APPENDIX A – GIS Technical Analysis

The purpose of this document is to describe the technical approach for identifying sites for additional monitoring stations in the Merced Subbasin GSP to address multiple data gaps in a strategic and cost-effective manner.

Two separate analyses were performed to provide a process to fill the data gaps, as identified by the GSP and stakeholder and public input.

The first analysis (Section 1 - Weighted Monitoring Network Analysis) focuses on leveraging existing infrastructure by identifying the quality of existing monitoring sites that could be incorporated into monitoring under SGMA, focusing on high quality sites that have well construction information, a higher frequency of monitoring, and longer period of records. Once the existing monitoring sites were screened for quality of site, an analysis was conducted to identify and quantify other factors that related to siting, such as distance to rivers, depth to groundwater, rate of subsidence, relationship to the Corcoran Clay and other factors to identify areas with higher needs for monitoring.

The second analysis (Section 2 - Site Identification Kriging Error Analysis) focuses on the spatial nature of monitoring networks and uses a measure of uncertainty, kriging error, to identify which areas are the most beneficial to establish new monitoring. Kriging is a technique often used to contour groundwater data. Errors in kriging quantify when there is insufficient data or inconsistent data in an area. These errors can be used to identify areas in need of new monitoring.

Results from both analyses were combined (Section 3 - Combining Recommended Monitoring Analyses) using the Esri ArcGIS Densify Sampling Network tool to recommend new monitoring sites. Based on guidance from the Department of Water Resources (Best Management Practices for the Sustainable Monitoring of Groundwater: Monitoring Networks and Identification of Data Gaps), a groundwater elevation monitoring density of 4 wells / 100 sq. mi. was selected for the purposes of the analysis to identify additional monitoring locations.

1. WEIGHTED MONITORING NETWORK ANALYSIS

This section focuses on leveraging existing infrastructure by identifying the quality of existing monitoring sites that could be incorporated into monitoring under SGMA, focusing on high quality sites that have well construction information, a higher frequency of monitoring, and longer period of records. Once the existing monitoring sites were screened for quality of site, an analysis was conducted to identify and quantify other factors that related to siting, such as distance to rivers, depth to groundwater, rate of subsidence, relationship to the Corcoran Clay and other factors to identify areas with higher needs for monitoring.

1.1 Well Tiering

Well tiering was used to divide existing monitoring wells into groups to better understand the coverage of high quality monitoring locations in the Subbasin. This effort is intended to focus additional monitoring on existing sites to reduce costs. The existing wells were divided into 8 tiers based on criteria that relate to suitability of those well facilities for monitoring. Tiering was developed using four factors:

1. Known screened intervals or depth
2. Frequency of existing monitoring
3. Period of data record
4. Volume of existing data

In this analysis, the most ideal monitoring sites are represented by Tier 1, and less ideal monitoring sites are represented by the other tiers, down to Tier 8. The factors used for each tier are described below and in Table 1-1. Figure 1-1 shows the approximate locations of monitoring sites designated Tiers 1 through 7. Table 3-1 at the end of this appendix provides a full listing of the wells in the tiering tool. This list excludes the handful of wells that are already part of the monitoring network.

Tier 1 wells

- Dedicated monitoring well
- With known screened intervals or depth, screened in 1 aquifer
- With existing semiannual or more frequent planned monitoring
- With at least 10 years of data (within the last 20 years)
- With at least 10 data points

Tier 2 wells

- With known screened intervals or depth, screened in 1 aquifer
- With existing semiannual or more frequent planned monitoring
- With at least 10 years of data (within the last 20 years)
- With at least 10 data points

Tier 3 wells

- With known screened intervals or depth, screened in 1 aquifer
- With existing semiannual or more frequent planned monitoring

Tier 4 wells

- With known screened intervals or depth, screened in 1 aquifer
- With existing annual or more frequent planned monitoring
- With at least 10 years of data (within the last 20 years)
- With at least 10 data points

Tier 5 wells

- With known screened intervals or depth, screened in 1 aquifer
- With existing annual or more frequent planned monitoring

Tier 6 wells

- With known screened intervals or depth, screened in 1 aquifer
- With at least 10 years of data (within the last 20 years)
- With at least 10 data points

Tier 7 wells

- With known screened intervals or depth, screened in 1 aquifer

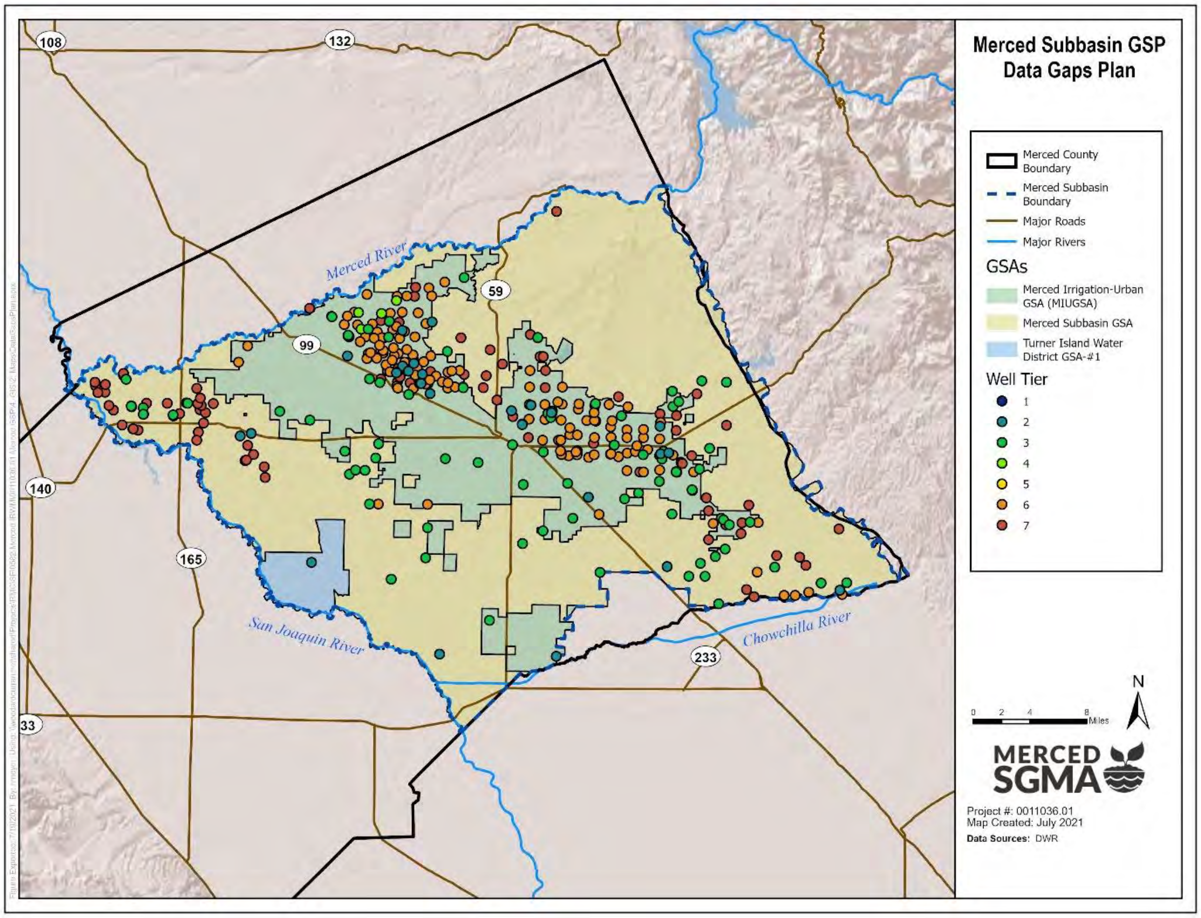
Tier 8 wells

- No known screened intervals or depth
- Not used in analysis due to inability to evaluate which aquifers are measured

Table 1-1: Criteria for Well Tiering

Criteria \ Well Tier	1	2	3	4	5	6	7	8
Dedicated monitoring well	X							
Known screened intervals or depth, screened in 1 aquifer	X	X	X	X	X	X	X	
Existing semiannual or more frequent planned monitoring	X	X	X					
Existing annual or more frequent planned monitoring				X	X			
At least 10 years of data (within the last 20 years)	X	X		X		X		
At least 10 data points	X	X		X		X		

Figure 1-1: Well Tiers 1-7



Wells that did not meet the criteria for Tiers 1-7 were categorized as Tier 8 and were not used in subsequent analysis. The majority of these did not meet the criteria for Tiers 1-7 because of a lack of well construction information including depth and screened interval, which was used to categorize wells as above vs. below and outside of the Corcoran Clay.

1.2 Criteria Ranking and Weighting

Ideal future monitoring sites should be sited preferentially in areas of importance for groundwater monitoring and should consider factors such as depth to groundwater, location of screened intervals relative to the Corcoran Clay, distance to streams and rivers, distance to water quality issues, and more. This step of the analysis reviewed data collected about these factors, analyzed those data using Geographic Information Systems (GIS) to assign inclusion values for each criterion.

Criteria evaluation components include:

- Well tiering analysis

- Depth to groundwater, separately for wells in the 'Above Corcoran Clay' and 'Below or Outside Corcoran Clay' Principal Aquifers
- Distance to major rivers and streams
- Proximity to water quality concerns
- Rate of subsidence
- Distance to Subbasin boundary
- Distance to Natural Communities Commonly Associated with Groundwater (NCCAGs), used for the Above and Outside Corcoran Clay Principal Aquifers
- Locations of Disadvantaged Communities (DACs)
- Distance to stream gauging stations
- Locations of proposed sites in the Below Corcoran Clay Principal Aquifer, used as inputs for the Above Corcoran Clay Principal Aquifer only

Each criterion was broken down into two or more categories and then each category was ranked from 0 to 1, where 0 is the least desirable and 1 is the most desirable new location. A weighting factor was used to differentiate the relative importance between data types.

Data were transformed into rasters according to the criteria, weights, and inclusion probabilities summarized in Table 1-2. The rasters were weighted, summed, and normalized using Esri ArcGIS Raster Calculator to develop the final raster of inclusion probabilities, with 0 as the least desirable and 1 as the most desirable new location. The resulting rasters are shown in Figure 1-2 to Figure 1-14 following Table 1-2.

Table 1-2: Weighted Site Analysis Inputs

Criteria	Rationale	Weighting Factor	Measurement	Ranking Value
Well tiering analysis	Prioritize wells with quality existing data and/or planned monitoring	2	Tier 1 Tier 2 Tier 3 Tier 4 Tier 5 Tier 6 Tier 7 No Well or Tier 8	1.0 .9 .8 .7 .6 .5 .4 0
Depth to groundwater (above Corcoran Clay)	Prioritize shallowest and deepest groundwater	1	<10' or >120' 10-20' or 100-120' 20-30' or 80-100' 30-40' or 60-80' 40-60'	1.0 .8 .6 .4 .2

Criteria	Rationale	Weighting Factor	Measurement	Ranking Value
Depth to groundwater (below & outside Corcoran Clay)	Prioritize shallowest and deepest groundwater	1	<10’ or >250’ 10-20’ or 200-250’ 20-30’ or 150-200’ 30-40’ or 100-150’ 40-100’	1.0 .8 .6 .4 .2
Distance to major rivers and streams	Prioritize areas with groundwater / surface water interaction	1	½ mile 1 mile 1.5 miles 2 miles > 2 miles	0 0.5 1.0 0.5 0
Proximity to water quality concerns	Prioritize areas at risk of migration of poor quality water (TDS)	1	>1,000 mg/L 1,000-900 mg/L 900-800 mg/L 800-700 mg/L 700-600 mg/L 600-500 mg/L <500 mg/L	1.0 0.9 0.8 0.7 0.6 0.5 0
Rate of subsidence	Prioritize areas with subsidence issues	1	> -0.6 ft/yr -0.6 to -0.45 ft/yr -0.45 to -0.3 ft/yr -0.3 to -0.15 ft/yr -0.15 to 1 ft/yr	1.0 0.9 0.8 0.7 0
Distance to Subbasin boundary	Prioritize areas to understand subsurface flows	0.5	¼ mile ½ mile 1 mile 2 miles > 2 miles	1.0 .75 .5 .25 0
Distance to NCCAGs (above & outside Corcoran Clay)	Prioritize areas of ecological importance	1	1 mile > 1 mile	1.0 0
Locations of DACs	Prioritize areas that benefit historically marginalized communities	1	Within DAC Outside DAC	1.0 0
Distance to stream gauging stations	Prioritize areas to cross-correlate streamflow and groundwater monitoring data	0.5	½ mile 1 mile 1.5 miles 2 miles > 2 miles	0 0.5 1.0 0.5 0

Criteria	Rationale	Weighting Factor	Measurement	Ranking Value
Locations of proposed Below Corcoran Clay sites (Above Corcoran Clay)	Prioritize areas with potential to install nested wells	3	1 mile > 1 mile	1.0 0

1.2.1 Well Tiering Processing

In order to prioritize monitoring sites as they relate to conditions affected by the Corcoran Clay, monitoring wells were sorted by their relationship to the Corcoran Clay. Groundwater conditions in Merced Subbasin vary based on their location in comparison with the Corcoran Clay, a regional aquitard that acts as a confining layer where present. Analysis was conducted to evaluate which monitoring sites are screened above the Corcoran Clay, below the Corcoran Clay, or outside the Corcoran Clay. This analysis was performed by comparing the depth and thickness of the Corcoran Clay at each well site to available information on well screens to categorize wells as Above, Below, or Outside the Corcoran Clay, or Unknown if there was no well screen information available.

Once separated into either above the Corcoran Clay or below or outside of the Corcoran Clay, analysis was performed by exporting Tier 1-7 wells from the database into GIS with a 0.5-mile radius buffer surrounding each well to incorporate the local spatial zone represented by each well. Where well buffers overlapped, the lowest tier (meaning highest quality data) was prioritized.

Tiered wells above the Corcoran Clay are shown in Figure 1-2, and tiered wells below and outside of the Corcoran Clay are shown in Figure 1-3.

