Vina Subbasin Domestic Well Survey & Risk Assessment

Clarifying Note Regarding Domestic Well Risk Assessment

Provided By: Christina Buck, Butte County staff providing technical staff support to the Vina GSA

Summary: The LWA memo provides a useful screening-level estimate for responding to the Board's request and DWR's corrective action related to quantifying potential domestic well impacts. The results should not be read as a final determination that all identified wells will go dry, will be eligible for mitigation, or will require full replacement. Staff is considering how to approach evaluating domestic well risk in RMS zones that include a wide range of land surface elevations.

The ***LWA Domestic Well Survey and Risk Assessment Technical Memorandum***, summarizes work completed to refine the domestic well inventory and estimate the number of domestic wells that could be at risk if groundwater levels reach the current Groundwater Level Minimum Thresholds (MTs). Using the 2022 GSP dataset, the analysis estimated 462 wells at risk out of 1,920 wells. Using the 2025 refined dataset, the analysis estimated 400 wells at risk out of 1,253 wells. The memo also presents upper-bound mitigation cost estimates of $18.5 million and $16 million, respectively, assuming $40,000 per well.

Important context for interpreting these results:

• **The at-risk well count has an important limitation to note.** The RMS polygons cover areas with varying land surface elevations and groundwater conditions. A well located substantially higher in elevation than the RMS well (as on the east side of the subbasin) may appear at risk when compared to the MT elevation established at the RMS well, even though the RMS well may not fully represent conditions at that location.

• **This limitation was recognized in the 2022 GSP.** Appendix 3-B explains that wells above the MT elevation tend to be especially shallow or have a significantly different, higher ground surface elevation than the RMS well, and that RMS wells are not fully representative of every well within a zone because groundwater surface and land surface elevations vary across the area.

• **Interpreting the cost estimate:** The cost estimates should be understood as a high-level sensitivity calculation only, not as a proposed program budget or estimate of likely mitigation costs, because actual costs would depend on future Board policy direction regarding eligibility, causation, covered mitigation measures, reimbursement limits, and funding approach.

Technical Memorandum

TO	Vina & Rock Creek Reclamation District Groundwater Sustainability Agencies
FROM	Ryan Fulton, PE
CC	Christina Buck & Becky Fairbanks
DATE	04/22/2026
SUBJECT	Vina Subbasin Domestic Well Survey & Risk Assessment (SGM Grant Component 2, Task 7 Deliverable)

1 BACKGROUND

The Vina Groundwater Sustainability Plan (GSP) was adopted in December 2021 by the Vina Groundwater Sustainability Agency (GSA) and Rock Creek Reclamation District GSA and subsequently reviewed and approved by the California Department of Water Resources (DWR) in July 2023. As part of its review, DWR provided recommended corrective actions (RCAs) in its Determination Letter identifying several areas for improvement with an expectation that they should be considered by the GSAs for the first periodic evaluation of the GSP. The Sustainable Groundwater Management Act (SGMA) requires the GSAs to submit the first Periodic Evaluation (PE) by January 2027. The PE is the GSAs' written assessment of its GSP implementation. Subsequently, the DWR will conduct its Periodic Review of the GSP taking into consideration Annual Reports, the Periodic Evaluation, and assessment of progress made toward achieving sustainability and will issue a determination of the status of the Plan: Approved, Incomplete, or Inadequate. Per the Water Code, DWR conducts this review whether or not the GSAs amend the GSP as part of the Periodic Evaluation. Vina GSA received funding through the Sustainable Groundwater Management Round 2 grant program to support work to address data gaps identified in the plan, complete the Periodic Evaluation, and amend the GSP, as necessary.

This memorandum describes the work Larry Walker and Associates (LWA) has completed to update the current dataset of domestic wells in the Vina Subbasin with results of their desktop survey to address the identified data gap in the GSP related to uncertainty about well location and whether wells in DWR's Online System for Well Completions Reports (OSWCR) database are active or not. The 2022 GSP states "domestic well reliability and protection are the focus of the Groundwater Levels Minimum Thresholds (MT). From a policy perspective, sustainably constructed domestic wells going dry during non-dry year conditions would be a "significant and unreasonable" undesirable result of groundwater management (GSP Section 3.3.2)." The domestic well survey identifies active domestic wells that are sustainably constructed (e.g., drilled below historical low groundwater elevations).

