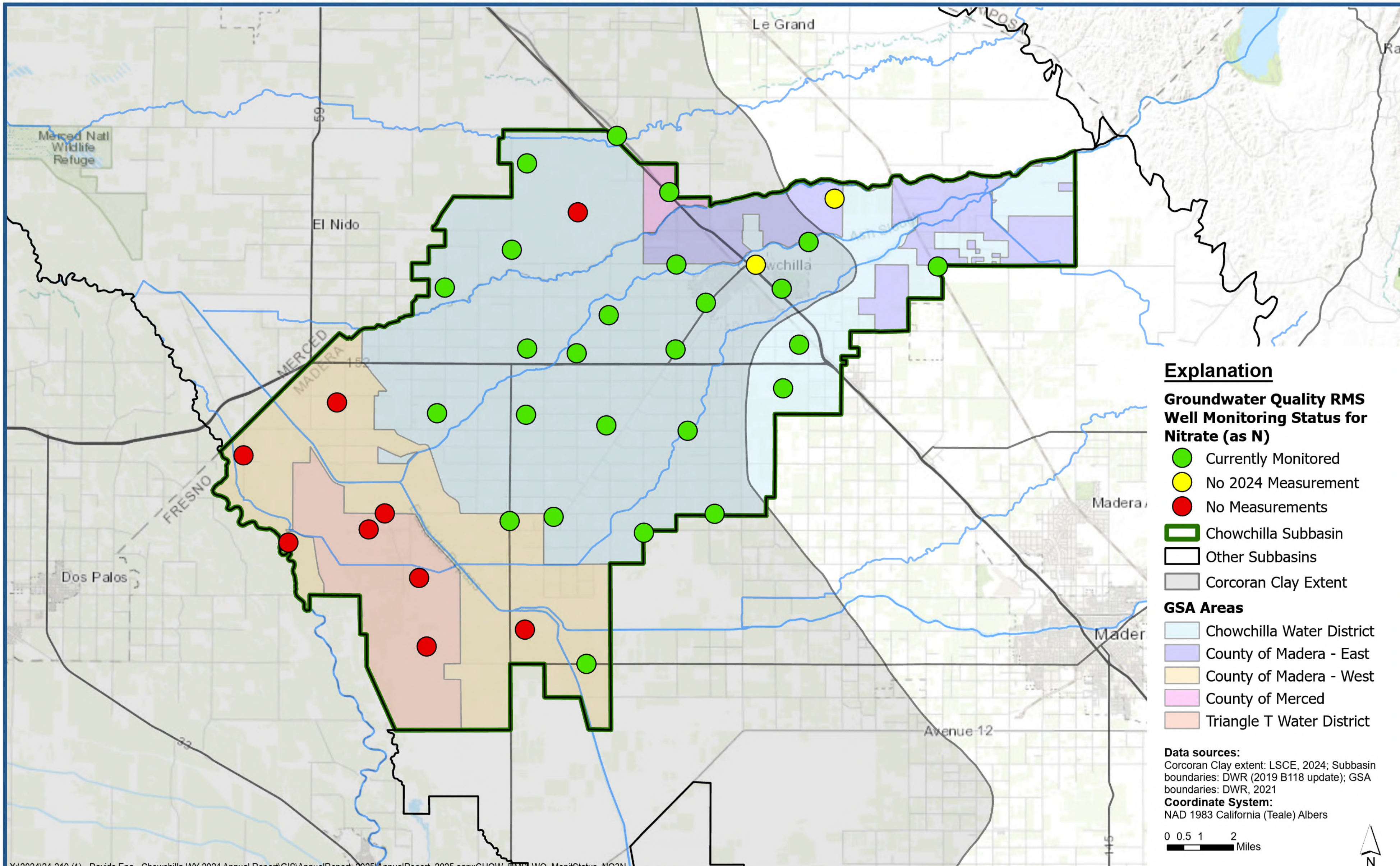
Figure E-2



Monitoring Status of Groundwater Quality RMS Network - Arsenic

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure E-3



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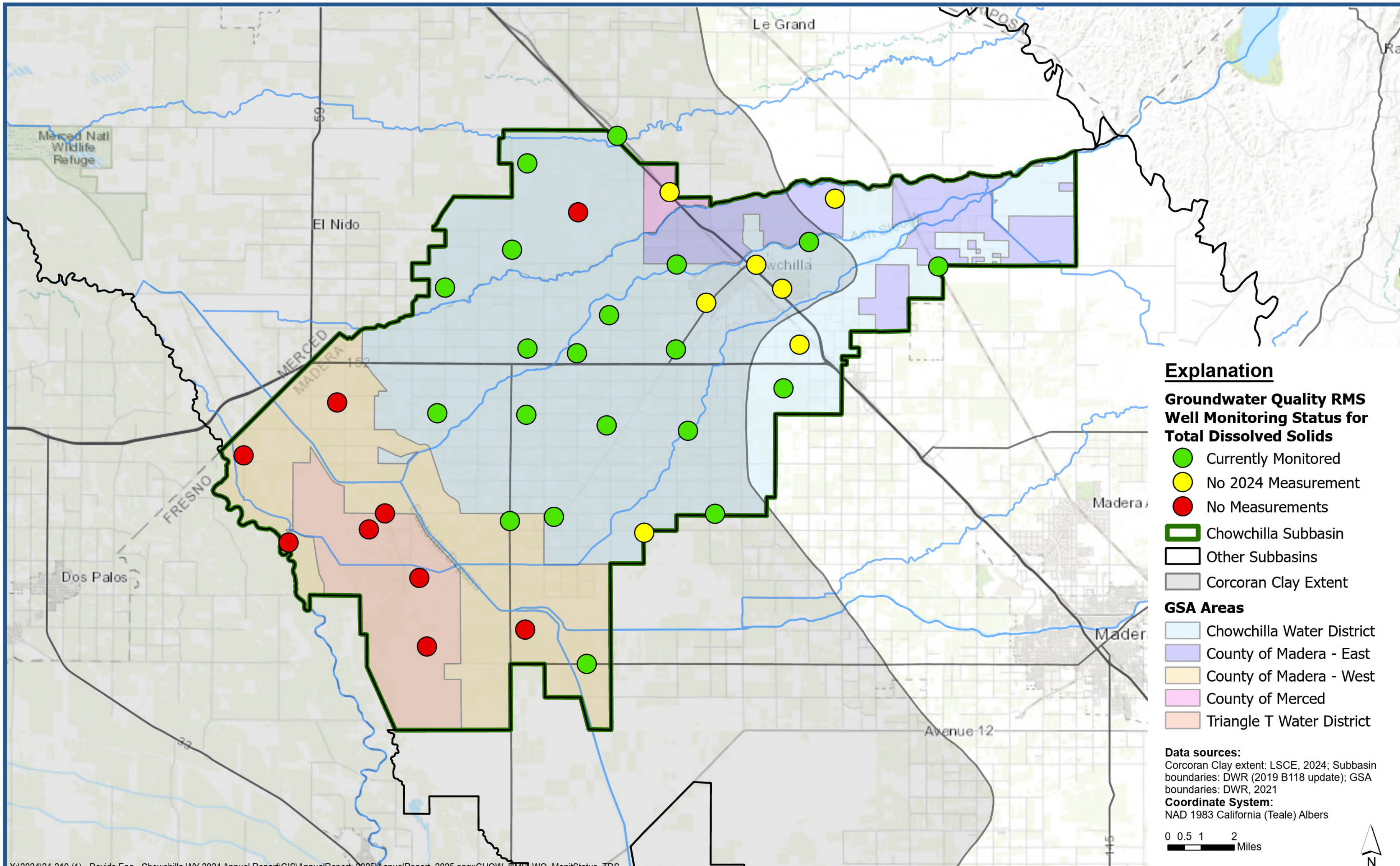
Monitoring Status of Groundwater Quality RMS Network - Nitrate (as N)

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure E-4



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Monitoring Status of Groundwater Quality RMS Network - Total Dissolved Solids

Chowchilla Subbasin
Groundwater Sustainability Plan 2025 Annual Report

Figure E-5

Appendix E. Table 3 - Summary of Monitoring Efforts for Water Quality RMS Wells in Chowchilla Subbasin