Figure 1-2: Well Tiers – Above Corcoran Clay

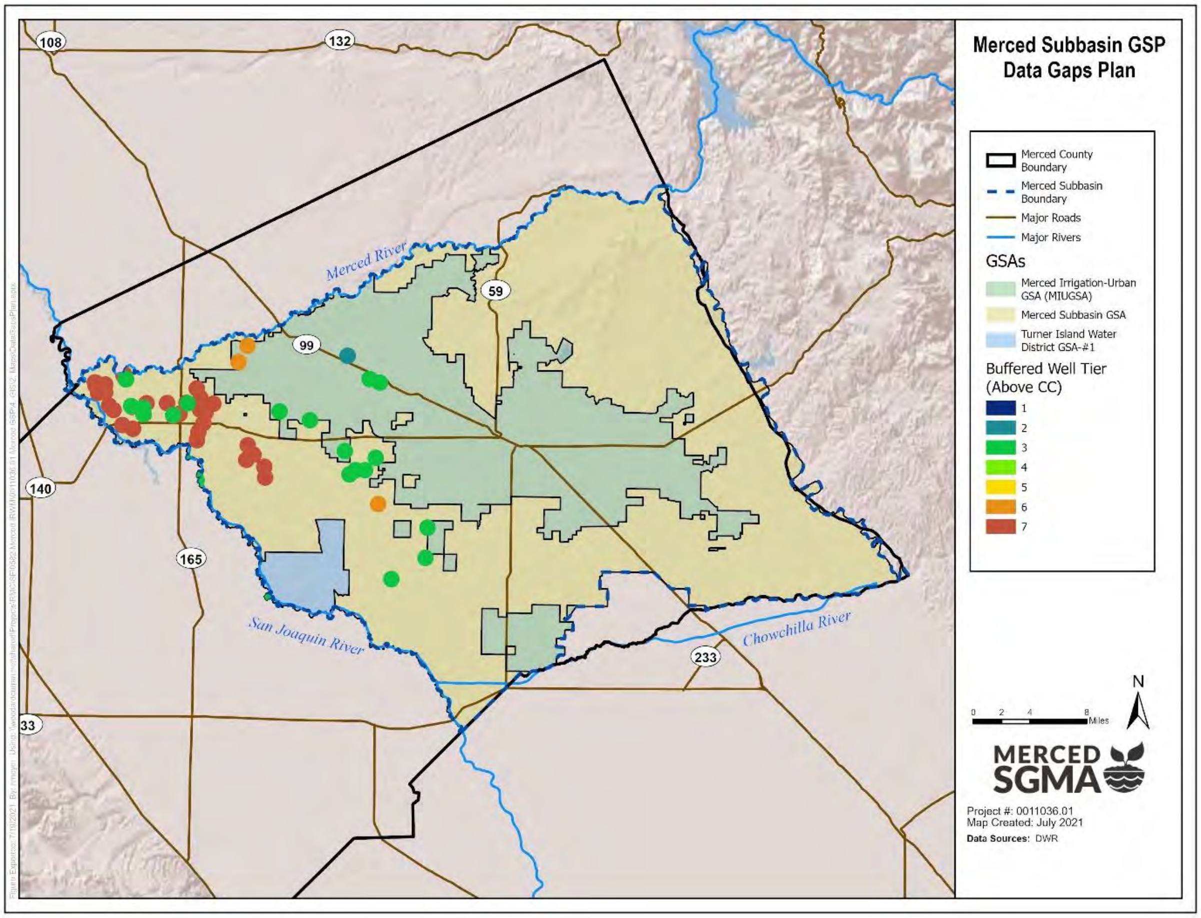
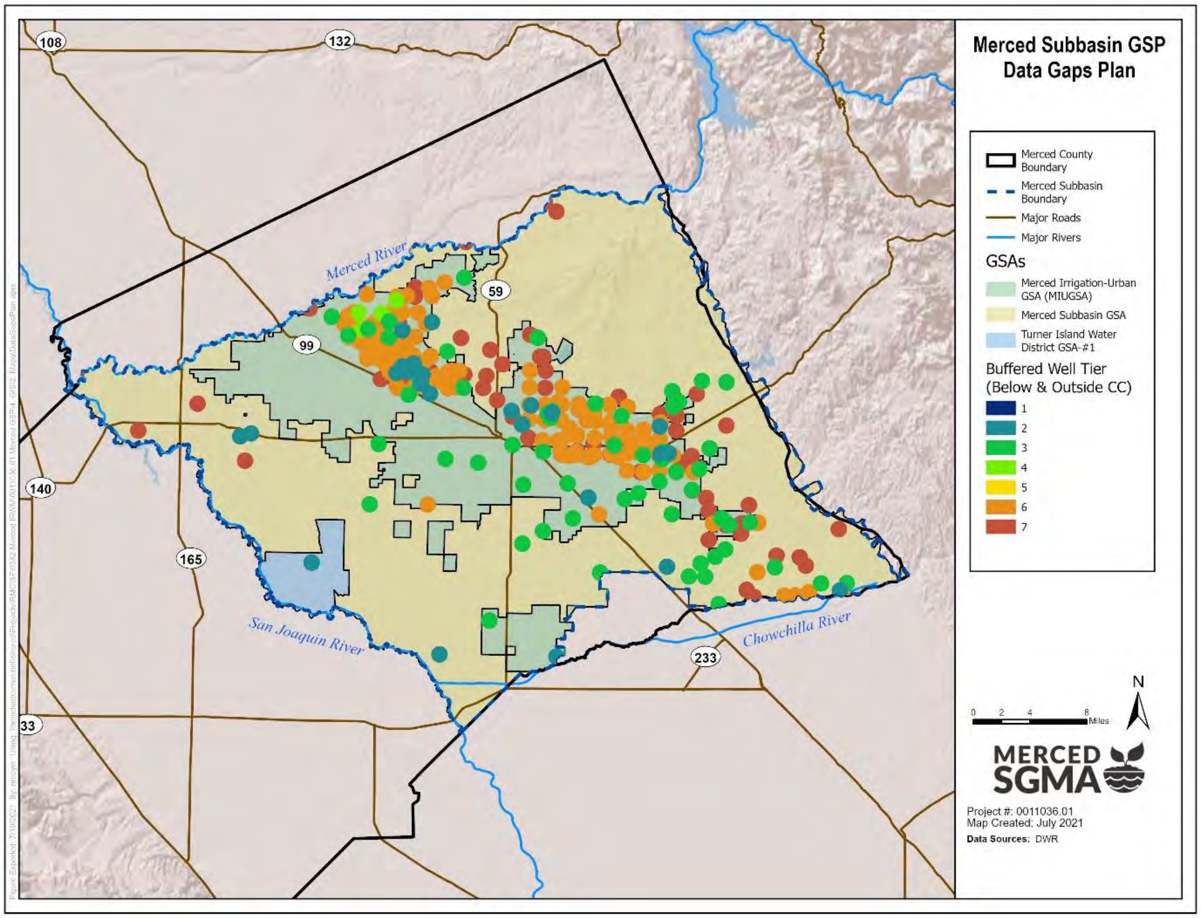


Figure 1-3: Well Tiers – Below and Outside Corcoran Clay



1.2.2 Depth to Groundwater

Depth to groundwater is a useful indicator for locating monitoring wells in locations that are the most beneficial for regional monitoring. Areas with deeper depths to water indicate potential management challenges and benefit more from increased monitoring density. Additionally, areas with very shallow groundwater (low depth to water) can benefit from monitoring if they support groundwater-dependent ecosystems or if they cause waterlogging issues.

Once separated into either above the Corcoran Clay or below or outside of the Corcoran Clay, analysis was performed by exporting depth to groundwater from the database into GIS. Figure 1-4 through Figure 1-6 show the depth to groundwater in each principal aquifer

Figure 1-4: Depth to Groundwater – Above Corcoran Clay

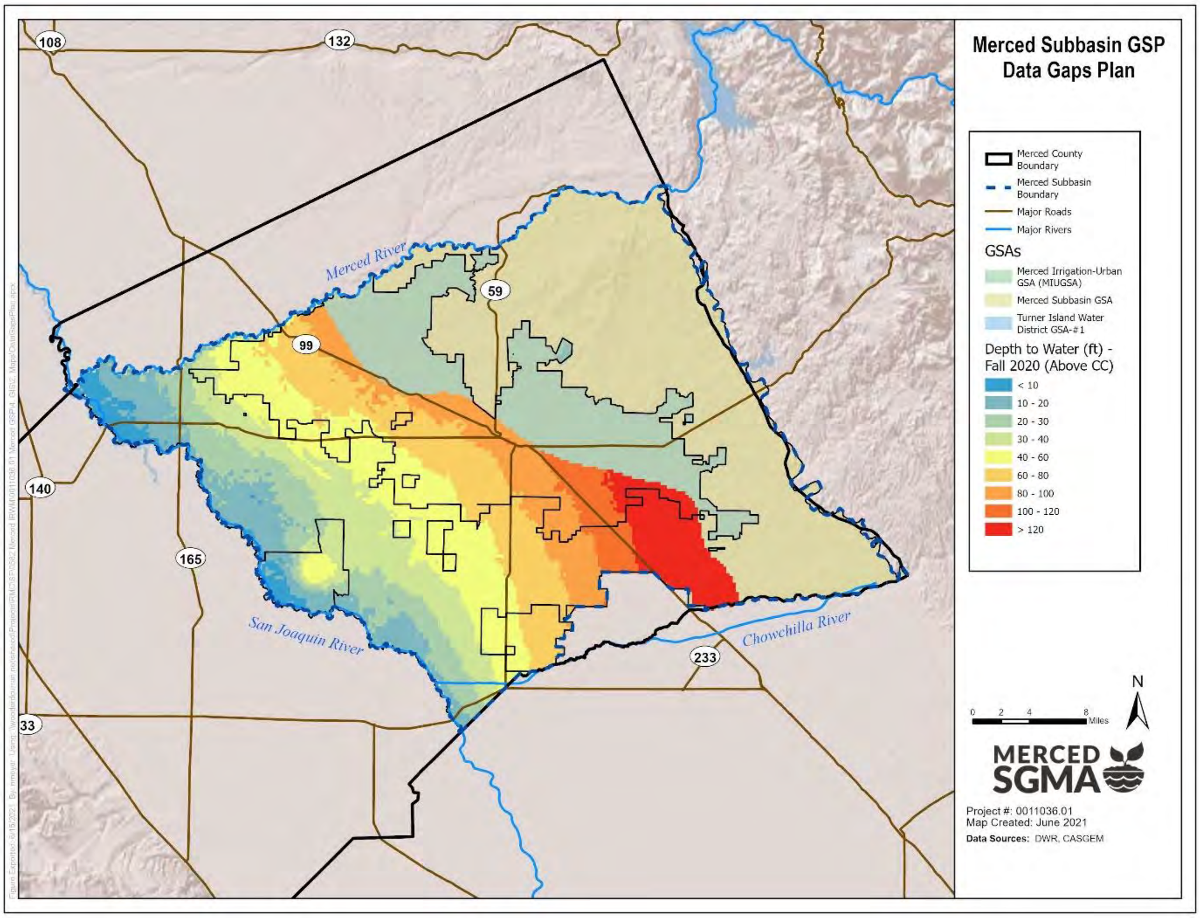


Figure 1-5: Depth to Groundwater – Below Corcoran Clay

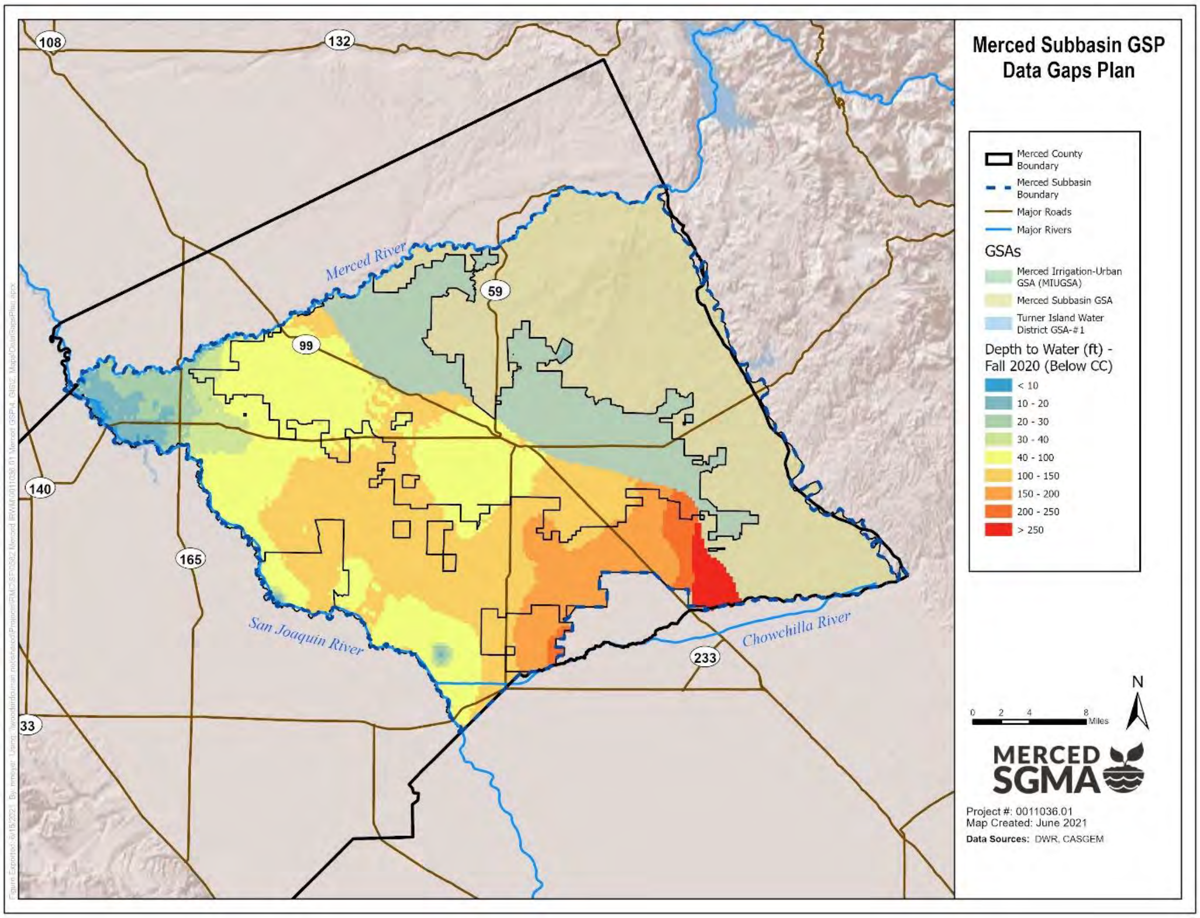
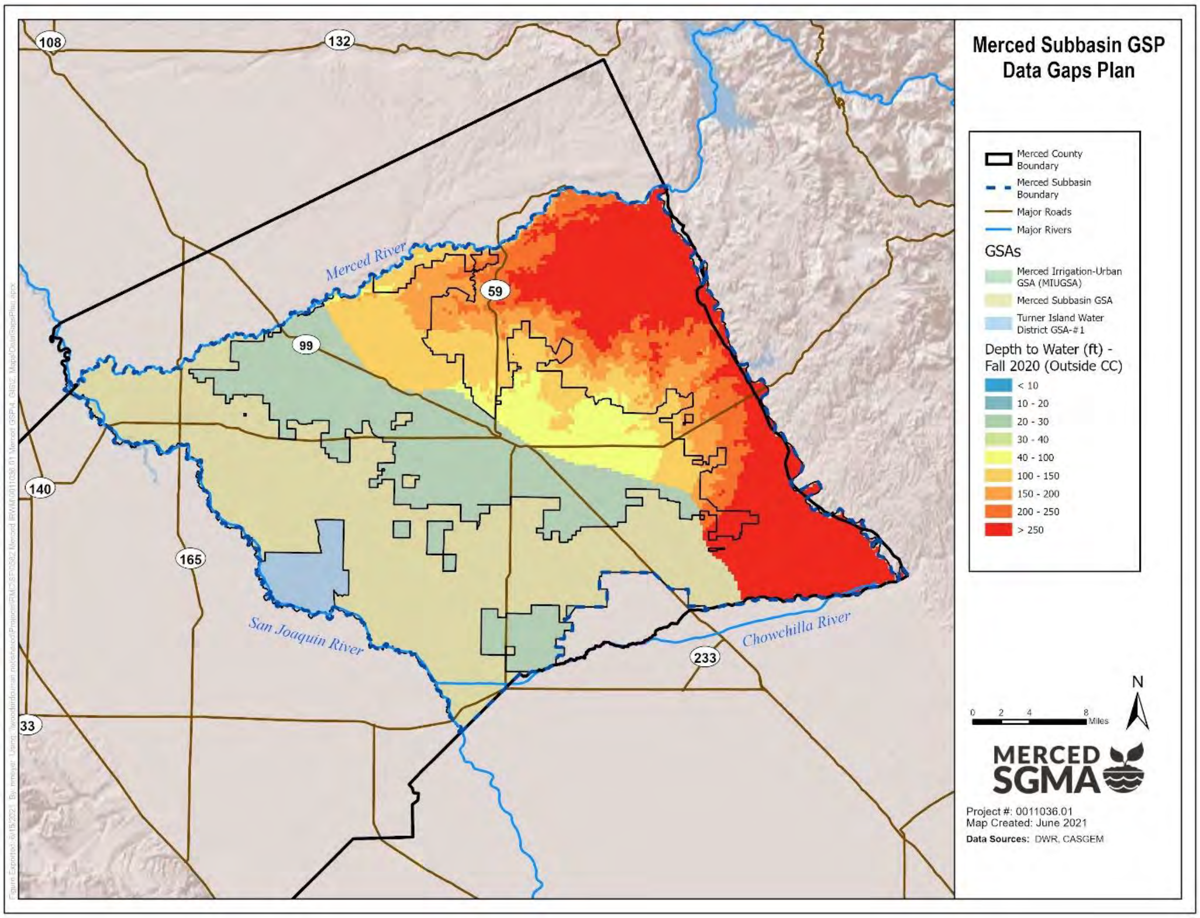


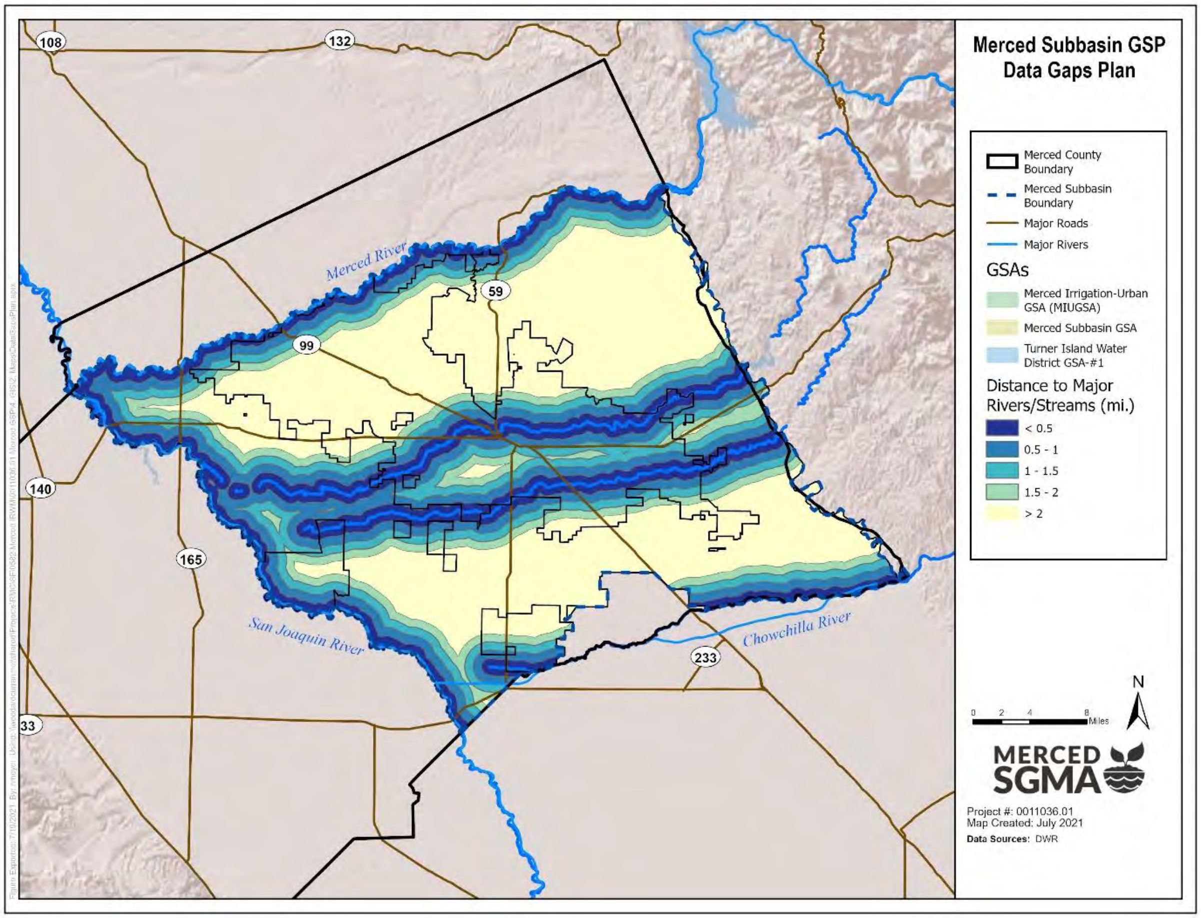
Figure 1-6: Depth to Groundwater – Outside Corcoran Clay



1.2.3 Distance to Major Rivers and Streams

Analysis was also conducted to assign values to areas based on their distance from major rivers and streams (Figure 1-7). Areas within 1 to 1.5 miles of streams were rated higher for inclusion of new monitoring wells, as wells within this distance of streams are valuable for understanding surface water and groundwater interaction.[1] Areas less than 0.5 miles and farther than 2 miles away from streams were rated the lowest in this criterion.