In addition, the memorandum includes results addressing a portion of DWR's RCA regarding potential impacts to domestic wells within the Subbasin at established groundwater level minimum thresholds. Specifically, RCA 3 (b) states:

> *"Provide information on impacts to domestic wells during projected conditions where minimum thresholds are exceeded but undesirable results do not occur and* ***also quantify domestic wells that will be impacted by the proposed minimum threshold.*** *Furthermore, the GSAs should*

evaluate the impacts of proposed minimum thresholds on other beneficial uses and users, such as public and small water systems and environmental users and users."

The following sections described the updated domestic well survey and risk assessment.

2 UPDATED WELL SURVEY

The LWA Team conducted a preliminary evaluation of domestic wells in the Vina Subbasin by identifying residential parcels that are not served by public water suppliers and estimated approximately 4,400 parcels within the Subbasin are likely supplied by a domestic well as shown in Figure 1. The analysis did not provide sufficient information to fill the domestic well data gap described in the GSP and to respond to DWR's RCA. Additional specifications, including well location and depth, are needed to estimate the number of wells at risk of going dry if groundwater level minimum thresholds are reached.

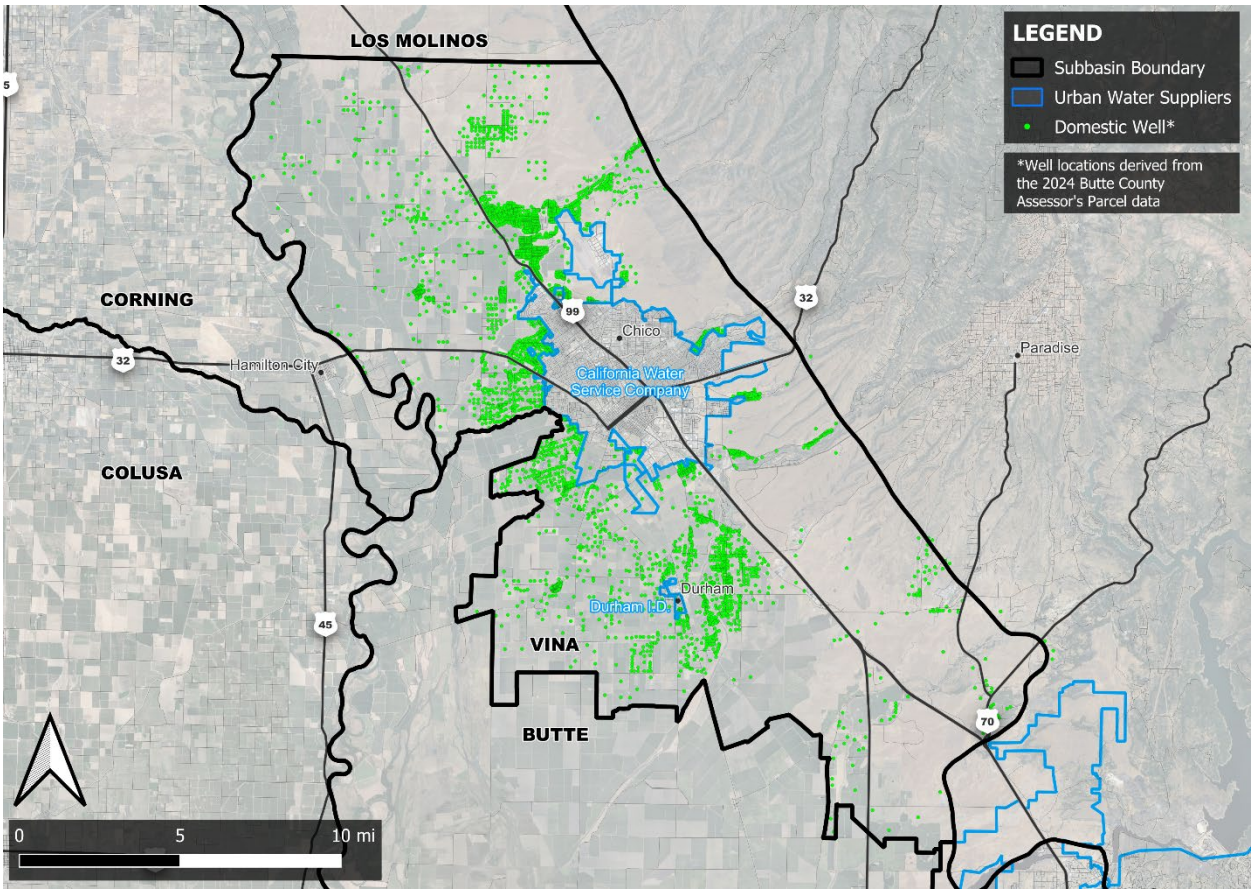

Figure 1. Vina Subbasin domestic well distribution (developed using County parcel information).