		Arsenic (ug/L)						Nitrate (as N) (mg/L)						Total Dissolved Solids (mg/L)					
RMS Well ID	Aquifer Designation	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result
Wells Monitored by GSAs																			
CWD RMS-1	Lower	10/20/2021	3/12/2024	2	2.1	3.6	2.9	10/20/2021	3/12/2024	2	12.0	12.0	12.0	10/20/2021	3/12/2024	2	420	460	440
CWD RMS-2	Lower	10/20/2021	3/12/2024	2	4.1	6.3	5.2	10/20/2021	3/12/2024	2	2.0	9.2	5.6	10/20/2021	3/12/2024	2	240	420	330
CWD RMS-4	Lower	10/21/2021	5/16/2024	2	ND	2.8	1.9	10/21/2021	5/16/2024	2	0.8	4.8	2.8	10/21/2021	5/16/2024	2	190	350	270
CWD RMS-5	Lower	10/20/2021	4/23/2024	2	ND	ND	ND	10/20/2021	4/23/2024	2	2.9	4.3	3.6	10/20/2021	4/23/2024	2	310	460	385
CWD RMS-6	Lower	3/12/2024	3/12/2024	1	ND	ND	ND	3/12/2024	3/12/2024	1	ND	ND	ND	3/12/2024	3/12/2024	1	240	240	240
CWD RMS-7	Lower	3/13/2024	3/13/2024	1	3.2	3.2	3.2	3/13/2024	3/13/2024	1	1.7	1.7	1.7	3/13/2024	3/13/2024	1	260	260	260
CWD RMS-9	Upper	3/15/2024	3/15/2024	1	ND	ND	ND	3/15/2024	3/15/2024	1	2.1	2.1	2.1	3/15/2024	3/15/2024	1	250	250	250
CWD RMS-10	Lower	10/20/2021	4/25/2024	2	6.1	6.5	6.3	10/20/2021	4/25/2024	2	0.8	0.9	0.8	10/20/2021	4/25/2024	2	180	210	195
CWD RMS-11	Lower	10/21/2021	3/11/2024	2	ND	3.6	2.3	10/21/2021	3/11/2024	2	0.8	1.5	1.1	10/21/2021	3/11/2024	2	210	210	210
CWD RMS-12	Upper	11/5/2021	3/18/2024	2	ND	ND	ND	11/5/2021	3/18/2024	2	2.0	12.0	7.0	11/5/2021	3/18/2024	2	210	810	510
CWD RMS-13	Lower	10/21/2021	3/18/2024	2	ND	ND	ND	10/21/2021	3/18/2024	2	3.0	4.7	3.9	10/21/2021	3/18/2024	2	220	280	250
CWD RMS-15	Lower	3/21/2024	3/21/2024	1	3.2	3.2	3.2	3/21/2024	3/21/2024	1	0.4	0.4	0.4	3/21/2024	3/21/2024	1	240	240	240
MCE RMS-1	Lower	7/12/2022	7/12/2022	1	11.0	11.0	11.0	7/12/2022	7/12/2022	1	0.3	0.3	0.3	7/12/2022	7/12/2022	1	190	190	190
MCW RMS-1	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-4	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-7	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
MCW RMS-9	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-1	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-3	Lower	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TRT RMS-4	Composite	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Clayton Ag Well #2	Upper	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
CSB01A	Lower	2/13/2020	7/26/2024	6	ND	6.1	1.9	6/16/2021	7/26/2024	4	9.3	10.0	9.7	2/13/2020	7/26/2024	9	460	620	560
CSB01B	Lower	2/13/2020	7/26/2024	6	3.1	14.0	9.0	6/16/2021	7/26/2024	4	ND	5.6	1.5	2/13/2020	7/26/2024	5	190	510	314
CSB01C	Lower	6/16/2021	7/26/2024	4	5.0	5.7	5.4	6/16/2021	7/26/2024	3	ND	ND	ND	6/16/2021	7/26/2024	3	210	250	230
CSB02A	Lower	2/13/2020	7/27/2021	3	13.0	28.0	21.3	-	-	-	-	-	-	2/13/2020	8/5/2020	2	650	800	725
CSB02B	Lower	2/13/2020	7/26/2024	6	4.1	9.6	8.0	6/16/2021	7/26/2024	4	2.7	3.5	3.1	2/13/2020	7/26/2024	6	240	530	312
CSB02C	Lower	2/13/2020	7/26/2024	6	7.5	8.7	8.1	6/16/2021	7/26/2024	4	0.8	1.0	0.9	2/13/2020	7/26/2024	5	250	270	256
CSB03A	Lower	2/14/2020	7/27/2021	5	3.4	5.6	4.1	6/16/2021	6/16/2021	1	7.2	7.2	7.2	2/14/2020	6/16/2021	4	280	310	293
CSB03B	Lower	2/14/2020	7/25/2024	6	3.3	7.3	4.3	6/16/2021	7/25/2024	4	ND	0.6	0.4	2/14/2020	7/25/2024	5	170	320	216
CSB03C	Lower	2/14/2020	7/25/2024	4	ND	6.1	2.3	6/21/2022	7/25/2024	3	ND	ND	ND	2/14/2020	7/25/2024	4	220	820	373
CSB05A	Lower	8/4/2020	7/30/2024	7	ND	4.5	2.2	6/16/2021	7/30/2024	4	1.6	2.5	1.9	8/4/2020	7/30/2024	10	170	220	182
CSB05B	Lower	2/13/2020	7/31/2024	6	ND	3.4	1.8	6/16/2021	7/31/2024	4	0.6	0.8	0.6	2/13/2020	7/31/2024	5	170	210	180
CSB05C	Lower	2/13/2020	7/30/2024	6	18.0	22.0	19.7	6/16/2021	7/30/2024	4	ND	ND	ND	2/13/2020	7/30/2024	5	1,100	1,500	1,360
CSB06A	Upper	2/12/2020	7/23/2024	5	ND	9.4	3.4	6/22/2022	7/23/2024	3	2.6	15.0	10.9	2/12/2020	7/23/2024	12	480	1,500	1,123
CSB06B	Lower	2/12/2020	7/23/2024	4	2.4	3.7	3.2	6/22/2022	7/23/2024	3	0.8	3.4	2.5	2/12/2020	7/23/2024	4	140	650	438
CSB06C	Lower	2/12/2020	7/23/2024	4	ND	5.2	3.1	6/22/2022	7/23/2024	3	0.8	12.0	4.5	2/12/2020	7/23/2024	4	140	960	360
CSB07A	Upper	2/12/2020	7/23/2024	7	3.0	4.2	3.5	6/28/2022	7/23/2024	4	8.7	13.0	10.5	2/12/2020	7/23/2024	10	480	670	569
CSB07B	Lower	2/12/2020	7/23/2024	4	3.4	4.2	3.7	6/13/2023	7/23/2024	3	3.7	7.5	5.0	2/12/2020	7/23/2024	4	240	440	333
CSB07C	Lower	2/12/2020	7/23/2024	5	ND	2.1	1.3	6/28/2022	7/23/2024	4	ND	0.4	0.2	2/12/2020	7/23/2024	5	580	3,300	2,476
CSB09A	Lower	8/4/2020	7/31/2024	7	ND	4.0	1.4	6/16/2021	7/31/2024	4	6.1	7.1	6.7	8/4/2020	7/31/2024	9	300	520	341