Figure 1-7: Distance to Major Rivers and Streams

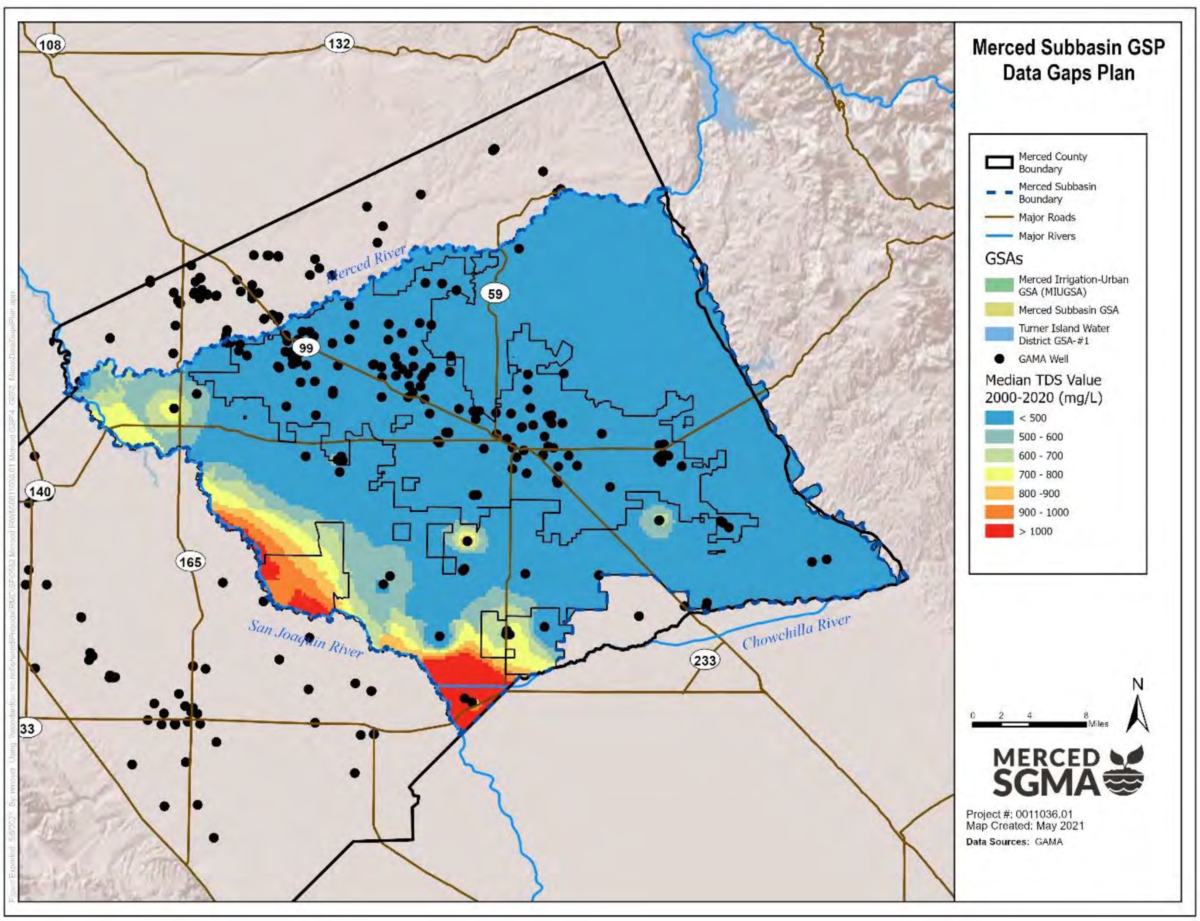


[1] EDF (2018). Addressing Regional Surface Water Depletions in California: A Proposed Approach for Compliance with the Sustainable Groundwater Management Act. Retrieved from: https://www.edf.org/sites/default/files/documents/edf_california_sgma_surface_water.pdf

1.2.4 Proximity to Water Quality Concerns

Areas near water quality concerns were prioritized as part of the beneficial monitoring analysis. Figure 1-8 identifies monitoring points where elevated levels of TDS were identified through analysis of the limited groundwater quality data in GAMA. Areas with higher regional TDS concentrations were prioritized in the analysis over areas with lower regional TDS concentrations. Note that this is not an exhaustive analysis of water quality conditions; other areas of water quality concerns exist for TDS and other constituents, and the areas identified here may not impact beneficial uses of water in the area.

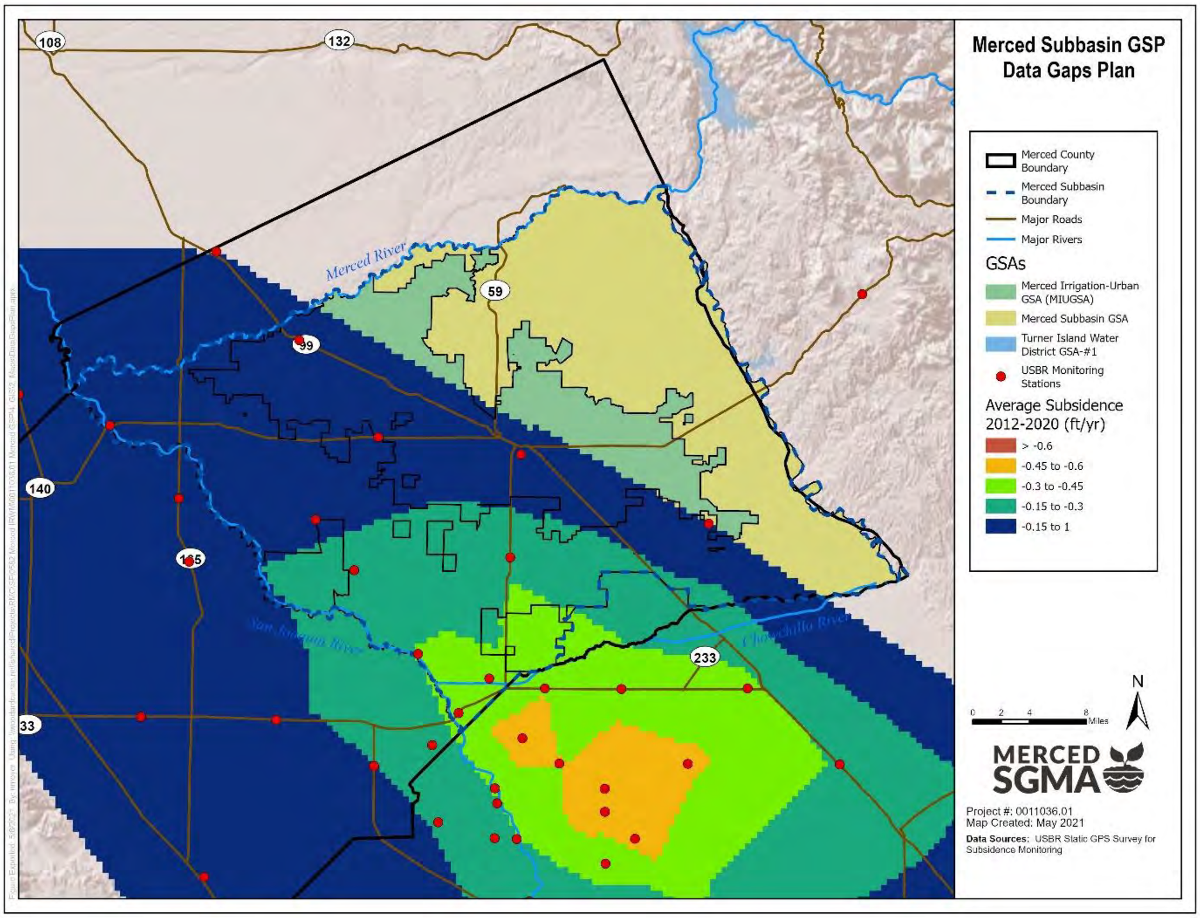
Figure 1-8: Proximity to Water Quality Concerns



1.2.5 Rate of Subsidence

Subsidence information from the USBR SJRRP was used to prioritize areas in the Above and Below Corcoran Clay Principal Aquifers that have been experiencing subsidence. Areas that have experienced higher rates of subsidence are prioritized over areas that experienced less subsidence. Figure 1-9 shows total subsidence in the Subbasin from December 2012 through December 2020.

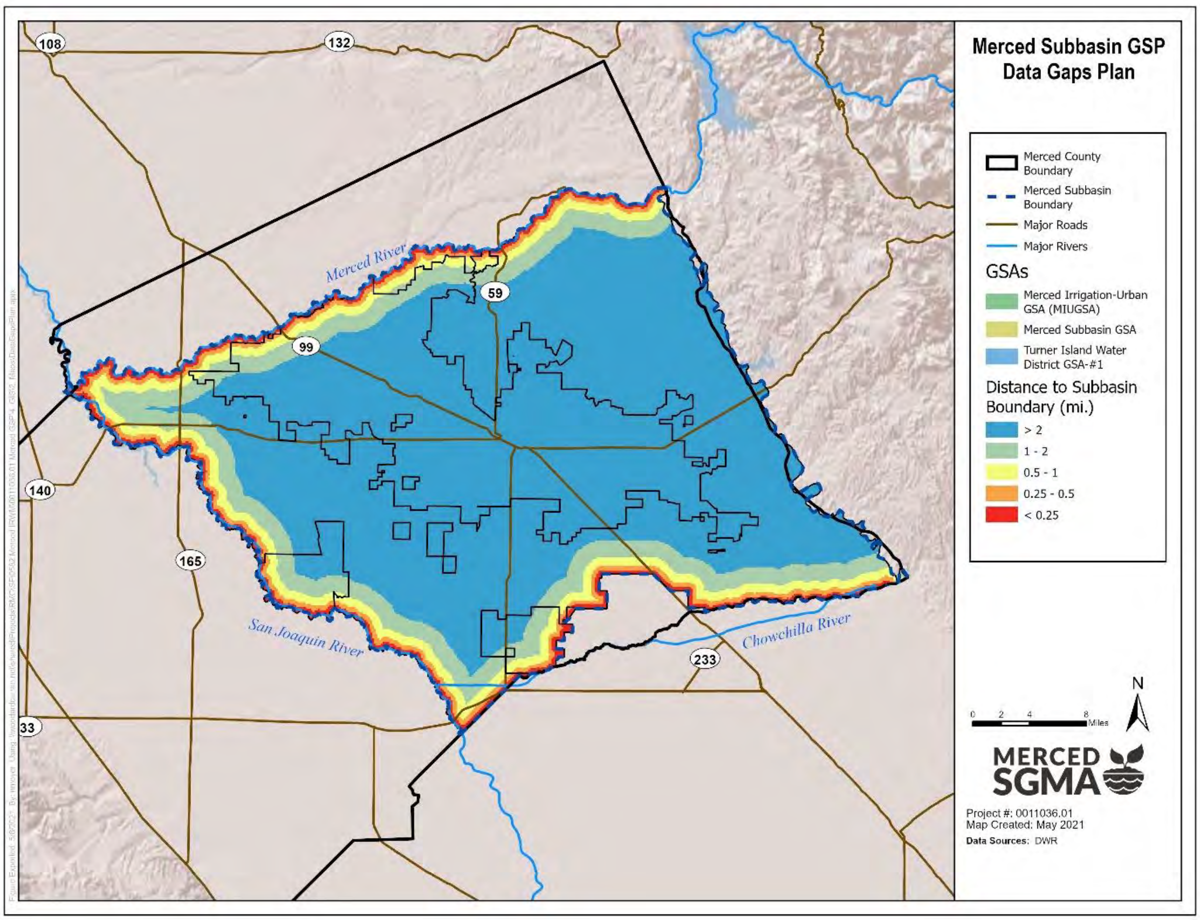
Figure 1-9: Rate of Subsidence



1.2.6 Distance to Subbasin Boundary

Subbasins as delineated by DWR in Bulletin 118 are used by SGMA to define areas to be managed by a GSP or coordinated GSPs. Conditions at a subbasin boundary are valuable to monitor to better understand groundwater flows at those locations for use in inter-basin agreements and in other technical analyses. Analysis in this criterion assigned higher values to areas near subbasin boundaries and lower values to areas further away from boundaries (Figure 1-10).

Figure 1-10: Distance to Subbasin Boundary

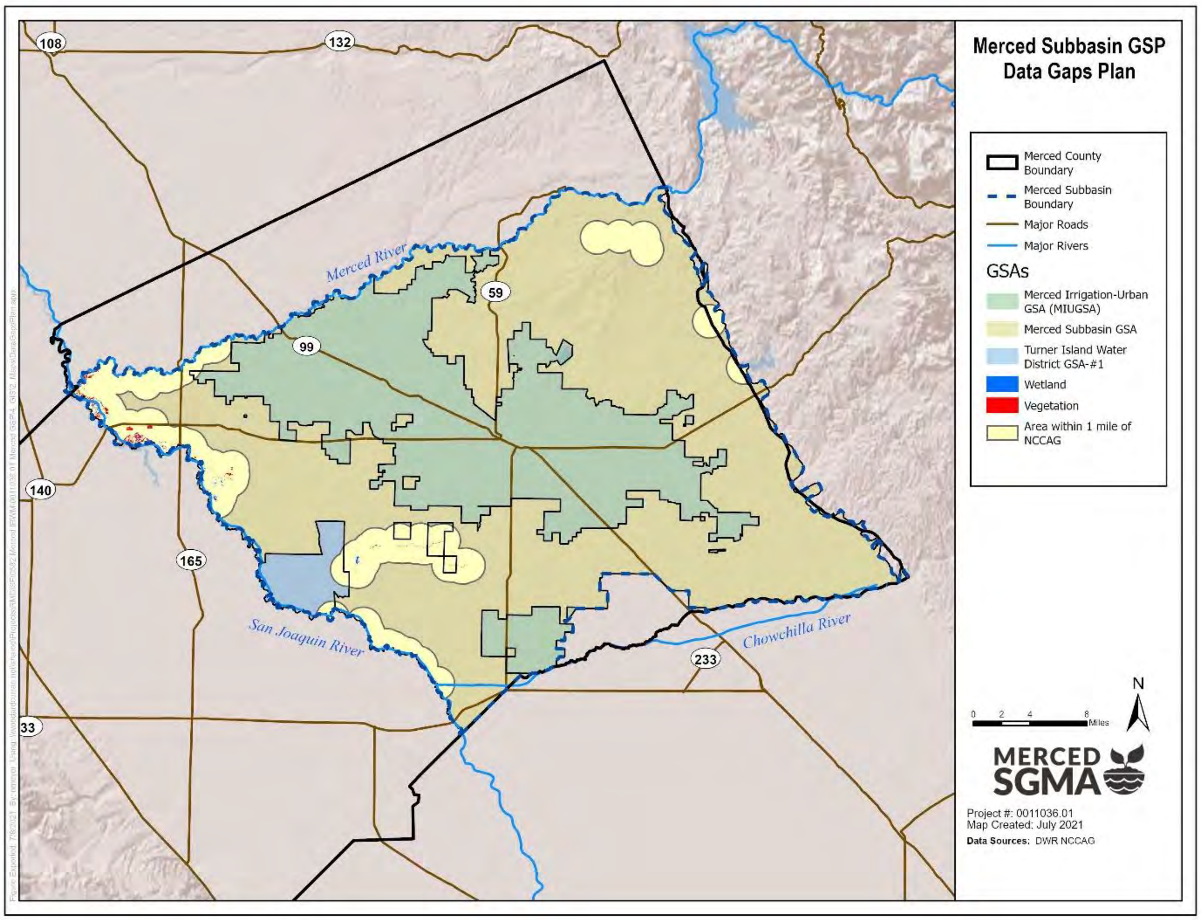


1.2.7 Distance to NCCAGs

Groundwater Dependent Ecosystems (GDEs) are defined in SGMA regulations as “ecological communities or species that depend on groundwater emerging from aquifers or on groundwater occurring near the ground surface”. GDEs exist within the Merced Subbasin largely where vegetation accesses shallow groundwater for survival.