The LWA Team compiled domestic well completion reports (WCRs) from DWR's OSWCR database. The database provides well specifications including drill / completion depth, location, screen interval(s), and age / status (e.g., active vs abandoned). The OSWCR database provides location information for all WCRs using the Public Land Survey System (PLSS) Section (or a one-square mile area). WCRs were thoroughly reviewed by LWA checking for other information that provided accurate location information such as sketches and APNs. This information is not always captured and digitized by DWR in the OSCWR database and is required to identify active and abandoned domestic wells. Abandoned wells are identified by looking at parcels with multiple domestic wells or within a public water supplier service area (e.g., Cal Water). For example, a parcel may have records of two domestic wells: one from the 1960s and

a second from the 2010s. In this case, it is assumed that the 1960s well is abandoned and replaced by the well drilled in the 2010s.

DWR's OSCWR database shows 4,275 domestic wells within the Vina Subbasin. Well depth is known for all wells except for nine (9) wells. Figure 2 shows the number of wells missing location information before and after LWA's review of the WCRs by decade. Approximately 75% of the WCRs were missing accurate location information before LWA's review. LWA staff identified the precise location of 1,731 domestic wells. An additional 403 wells had an identifiable APN on the WCR, bringing the total number of wells with a refined location to 2,134 (or 50%). The remaining 2,141 wells could not be identified past the center of the PLSS section. These wells were mostly drilled before 1980. The installation date is missing from 91 of the 4,275 WCRs. Figure 3 shows domestic wells with the updated locations.