Appendix E. Table 3 - Summary of Monitoring Efforts for Water Quality RMS Wells in Chowchilla Subbasin

		Arsenic (ug/L)						Nitrate (as N) (mg/L)						Total Dissolved Solids (mg/L)					
RMS Well ID	Aquifer Designation	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result	First Sample Date	Most Recent Sample Date	Sample Count	Minimum Result	Maximum Result	Average Result
CSB09B	Lower	10/27/2020	8/1/2024	5	ND	1.0	1.0	6/16/2021	8/1/2024	4	5.3	7.0	6.3	10/27/2020	8/1/2024	5	280	310	300
CSB09C	Lower	10/27/2020	7/31/2024	6	ND	2.8	1.7	6/16/2021	7/31/2024	4	0.9	1.5	1.2	10/27/2020	7/31/2024	5	240	290	268
Wells Monitored by Non-GSA Entities																			
2000511-001	Unknown	5/27/2008	2/21/2024	6	1.1	2.0	1.5	2/22/2006	7/22/2024	79	3.8	58.5	24.2	5/27/2008	2/21/2024	7	150	450	310
2000597-001	Lower	2/14/2000	6/10/2021	4	ND	3.0	2.3	2/18/2003	7/17/2024	44	2.9	31.0	8.6	2/18/2003	12/17/2009	3	154	190	171
2000681-002	Unknown	1/23/2012	12/13/2017	3	ND	ND	ND	3/3/2009	4/9/2024	10	1.5	10.0	5.0	1/23/2012	5/7/2013	2	180	190	185
2010001-008	Lower	10/10/1991	7/29/2015	8	ND	10.0	2.9	10/10/1991	10/23/2017	26	ND	10.0	5.1	10/10/1991	7/27/2016	16	108	190	169
2010001-010	Lower	12/1/1994	6/2/2021	6	ND	3.0	1.8	12/1/1994	7/3/2024	69	0.6	30.2	16.0	12/1/1994	6/2/2021	17	160	440	340
2010001-011	Lower	8/19/1996	2/8/2022	6	ND	3.0	1.9	8/19/1996	7/3/2024	32	0.5	7.6	2.7	8/19/1996	2/8/2022	16	120	190	174
2400216-001	Lower	8/10/2010	10/14/2019	4	3.9	5.3	4.5	3/20/2003	7/17/2024	20	1.6	8.1	4.5	8/10/2010	8/22/2013	2	160	180	170
ESJ11	Unknown	7/27/2021	7/27/2021	1	2.7	2.7	2.7	-	-	-	-	-	-	-	-	-	-	-	-

ND = Non-detect

ND measurements included in average concentration cacluation as half of reporting limit.