The Natural Communities Commonly Associated with Groundwater (NCCAG) database was used in the GSP as a part of the process to identify vegetation and wetlands commonly associated with groundwater. Analysis in this criterion assigned higher values to areas near NCCAG areas and lower values to areas further away from NCCAG areas (Figure 1-11).

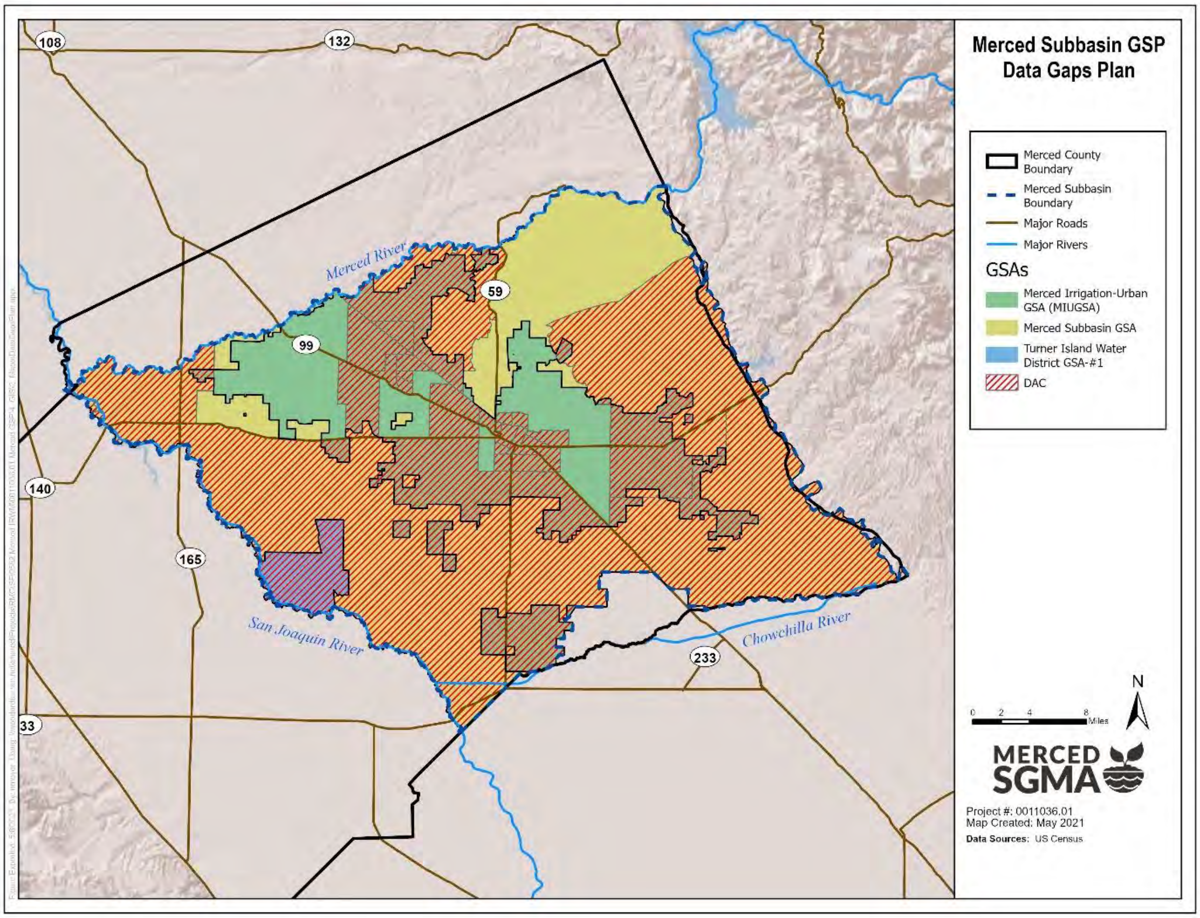
Figure 1-11: Distance to NCCAGs



1.2.8 Locations of DACs

In this analysis, US Census American Community Survey (ACS) data was used to map the locations of disadvantaged communities (DACs). The ACS defines DACs as census tracts at less than 80% of the California's median household income. Analysis in this criterion assigned higher values to areas within DACs and lower values to areas outside DACs (Figure 1-12).

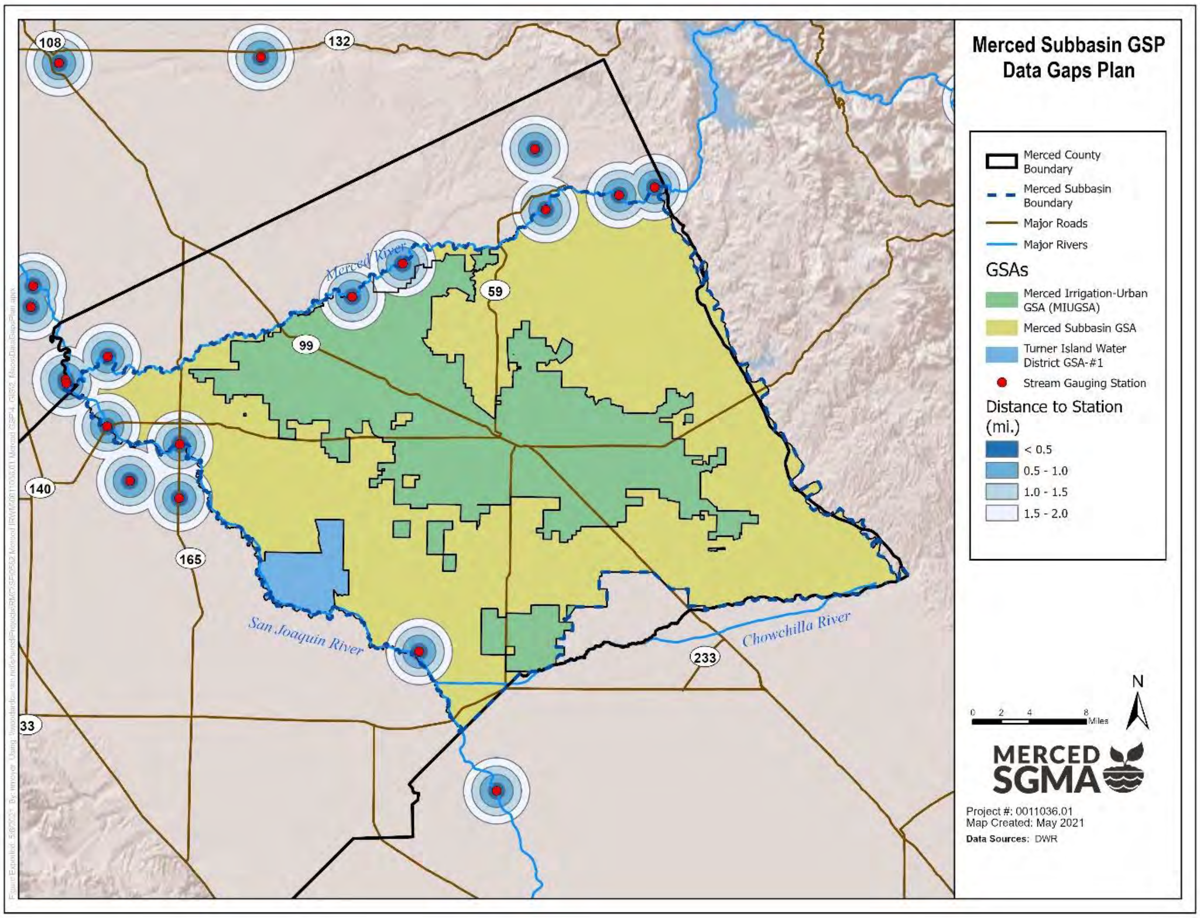
Figure 1-12: Locations of DACs



1.2.9 Distance to Stream Gauging Stations

Streamflow gauging stations monitored by DWR, USGS, Merced Irrigation District, and United States Army Corps of Engineers are located on the Merced and San Joaquin Rivers. Groundwater level monitoring near these sites would be useful for correlation with streamflows to better understand surface and groundwater interactions. This criterion assigned higher values to areas near streamflow gauging stations (Figure 1-13).

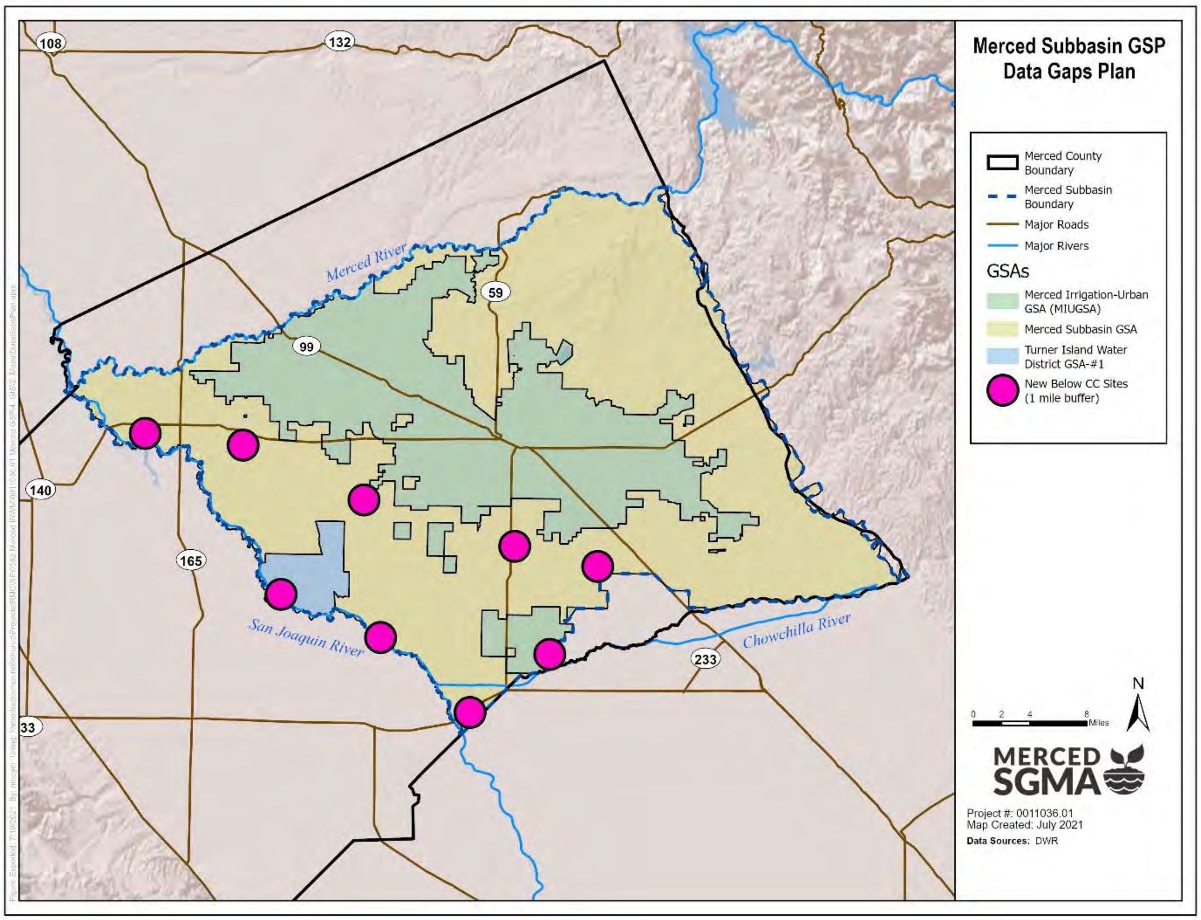
Figure 1-13: Distance to Stream Gauging Stations



1.2.10 Locations of Suggested Below Corcoran Clay Sites

New sites selected for monitoring in the Below Corcoran Clay Principal Aquifer have the potential to function as a new monitoring point for the Above Corcoran Clay Principal Aquifer through the installation of a nested groundwater level monitoring well. Thus, an additional criterion was added for only the Above Corcoran Clay Principal Aquifer which places extra weight within a 1-mile buffer of the locations of proposed additional Below Corcoran Clay Principal Aquifer monitoring wells (Figure 1-14).

Figure 1-14: Locations of Suggested Below Corcoran Clay Sites



1.3 Analysis Results

An overlay analysis was conducted in GIS to combine the values assigned to each criterion described in Table 1-2 into one map. In addition to having a specific ranking value for each category within a criterion, each criterion was assigned a weighting factor, to prioritize some criteria over others. GIS compilation of areas, values, and weighting resulted in a layer describing preferential sites for monitoring.

After calculating a final weighted probability layer, areas where the existing monitoring network has a density of 3.5 wells / 100 sq. mi. or higher were "zeroed out" (e.g. probability manually set to 0) to avoid siting new or expanded monitoring near the existing monitoring network. While the ultimate groundwater level monitoring density goal is 4 wells

/ 100 sq. mi., the threshold of 3.5 wells / 100 sq. mi. was used for this analysis to provide some additional buffer around existing clustered monitored areas.

Areas within 1 mile of the Corcoran Clay boundary or where the Corcoran Clay layer is less than 100 feet below the surface were also “zeroed out” to avoid monitoring areas of mixed aquifer conditions.

Figure 1-15 shows the preferential areas for monitoring sites screened in the Above Corcoran Clay Principal Aquifer. Areas in warm colors (red/orange/tan) are prioritized the highest for monitoring locations, while areas in cool colors (blue/green) are prioritized the lowest for monitoring locations. Areas in black have been removed from consideration due to proximity to existing wells, shallow Corcoran Clay, or the Subbasin boundary. The figure shows a preference for utilizing existing wells and for collocating wells, as the “dots” visible on the map represent locations of recommended monitoring sites screened in the Below Corcoran Clay Principal Aquifer.

Figure 1-15: Weighted Beneficial Monitoring Site Analysis Probability Raster – Above Corcoran Clay

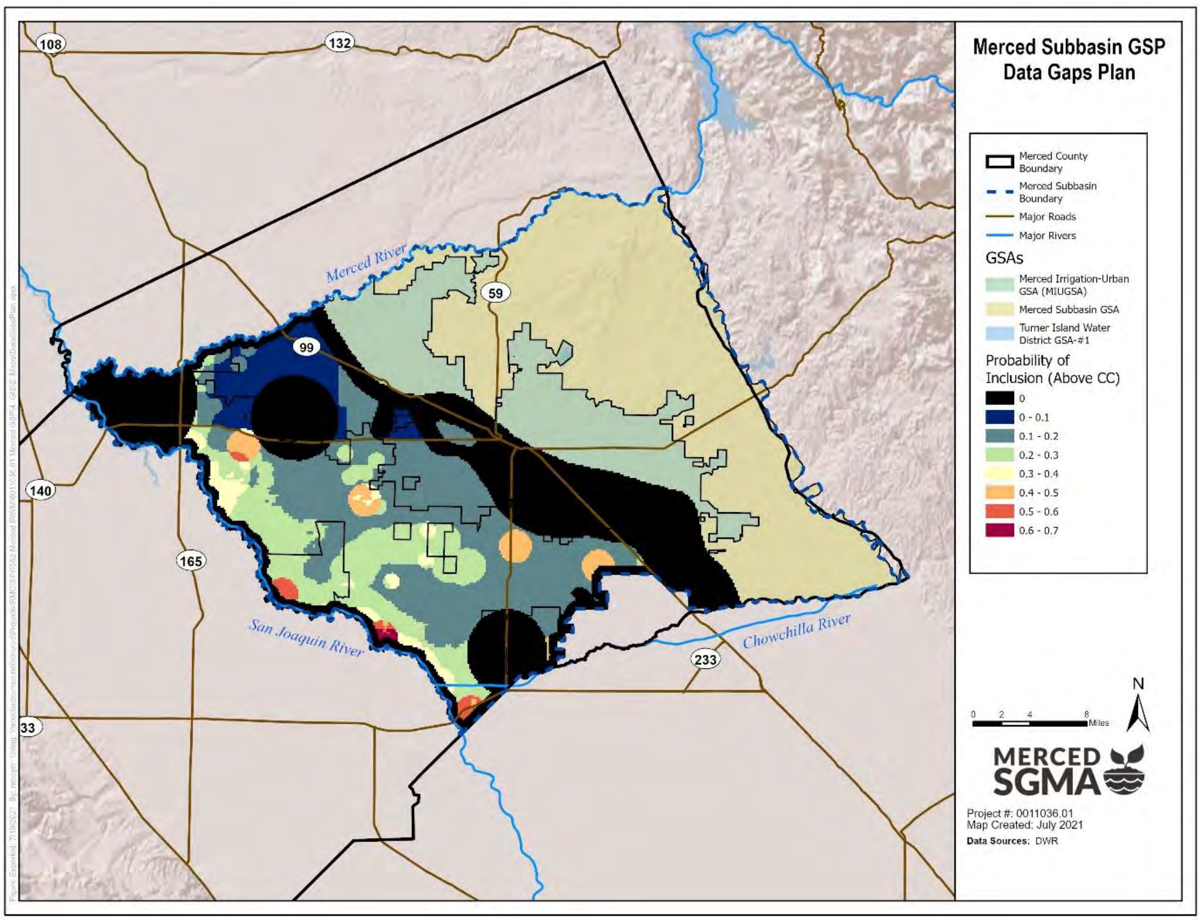


Figure 1-16 shows the preferential areas for monitoring sites screened in the Below Corcoran Clay Principal Aquifer. Areas in warm colors (red/orange/tan) are prioritized the highest for monitoring locations, while areas in cooler colors (blue/green) are prioritized the lowest for monitoring locations. Areas in black have been removed from consideration due to proximity to existing wells, shallow Corcoran Clay, or the Subbasin boundary. The figure shows a preference for utilizing existing wells, as the orange and red "dots" visible on the map represent tiered existing wells.