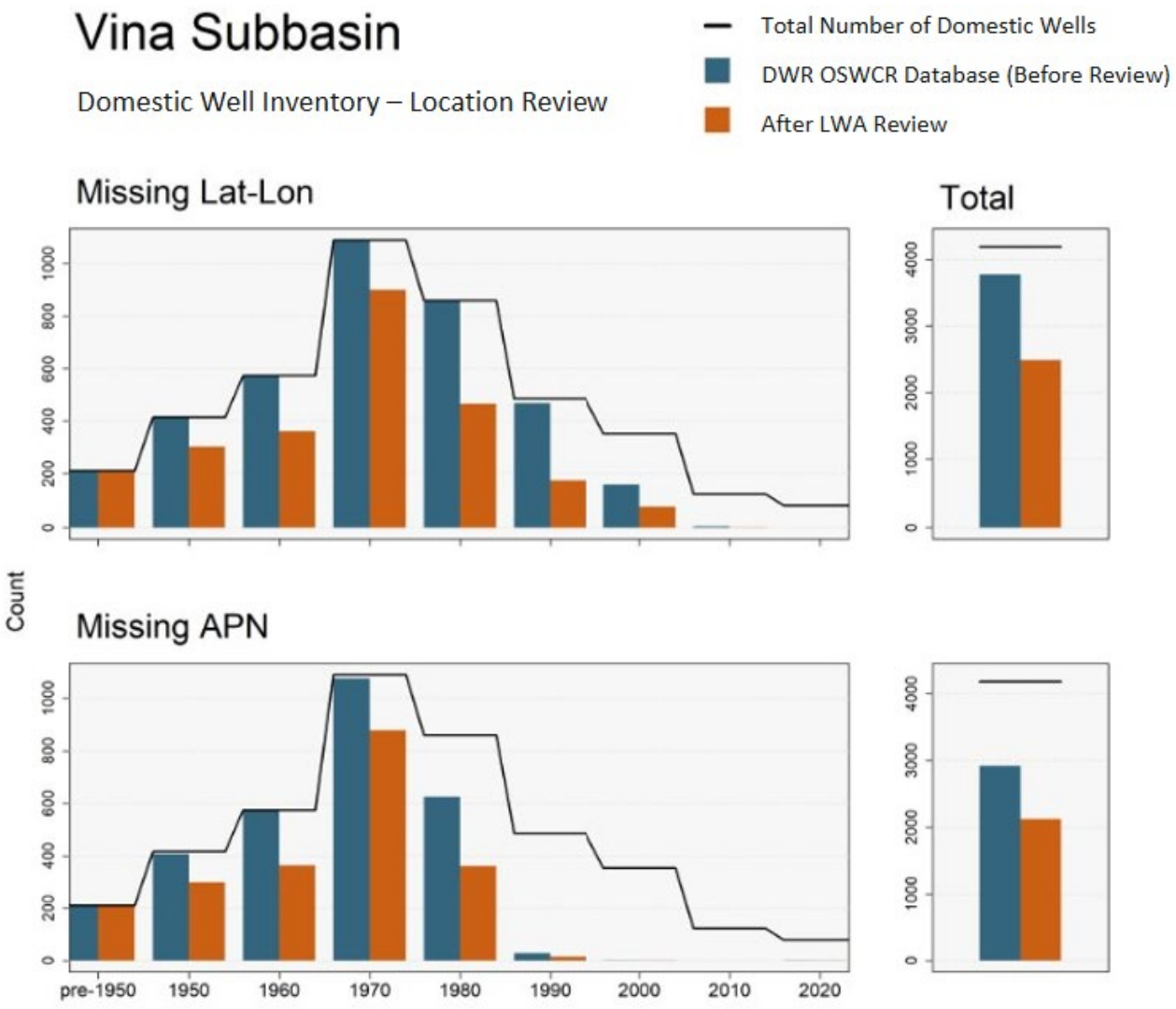

Figure 2. Summary of wells missing location information before and after manual review.

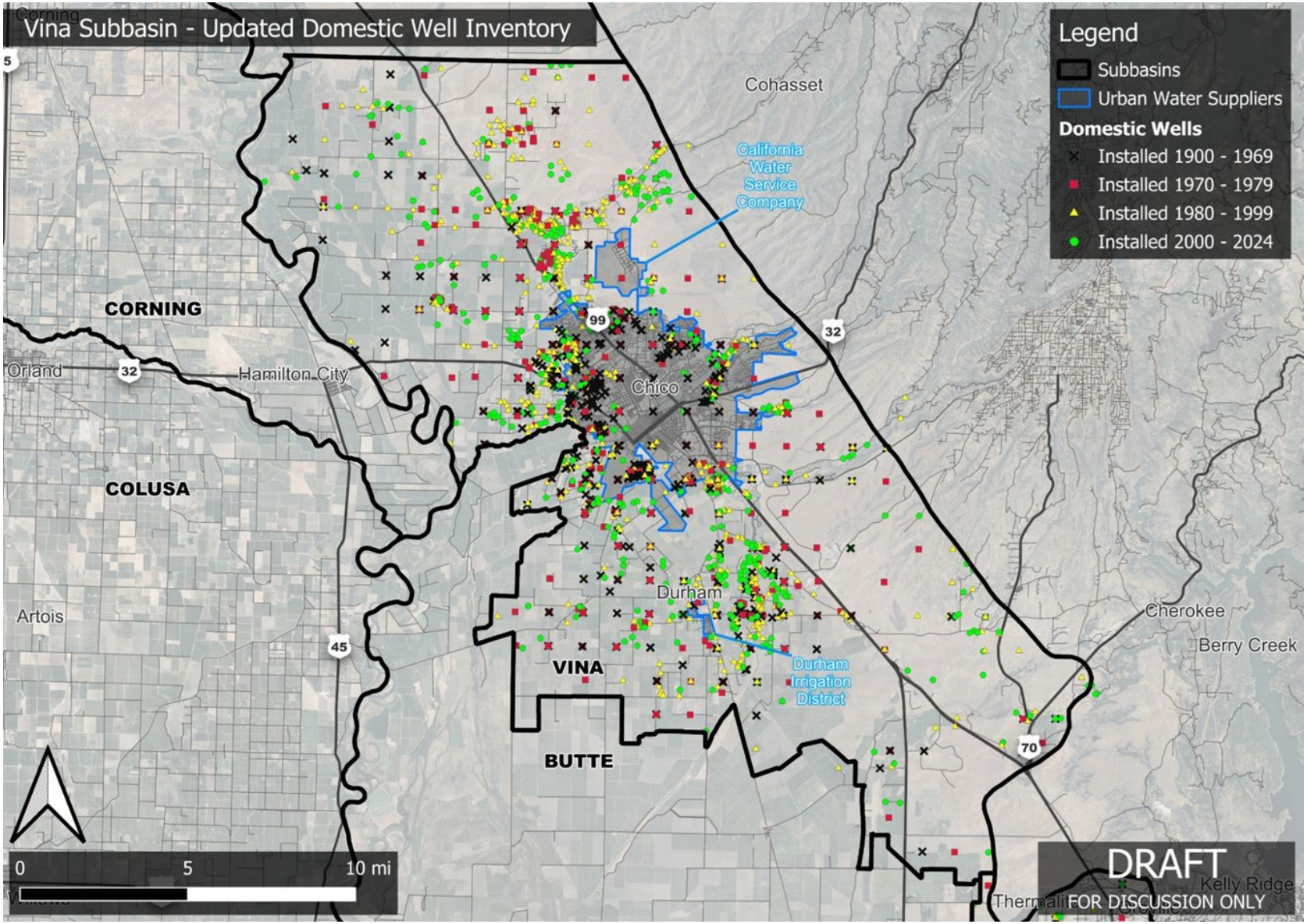

Figure 3. Vina Subbasin Domestic Wells from DWR's OSWCR database (updated locations shown).

Sustainably constructed, active domestic wells were identified using the refined OSWCR dataset based on the following assumptions:

1. Removed wells drilled prior to 1980 (consistent with the 2022 GSP). The GSP states “wells installed before 1980 were removed. This removes the oldest wells and wells likely to have been replaced as a result of historically low groundwater conditions that occurred during the 1976-1977 drought. Wells that remain are more likely to be consistent with current well standards and currently serving domestic water needs (GSP Section 3.3.2).” There are 2,282 WCRs dated before 1980 and 1,920 WCRs dated after 1980.
2. Removed wells within public water supplier service areas (e.g., Cal Water-Chico and Durham I.D.) or on the same parcel as another more recently installed well.
3. Removed wells that have gone dry in the past. These wells have a bottom elevation greater than the minimum historical groundwater level measured at the corresponding groundwater level RMS well per the 2022 GSP. The County well ordinance requires all wells to be drilled below the historical minimum groundwater elevation. In accordance with the 2022 GSP, the GSA considers these wells to be not sustainably constructed.

As a result, there are 1,253 sustainably constructed, active domestic wells across the Vina Subbasin as shown in Figure 4. Generally, wells are spatially distributed across the Subbasin similarly to the parcel-derived locations (Figure 1). There are significantly fewer sustainably constructed, active wells than parcels likely having a domestic well. This is likely due to uncertainties in both analyses including incomplete WCR records and errors in the County’s parcel coverage.