Figure 1-16: Weighted Beneficial Monitoring Site Analysis Probability Raster – Below Corcoran Clay

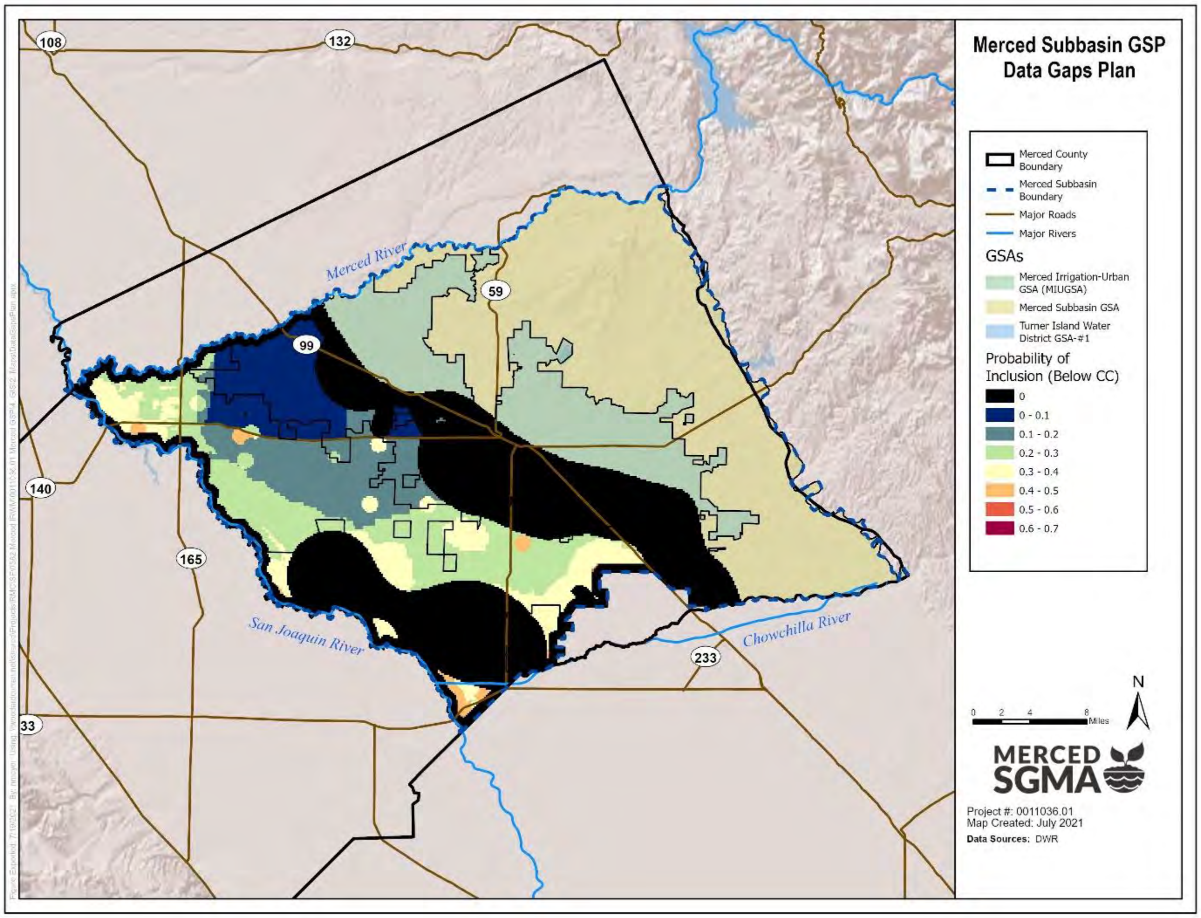
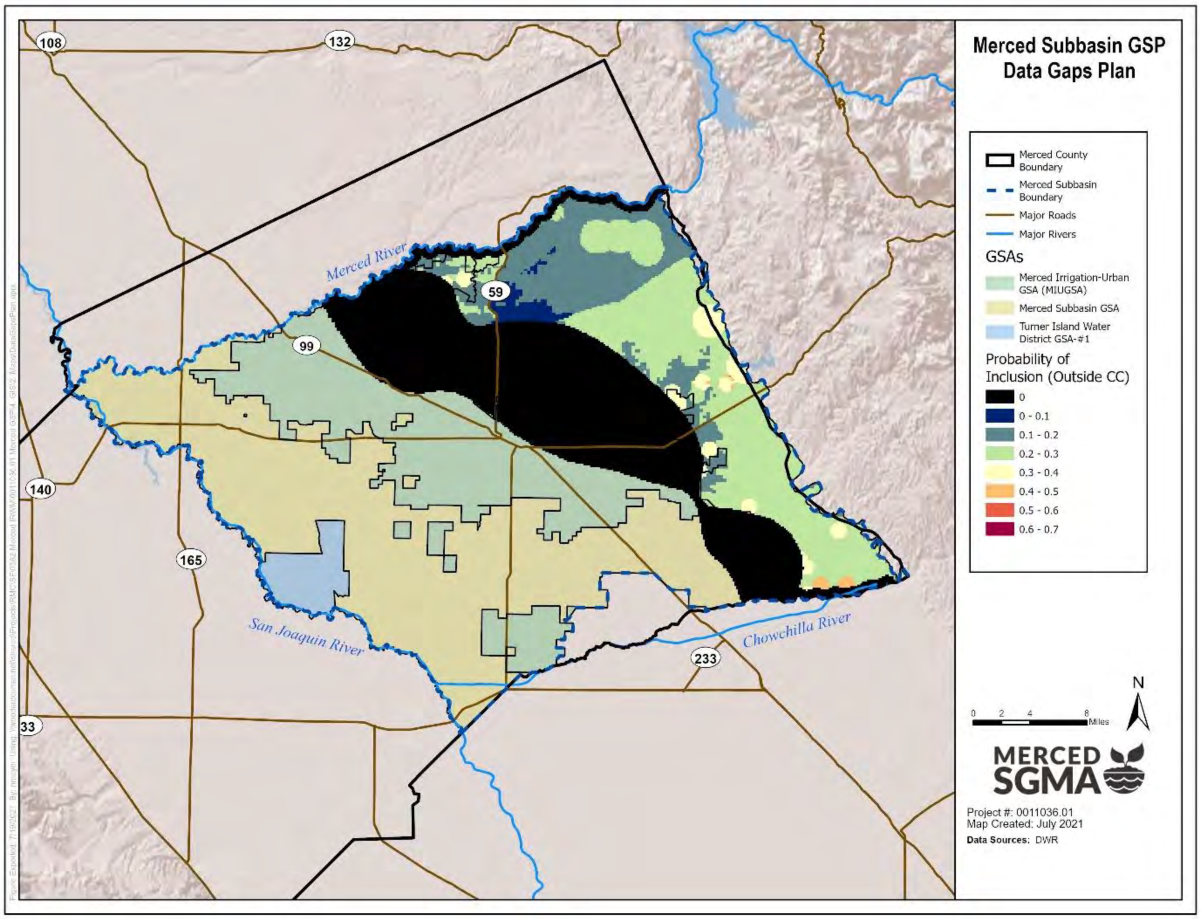


Figure 1-17 shows the preferential areas for monitoring sites screened in the Outside Corcoran Clay Principal Aquifer. Areas in warmer colors (red/orange/tan) are prioritized the highest for monitoring locations, while areas in cooler colors (blue/green) are prioritized the lowest for monitoring locations. Areas in black have been removed from consideration due to proximity to existing wells or the Subbasin boundary.

Figure 1-17: Weighted Beneficial Monitoring Site Analysis Probability Raster – Outside Corcoran Clay



2. SITE IDENTIFICATION KRIGING ERROR ANALYSIS

This analysis focuses on the spatial nature of monitoring networks and uses kriging error to identify which areas are the most beneficial to establish new monitoring. Kriging is a technique often used to contour groundwater data in GIS. Errors in kriging quantify when there is insufficient data or inconsistent data in an area. These errors can be identified and used to identify areas in need of new monitoring.

2.1 Wells Used in Analysis

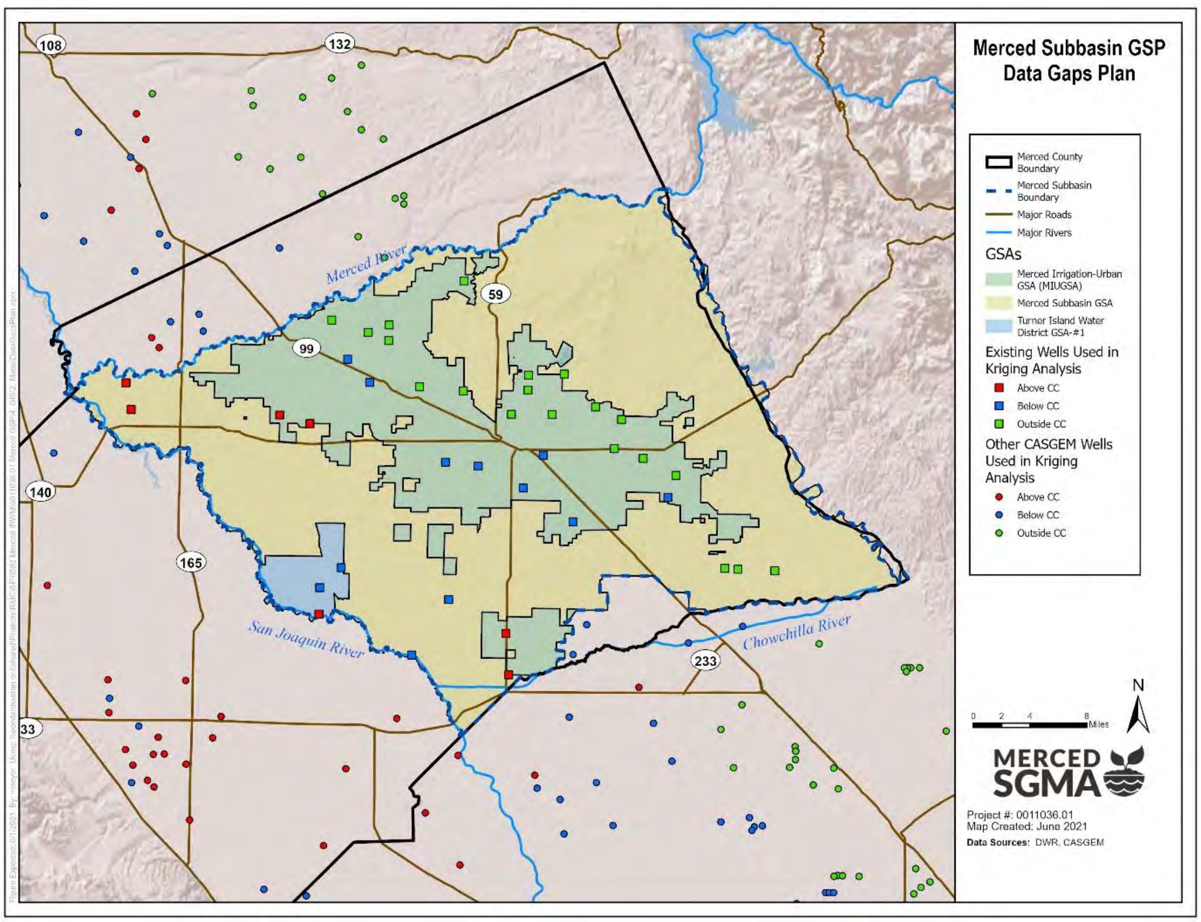
Input data for the kriging tool (Figure 2-1) consist of multiple data sources. Primarily, measurements come from fall 2020 groundwater level data obtained from the SGMA Data Viewer for existing wells within the Merced GSP monitoring network. Groundwater level data outside the Subbasin were also obtained to help avoid edge effects when running kriging interpolation.

Many voluntary wells in the SGMA Data Viewer do not consistently report groundwater elevations each spring and fall. Also, in some cases, measurements for monitoring network wells were discounted due to nearby pumping or another data quality flag. A linear regression was applied to estimate the groundwater elevations for the missing seasons for wells with missing seasonal data located within the Merced Subbasin. The linear regression was applied separately at each well for fall and spring measurements where there were several years of historical data for each respective season.

Groundwater elevations were estimated from the interpolated groundwater elevation layers from the Merced GSP Water Year 2020 Annual Report for the newly installed or soon to be installed monitoring network wells described in the main Data Gaps Plan.

Finally, some measurements from TIWD wells were incorporated that are not reported in the SGMA Data Viewer.

Figure 2-1: Wells Used in Analysis



2.2 Kriging

There are multiple types of kriging that can be used depending on knowledge of the mean and trend patterns in the search neighborhood. Ordinary kriging was chosen as the kriging model for further analysis since groundwater elevation is unknown and the trend is approximately constant within the search neighborhood.

The kriging tools used were accessed within the Geostatistical Wizard of Esri ArcGIS and default settings were used to operate the tool. Figure 2-2 through Figure 2-4 show the results of the kriging for each principal aquifer. Note that the actual groundwater levels do not necessarily matter in the ultimate data gaps analysis – it is the level of uncertainty ("error") associated with the prediction that is of use (described further in Section 2.3).

Figure 2-2: Groundwater Surface Elevation – Above Corcoran Clay

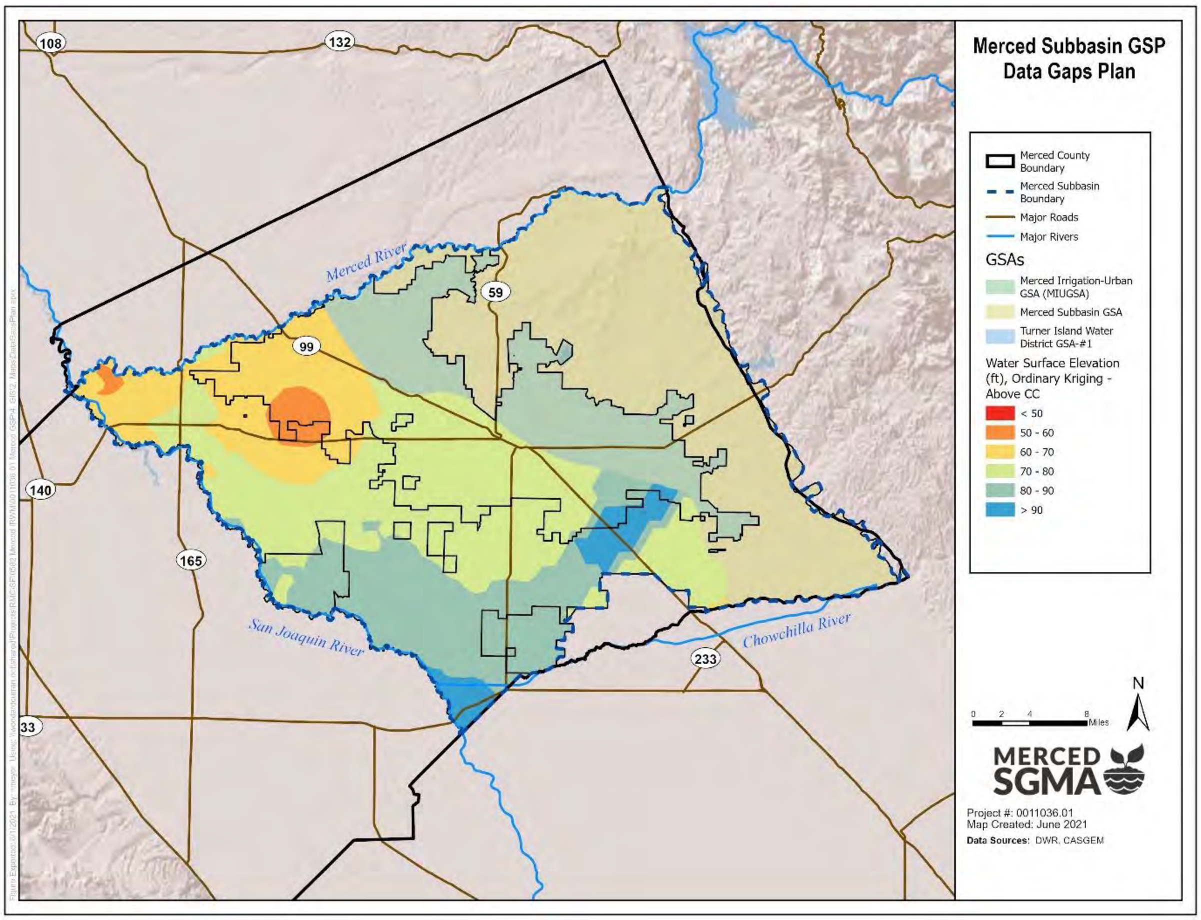


Figure 2-3: Groundwater Surface Elevation – Below Corcoran Clay

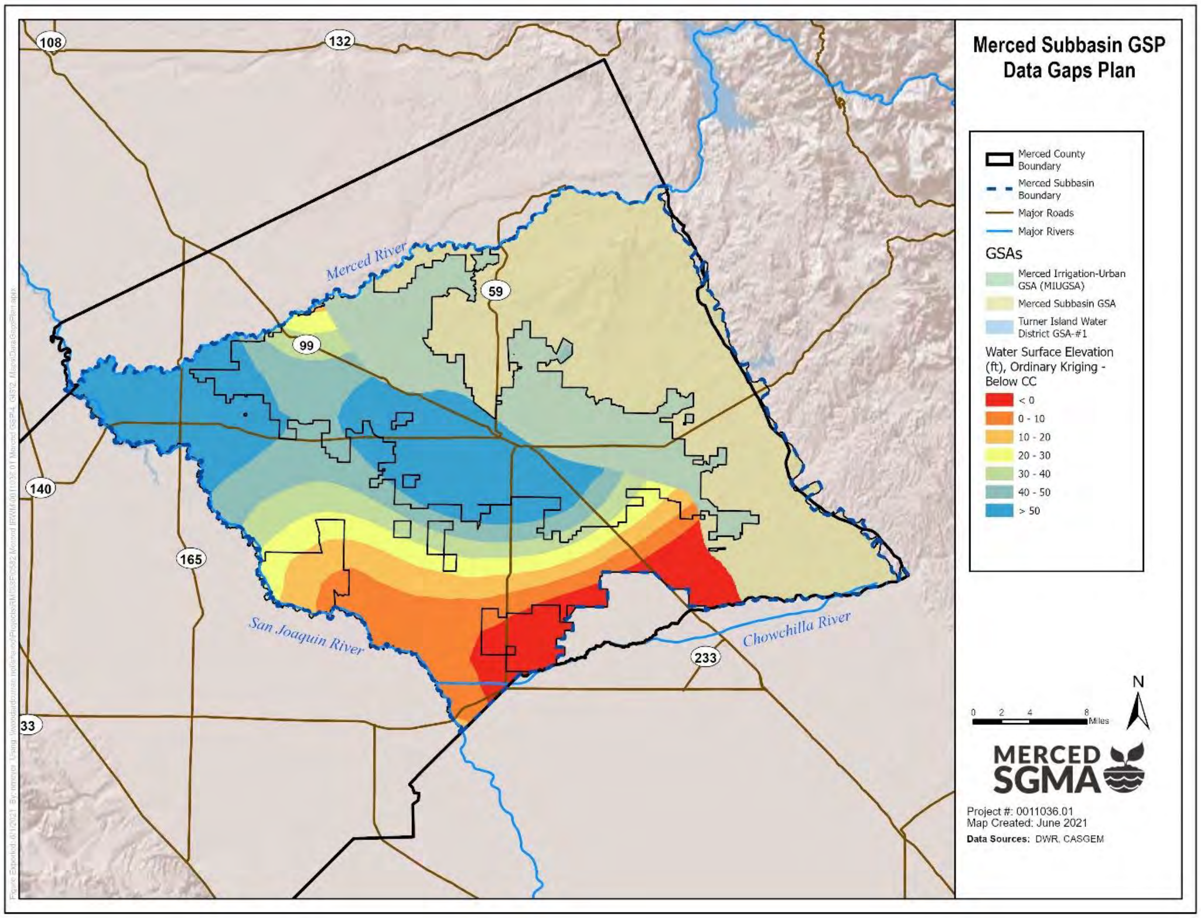
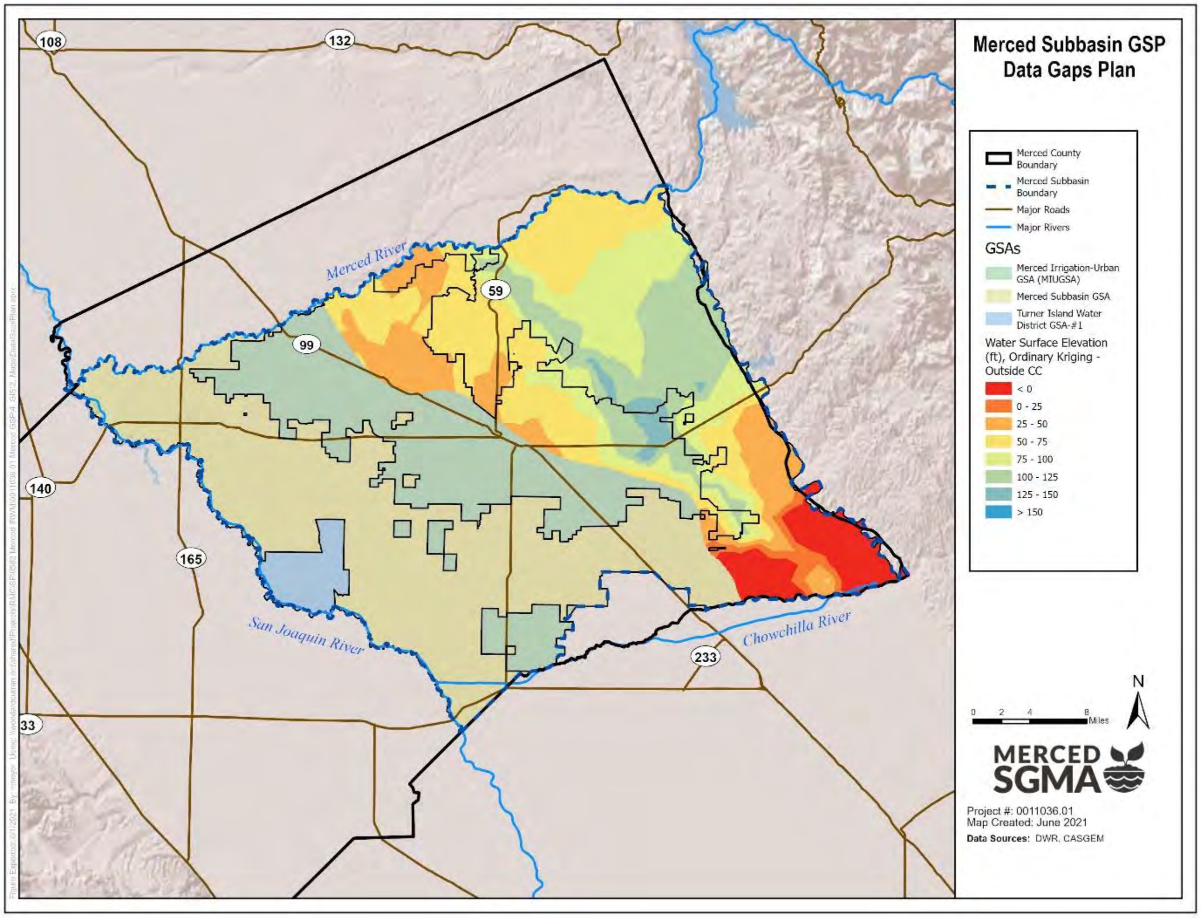


Figure 2-4: Groundwater Surface Elevation – Outside Corcoran Clay



2.3 Kriging Standard Error

Kriging can also quantify uncertainty (or "standard error") based on the availability of monitoring data. Figure 2-5, Figure 2-6, and Figure 2-7 show the amount of standard error associated with the kriging performed in Figure 2-2, Figure 2-3, and Figure 2-4 for groundwater levels above, below, and outside the Corcoran Clay, respectively.

Standard error in kriging quantifies when there is insufficient data or inconsistent data in an area. This standard error can be used to identify areas in need of new or expanded monitoring. Areas with high standard error are areas that strongly benefit from increased groundwater level monitoring. Combining this analysis with the weighted beneficial monitoring site analysis is valuable for siting new monitoring locations, as discussed in the next section.

Figure 2-5: Kriging Error for Groundwater Surface Elevation – Above Corcoran Clay

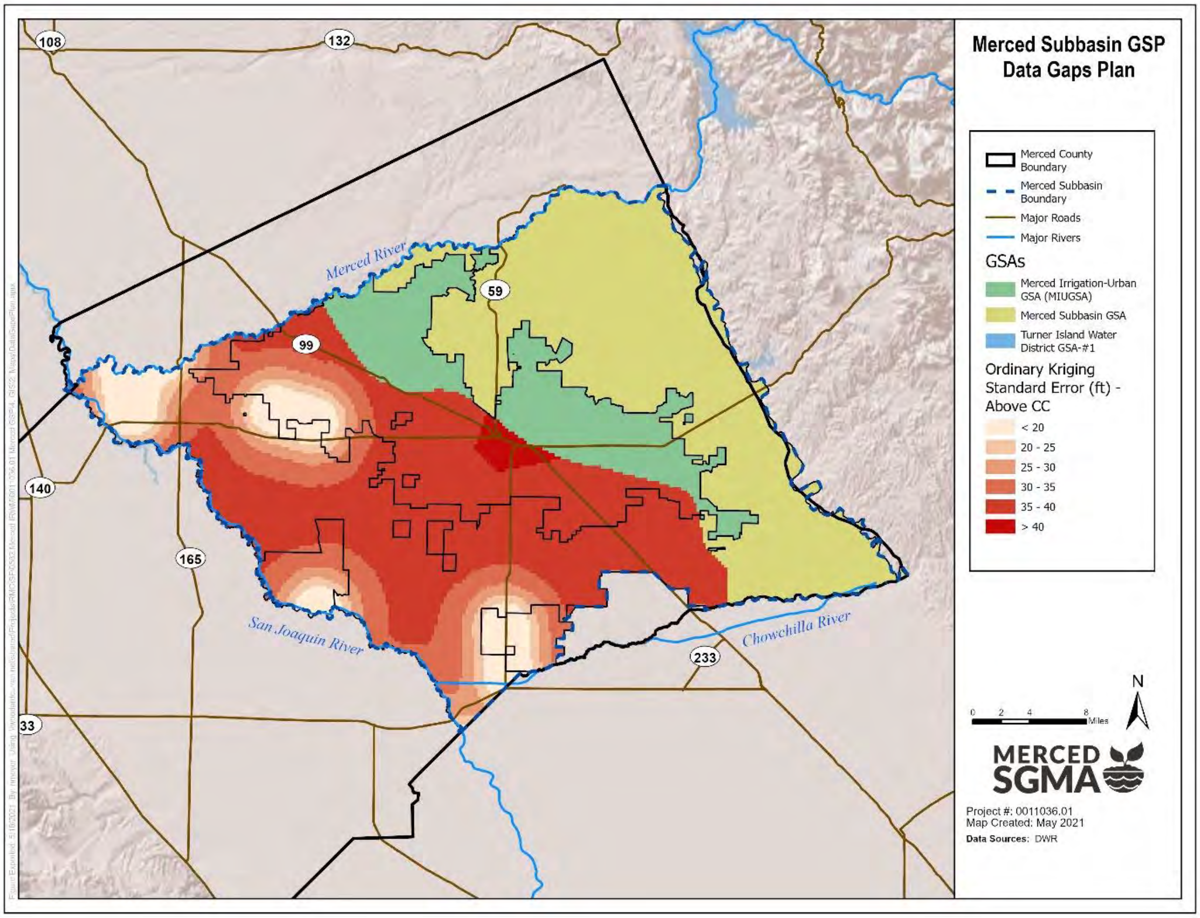


Figure 2-6: Kriging Error for Groundwater Surface Elevation – Below Corcoran Clay

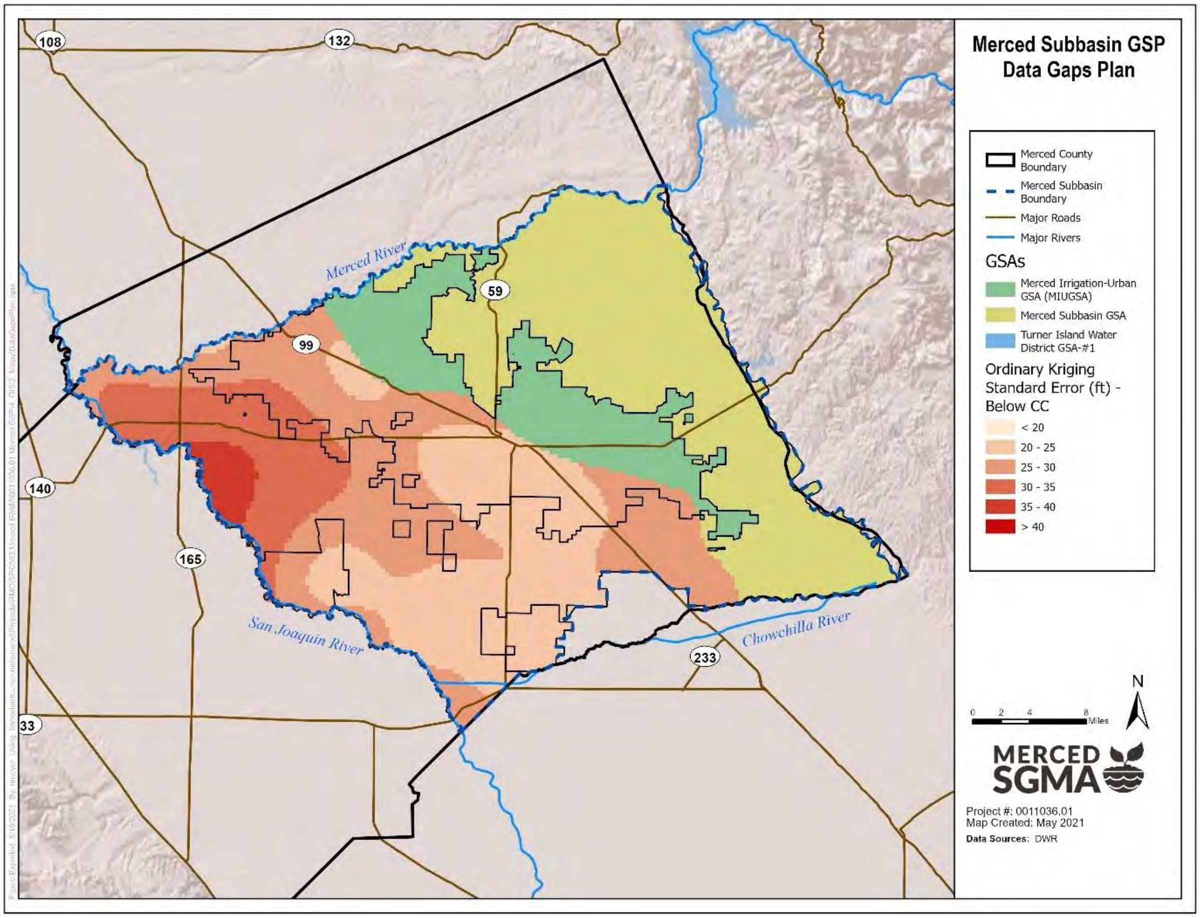
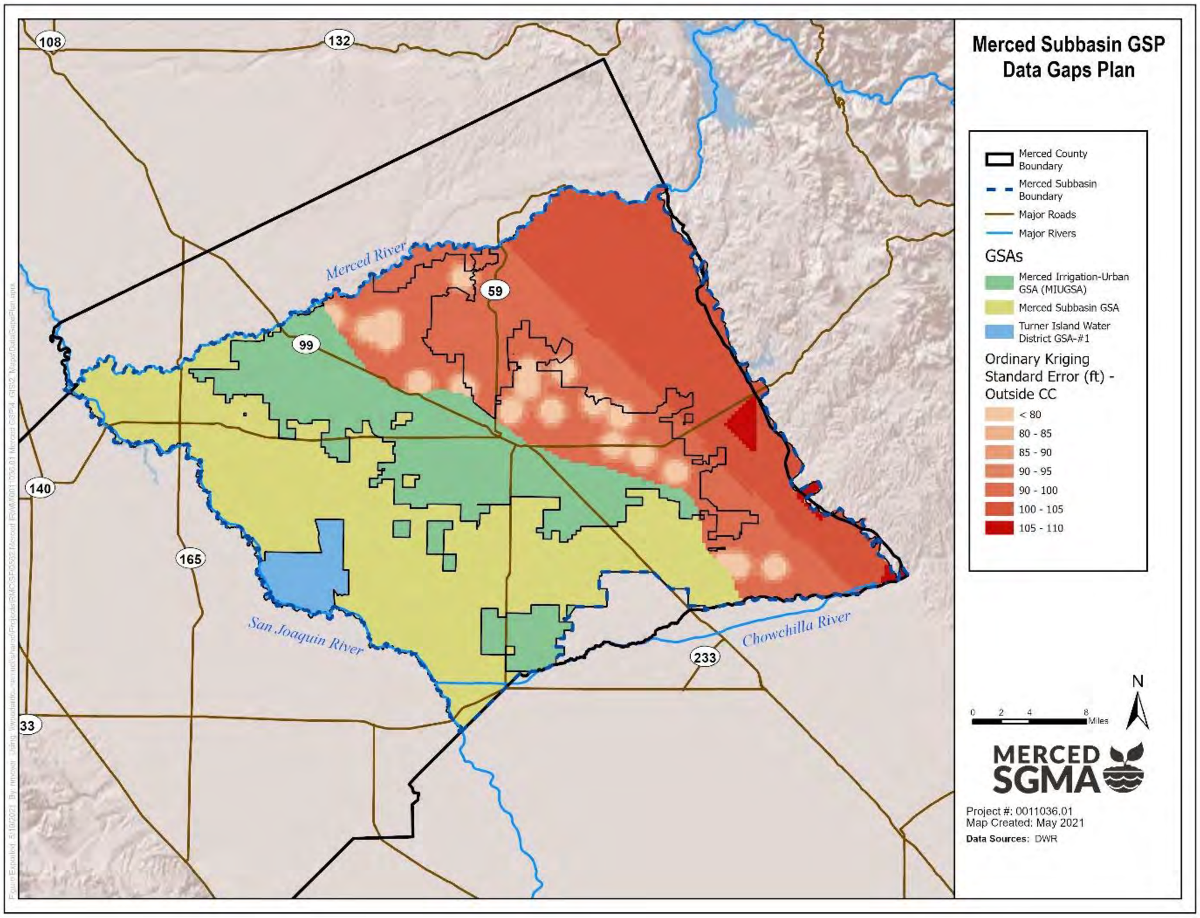


Figure 2-7: Kriging Error for Groundwater Surface Elevation – Outside Corcoran Clay



3. COMBINING RECOMMENDED MONITORING ANALYSES

The weighted beneficial monitoring site analysis and kriging error analysis results were combined using the Esri ArcGIS Densify Sampling Network tool to identify strong locations for future monitoring sites. This section describes the Densify Sampling Network tool and presents the results of the use of the tool.