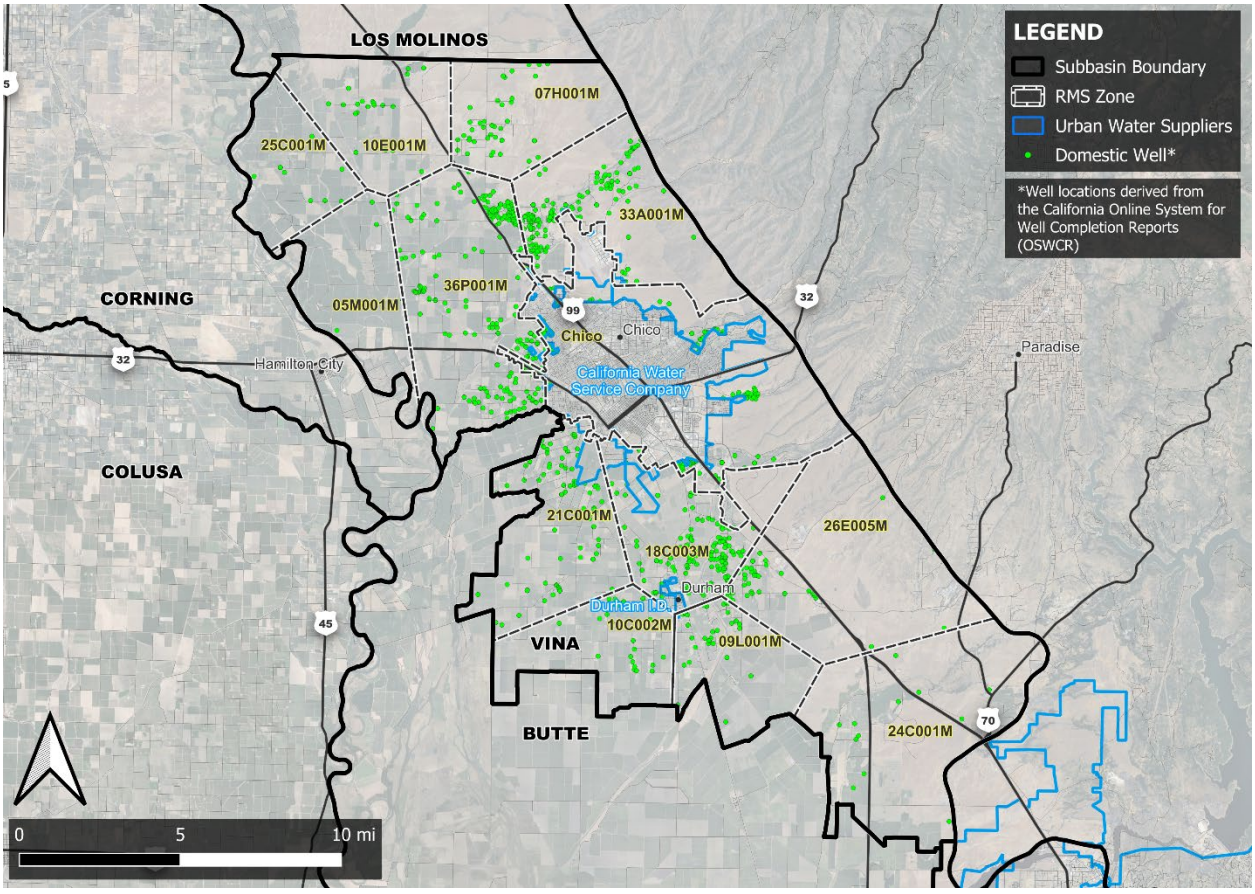

Figure 4. Vina Subbasin sustainably constructed, active domestic wells from DWR’s OSWCR database.

3 DOMESTIC WELL RISK ASSESSMENT

To address DWR's RCA 3(b): the number of wells at risk of going dry if groundwater levels reach MTs was estimated using two different approaches. The first approach is consistent with the methodology described in the 2022 GSP Appendix 3-B using the same data set of domestic wells. It relies on DWR's OSWCR database and assumes all domestic wells drilled post-1980 are active. Risks to domestic wells were determined by identifying wells where the bottom of the well is above the MT elevation. Wells above the MT elevation tend to be especially shallow (less than 100 feet deep) or are located at a higher ground surface elevation than the RMS well.