3.1 Densify Sampling Network Tool and Settings

The Densify Sampling Network tool is a standalone tool in Esri ArcGIS. The Densify Sampling Network tool builds upon an existing monitoring network by determining the best locations for adding new sampling points based on available information.

The Densify Sampling Network tool uses the distribution of standard error generated by the kriging interpolation layer generated in Section 2 to place new monitoring points in areas that would minimize the overall standard error for estimation of groundwater elevation, and the probability layer generated in Section 1 to weight where new monitoring locations should be placed based on other known characteristics. Lastly, an inhibition distance was set to make sure that new monitoring locations are not placed too close to each other.

Choices for several inputs to the tool are described below:

- Probability Layer, Weighted – The probability layer indicates the likelihood that a location should be selected as a monitoring location based on weighted values (Section 1).
- Kriging Error – The kriging error quantifies when there is insufficient data or inconsistent data in an area to identify areas in need of new monitoring wells (Section 2).
- Inhibition Distance – The inhibition distance should be set to limit the proximity of recommended monitoring sites. This prevents recommended sites from being too close together to be valuable. An inhibition distance of 5.6 miles corresponds to the DWR guidance of 4 wells / 100 sq. mi. However, a lower inhibition distance of 4.4 miles was selected to allow for sites to exceed this goal and create full coverage within areas not zeroed out (as described in Section 1.3).
- Number of Monitoring Sites – To calculate the number of additional wells recommended, a weighting scheme was developed to calculate the area of each aquifer that requires additional wells to meet the network density goal of 4 wells / 100 sq. mi. Areas with an existing lower density of wells were weighted more strongly while areas with an existing higher density of wells were weighted more weakly. More specifically, the existing map of network density in each principal aquifer was categorized into intervals of 0.05 from 0 to 4 wells / 100 sq. mi. (e.g. 0.05 to 0.10 wells / 100 sq. mi, 0.10 to 0.15 wells / 100 sq. mi., and so on). The areas associated with each interval were then weighted equally from 1 to 0, with the lowest density areas weighted at 1 and the highest density areas weighted at 0. Areas and weights were multiplied and then summed (e.g. 10 acres weighted at 0.5 would result in 5 acres contributing to the sum of area needing additional wells). The resulting sum of the weighted area was used to calculate the number of additional wells recommended to achieve an overall network density of 4 wells / 100 sq. mi., assuming equal spacing between new wells.
    - Above the Corcoran Clay – The total weighted area requiring additional monitoring wells is 311 sq. mi.. At 4 wells / 100 sq. mi., this translates to 13 additional monitoring wells recommended.
    - Below the Corcoran Clay – The total weighted area requiring additional monitoring wells is 206 sq. mi.. At 4 wells / 100 sq. mi., this translates to 9 additional monitoring wells recommended.
    - Outside the Corcoran Clay – The total weighted area requiring additional monitoring wells is 132 sq. mi.. At 4 wells / 100 sq. mi., this translates to 6 additional monitoring wells recommended.

3.2 Results from Densify Sampling Network Tool

The recommended monitoring sites as calculated by the Densify Sampling Network Tool are presented in Figure 3-1 through Figure 3-6. Recommended monitoring sites are labeled with their rank (with 1 as the most desirable and higher numbers as relatively less desirable locations).

- Figure 3-1 shows the recommended monitoring sites for groundwater above the Corcoran Clay, displayed over the beneficial monitoring site analysis probability results.
- Figure 3-2 shows the same recommended monitoring sites for groundwater above the Corcoran Clay, displayed over the kriging error site analysis probability results.
- Figure 3-3 shows the recommended monitoring sites for groundwater below the Corcoran Clay, displayed over the beneficial monitoring site analysis probability results.

- Figure 3-4 shows the same recommended monitoring sites for groundwater below the Corcoran Clay, displayed over the kriging error site analysis probability results.
- Figure 3-5 shows the recommended monitoring sites for groundwater outside the Corcoran Clay, displayed over the beneficial monitoring site analysis probability results.
- Figure 3-6 shows the same recommended monitoring sites for groundwater outside the Corcoran Clay, displayed over the kriging error site analysis probability results.

Figure 3-1: Weighted Beneficial Monitoring Site Analysis Probability Raster and Recommended Monitoring Sites – Above Corcoran Clay

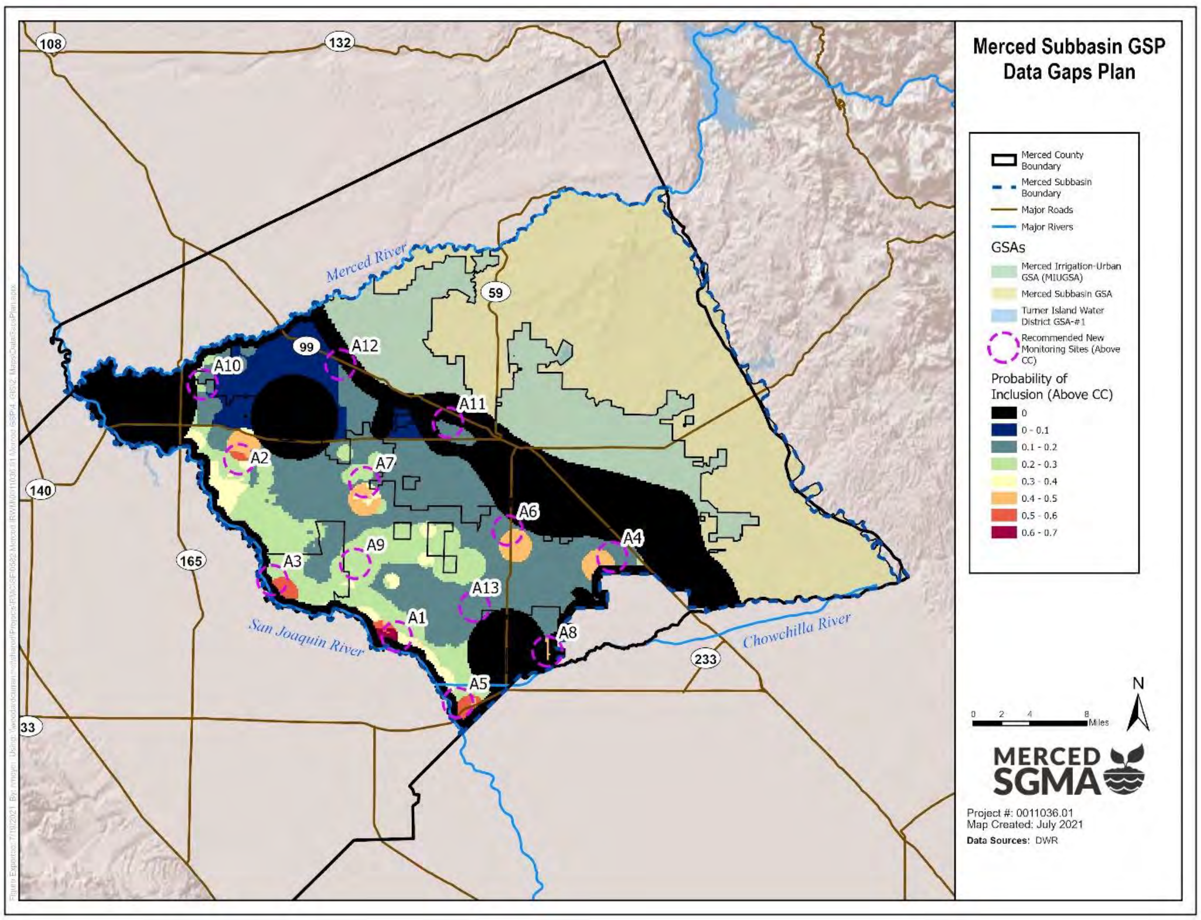


Figure 3-2: Kriging Error and Recommended Monitoring Sites – Above Corcoran Clay

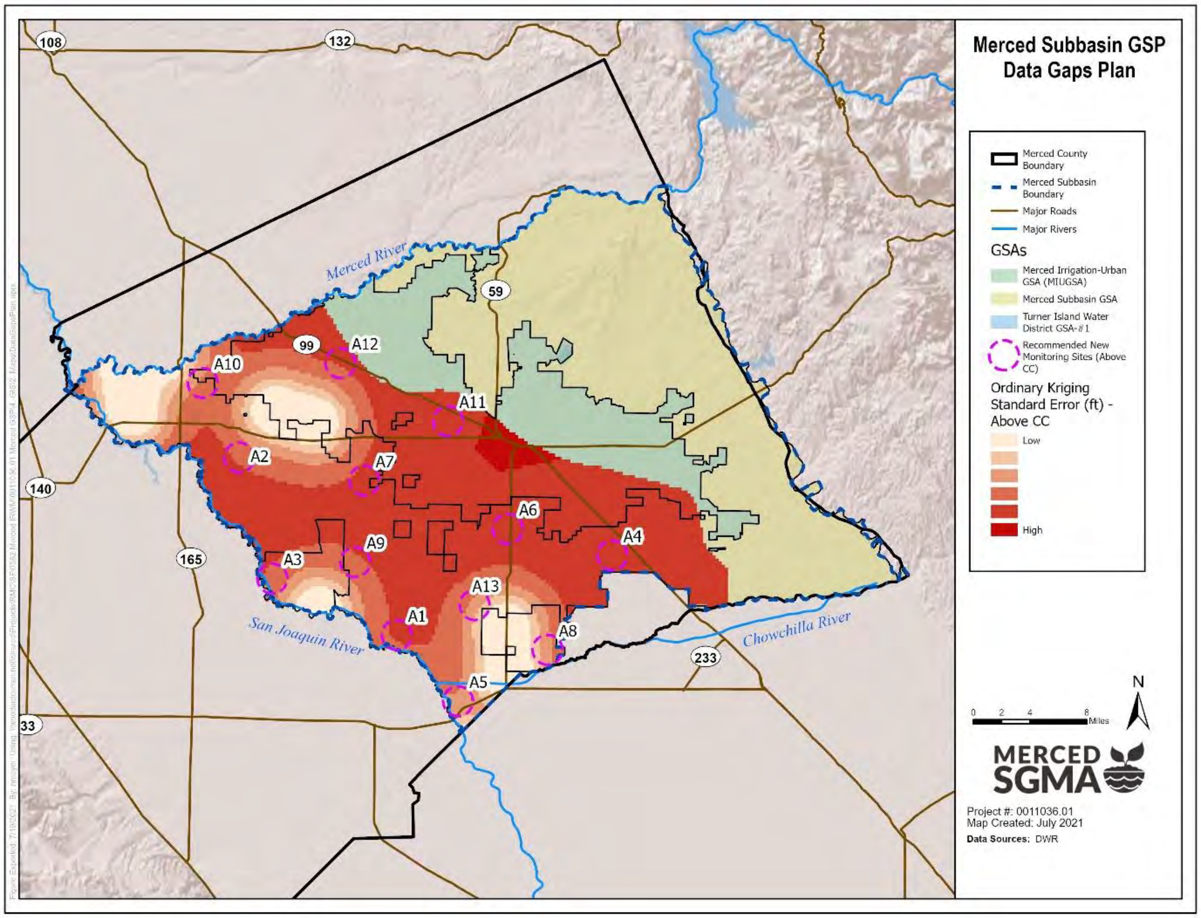


Figure 3-3: Weighted Beneficial Monitoring Site Analysis Probability Raster and Recommended Monitoring Sites – Below Corcoran Clay