A second risk assessment was conducted using the sustainably constructed, active domestic wells from the LWA desktop survey (described in Section 2) and the same groundwater level RMS wells and zones provided in 2022 GSP, Appendix 3-B. The number of domestic wells at-risk at the current MTs was estimated using the following steps:

1. Estimated the "effective depth" of each domestic well, which was the shallower of the assumed pump elevation (e.g., bottom of well elevation plus 10 feet above mean sea level), and the bottom elevation of the well's deepest perforated interval.
2. Adjusted ground elevation at each domestic well using LiDAR data to account for ground elevations changes across each RMS zone.
3. Quantified the number of domestic wells at risk of going dry at the current MTs for each RMS zone. If a well's effective depth is shallower than the current MT, then it is at risk of going dry before undesirable results occur in the subbasin.

Table 3 summarizes the number of at-risk domestic wells using both approaches. DWR's OSWCR database shows there are a total of 4,275 domestic wells within the Subbasin of which 1,920 wells were drilled post-1980. It is estimated using the original well inventory that 462 wells (or 24% of 1,920 wells) are at risk at the current MTs. Likewise, it is estimated using the updated approach that 400 wells (or 32% of 1,253 wells) are at risk at the current MTs. Both assessments resulted in similar numbers of at-risk domestic wells even though the total number of active domestic wells decreased using the updated inventory. The total maximum mitigation program cost is up to $18.5 million (2022 GSP) or $16 million (updated inventory) assuming it will cost $40,000 to replace / deepen a well and all at risk wells would be eligible for full replacement (Table 1). This therefore represents an upper estimate of mitigation costs. Dry wells are likely to occur over several years / decades as groundwater levels may gradually approach MTs. Assuming costs are spread over twenty years, the equivalent annual cost per irrigated acre is $12.25 and $10.60; respectively.

Table 1. Total number of domestic wells and wells at-risk by RMS zone.

Management Area	RMS Zone	2022 GSP[1]			Updated Risk Assessment		
		Number of At-Risk Wells	Total Number of Active Wells	Percent of Wells at Risk	Number of At-Risk Wells	Total Number of Active Wells	Percent of Wells at Risk
Vina North	10E001	6	21	29%	5	20	25%
Vina North	25C001	5	18	28%	4	10	40%
Vina North	05M001	2	5	40%	3	7	43%
Vina North	36P001	69	329	21%	103	288	36%
Vina North	07H001	32	67	48%	30	58	52%
Vina North	33A001	116	307	38%	99	228	43%
Chico MA	RMS All	85	544	16%	30	200	15%
Vina South	21C001	57	155	37%	42	120	35%
Vina South	18C003	60	339	18%	37	195	19%
Vina South	26E005	15	45	33%	23	50	46%
Vina South	10C002	4	29	14%	9	26	35%
Vina South	09L001	7	49	14%	6	39	15%
Vina South	24C001	4	12	33%	9	12	75%
Total:		462	1,920	24%	400	1,253	32%
Max. Total Mitigation Cost:[2]		$18.5 million (or $245 per irrigated acre)			$16 million (or $212 per irrigated acre)		
Annual Mitigation Cost:[3]		$12.25 per irrigated acre			$10.60 per irrigated acre		

Notes:
1.) Methodology described further in GSP Appendix 3-B. Risks to domestic wells are shown on graphs in Appendix.
2.) The maximum total mitigation cost assumes $40,000 per well to deepen / replace. Per acre cost is based on 75,500 acres of irrigated farmland within Vina Subbasin (source: 2024 Annual Report).
3.) The equivalent annual mitigation cost per acre spreads the max total mitigation cost over 20 years.

4 RECOMMENDATIONS

The domestic well survey estimated the number of domestic wells within the Vina Subbasin to be as low as 1,253 (WCR-based approach) and to be as high as 4,400 (parcel-based approach). It is recommended that the GSA implement a well registration program to improve the GSA's domestic well inventory as funding allows. A registry may support a domestic well mitigation program as needed.