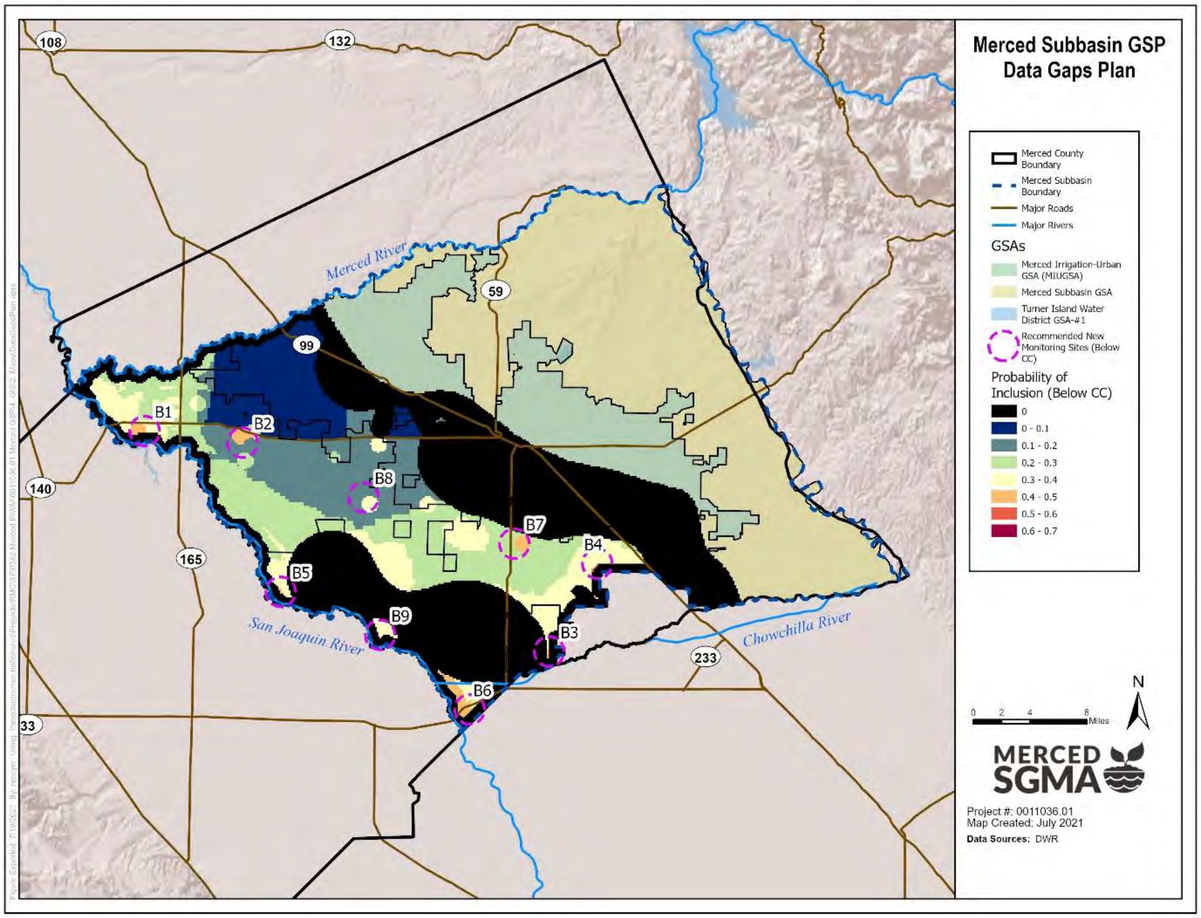


Figure 3-4: Kriging Error and Recommended Monitoring Sites – Below Corcoran Clay

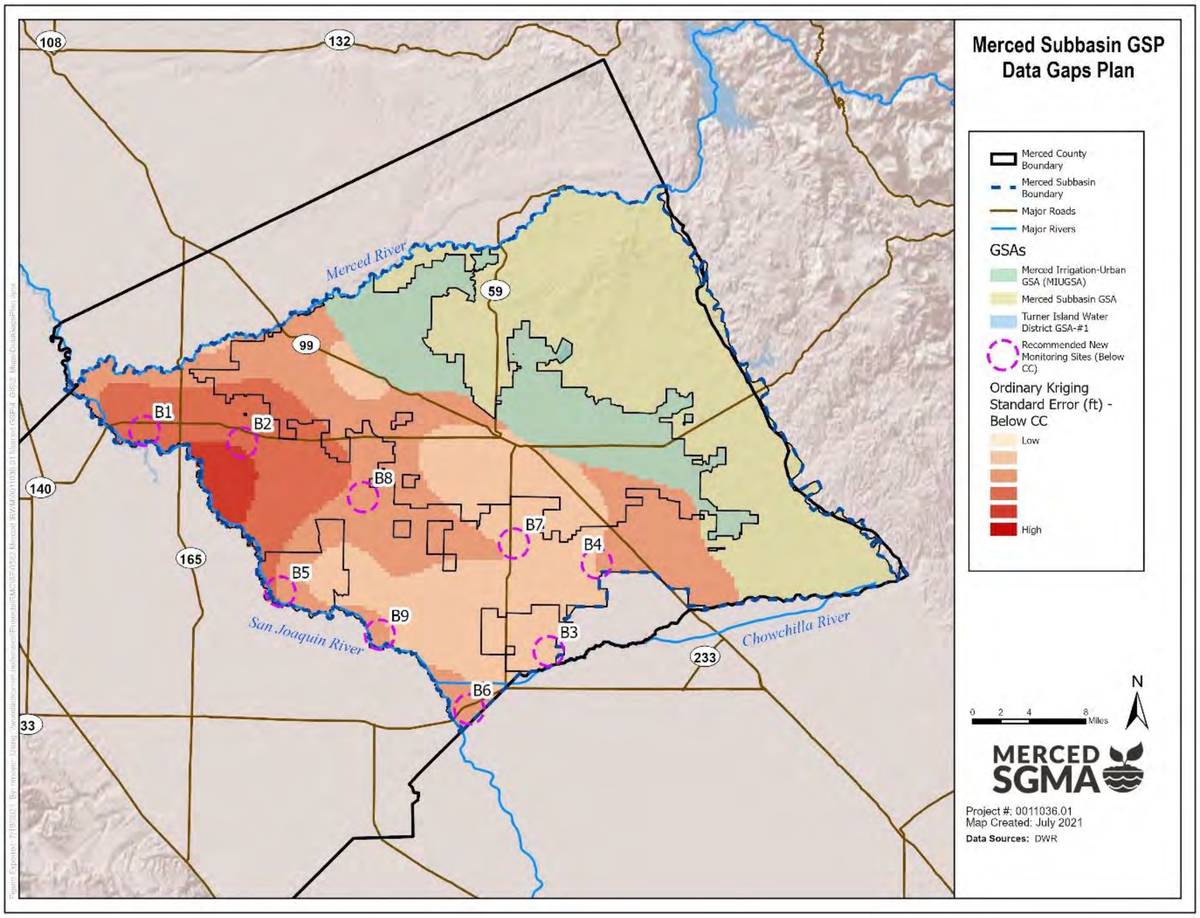


Figure 3-5: Weighted Beneficial Monitoring Site Analysis Probability Raster and Recommended Monitoring Sites – Outside Corcoran Clay

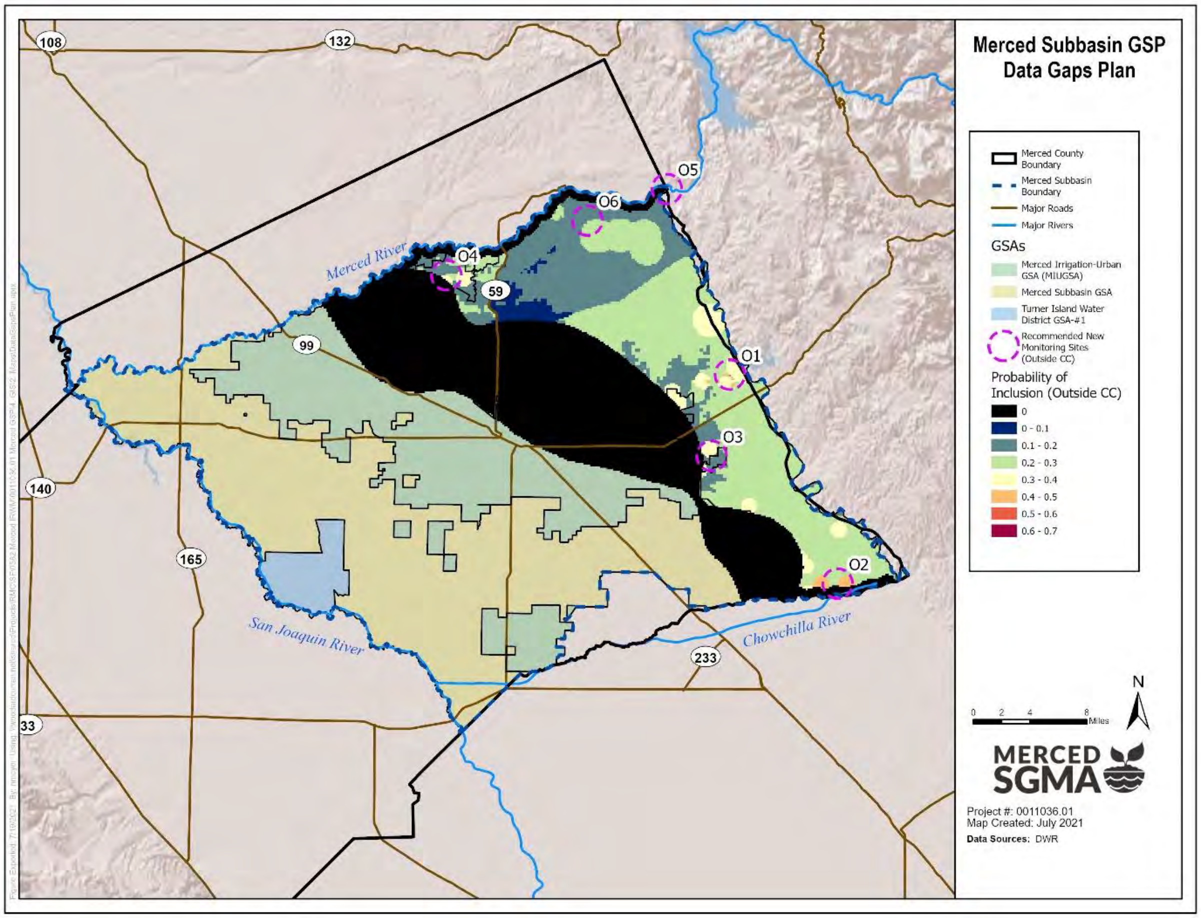


Figure 3-6: Kriging Error and Recommended Monitoring Sites – Outside Corcoran Clay

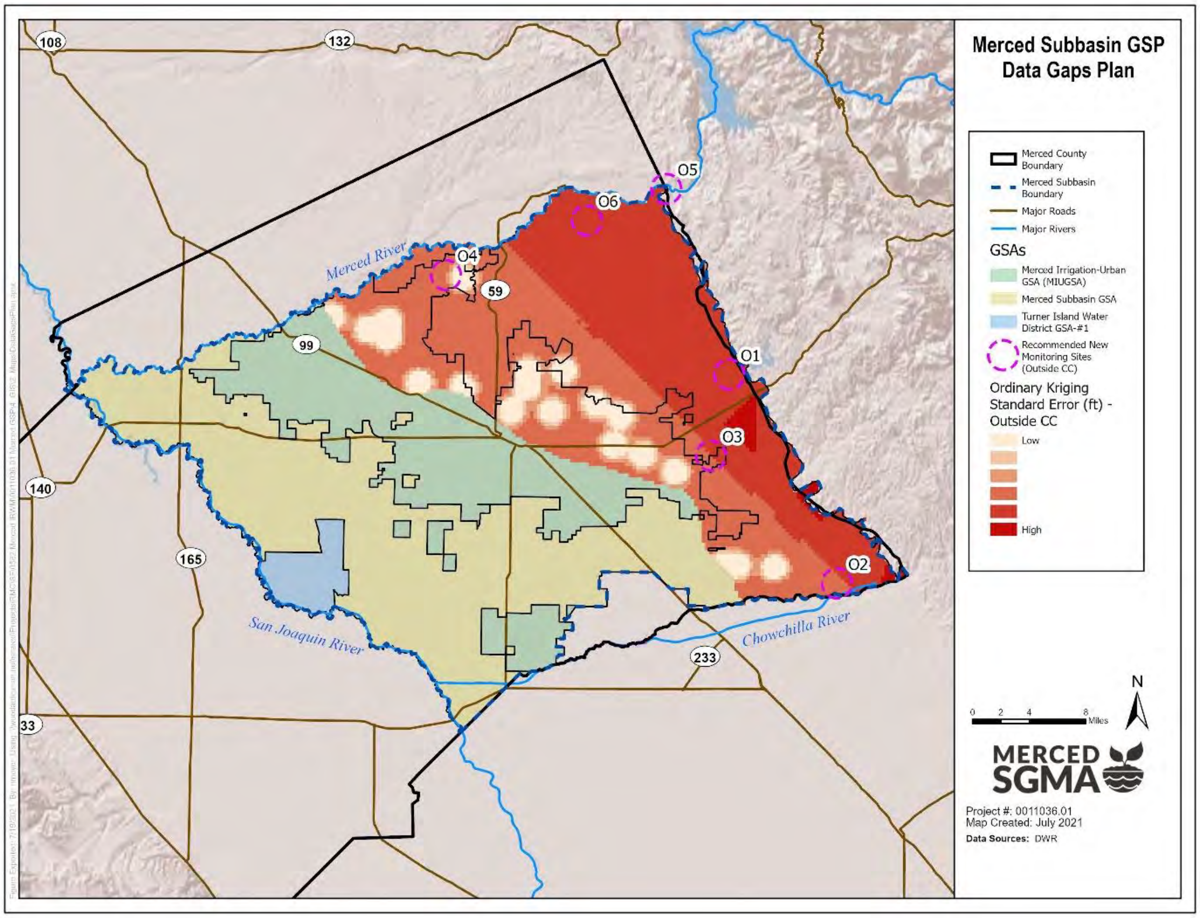


Table 3-1: Well Tier Locations

(begins on next page)

Tier [A]	State Well ID	Station ID	Local Name	Latitude	Longitude	Aquifer_Category
1	05S10E35Q001M	7237	374493N1208354W001	37.4493	-120.8354	Above
2	06S12E33D001M	5773	373732N1206679W001	37.373256	-120.668163	Above
2	10S12E13L001M	33415	370599N1206118W001	37.0599	-120.6118	Above
2	10S12E26H001M	33419	370327N1206185W001	37.0327	-120.6185	Above
2	10S12E27A001M	39083	370391N1206385W001	37.0391	-120.6385	Above
3	10S10E30B001M	48520	370385N1209176W001	37.0385	-120.9176	Above
3	10S10E32F001M	48521	370229N1209003W001	37.0229	-120.901	Above
3	10S10E32R001M	48524	MP80.03L	37.0155	-120.8942	Above
3	10S10E33P001M	48527	370132N1208820W001	37.0132	-120.882	Above
3	11S10E12N002M	48531	369841N1208371W001	36.9841	-120.8371	Above
3	07S10E17D001M	47567	MW-4A	37.327807	-120.905375	Above
3	07S10E17D002M	47568	MW-4B	37.327717	-120.905377	Above
3	07S10E17D003M	47569	MW-4C	37.327761	-120.90538	Above
3	07S10E11A001M	47570	MW-5A	37.351012	-120.911379	Above
3	07S10E06K002M	47571	MW-5B	37.351023	-120.911327	Above
3	07S10E06K003M	47572	MW-5D	37.351029	-120.911276	Above
3	07S11E24A001M	31372	373166N1207091W001	37.316698	-120.708984	Above
3	10S10E28A002M	31576	370421N1208727W001	37.0421	-120.8727	Above
3	10S12E27J001M	33420	370291N1206482W001	37.0291	-120.6482	Above
3	09S10E35J001M	48609	371057N1208355W001	37.1057	-120.8355	Above
3	09S11E10N001M	38986	371574N1207566W001	37.1574	-120.7566	Above
3	10S10E32L002M	48600	370173N1208999W002	37.0173	-120.8999	Above
3	10S10E32L004M	48601	370173N1208999W003	37.0173	-120.8999	Above
3	07S11E15H001M	8604	373243N1207424W001	37.32412	-120.74238	Above
3	07S12E03F001M	8626	373532N1206432W001	37.353105	-120.643827	Above
3	07S12E03J001M	8627	373496N1206327W001	37.350005	-120.6326	Above
3	08S09E06N001M	8026	372632N1210271W001	37.2632	-121.0271	Above
3	10S10E28A001M	10752	370418N1208724W001	37.0418	-120.8724	Above
3	10S11E19M001M	11295	370480N1208166W001	37.048	-120.8166	Above
3	06S10E15F002M	6602	374146N1208602W002	37.414468	-120.860359	Above
3	09S09E21F001M	32094	371410N1209927W001	37.141	-120.9927	Above
3	09S09E05R001M	14184	371735N1209954W001	37.1735	-120.9954	Above
3		51169	371541N1209930W001	37.1541	-120.993	Above
3		51161	370157N1206670W001	37.0157	-120.667	Above
3		51164	371384N1209930W001	37.1384	-120.993	Above
3		51171	372414N1210120W001	37.2414	-121.012	Above
3		51173	370317N1206600W001	37.0317	-120.66	Above
3		51175	371223N1209790W001	37.1223	-120.979	Above
3			Los Banos Well No. 5	37.06714	-120.8345	Above
3			Los Banos Well No. 3	37.05299	-120.854	Above
3			Los Banos Well No. 2	37.05224	-120.8535	Above
3			Los Banos Well No. 1	37.05282	-120.853	Above
3			Grasslands Well #4	36.94015556	-120.7569361	Above
3			Grasslands Well #3	36.94102222	-120.703	Above
3			Grasslands Well #1	36.935025	-120.6985417	Above
3			CCID WELL #62	37.04	-120.9	Above
3			CCID WELL #8A	37.04	-120.89	Above

3			CCID WELL #1	37.14	-120.99	Above
3			Los Banos Well No. 6	37.06186	-120.8659	Above
3			Los Banos Well No. 7	37.06198	-120.8293	Above
3			Los Banos Well No. 9	37.06873	-120.8428	Above
3			Los Banos Well No. 10	37.05308	-120.8258	Above
3			Los Banos Well No. 11	37.05605	-120.8836	Above
3			Los Banos Well No. 12	37.05231	-120.8684	Above
3			Los Banos Well No. 13	37.06347	-120.8694	Above
3			Los Banos Well No. 14	37.07932	-120.8496	Above
3			Los Banos Well No. 15	37.07057	-120.8763	Above
3			R7	37.178367	-120.618537	Above
3			SL1	37.173981	-120.773752	Above
3			SL2	37.207581	-120.821949	Above
3			SL3	37.173332	-120.788244	Above
3			WBC1	37.263566	-120.842104	Above
3			WBC2	37.263481	-120.832962	Above
3			WBC3	37.27807	-120.842104	Above
3	11S13E13R002M	32643	CCID 66	36.9818	-120.979	Above
5			Grasslands Well #12	37.18319167	-120.9495361	Above
5			Grasslands Well #11	37.18877778	-120.9053083	Above
5			Grasslands Well #10	37.19460556	-120.9206556	Above
5			Grasslands Well #9	37.14431389	-120.8739194	Above
5			Grasslands Well #8	37.09949167	-120.8219306	Above
5			Grasslands Well #7	37.03021667	-120.7806194	Above
5			Grasslands Well #6	36.99826389	-120.7999861	Above
5			Grasslands Well #5	36.99320278	-120.7085833	Above
5			Grasslands Well #2	36.93765833	-120.7006444	Above
3	10S10E29N002M	31580	370307N1209082W001	37.0307	-120.9082	Above
6	10S10E32B001M	31585	370271N1208996W001	37.0271	-120.8996	Above
6	11S10E01E001M	13232	370060N1208363W001	37.006	-120.8363	Above
6	11S10E24N001M	33951	369549N1208371W001	36.9549	-120.8371	Above
6	10S11E17E001M	30429	370660N1207963W001	37.066	-120.7963	Above
3	06S10E21N002M	6618	373907N1208835W001	37.3907	-120.8835	Above
6	10S10E21P001M	10739	370424N1208816W001	37.0424	-120.8816	Above
6	11S10E02Q001M	33646	370005N1208429W001	37.0005	-120.8429	Above
6	11S10E03M001M	33647	370021N1208713W001	37.0021	-120.8713	Above
6	11S10E04D001M	33648	370102N1208907W001	37.0102	-120.8907	Above
6	11S10E04G001M	33649	370060N1208821W001	37.006	-120.8821	Above
6	11S10E05D001M	33650	370102N1209057W001	37.0102	-120.9057	Above
6	11S10E23B003M	33664	369680N1208463W001	36.968	-120.8463	Above
6	11S10E23K003M	33665	369618N1208460W001	36.9618	-120.846	Above
6	06S11E29J001M	28446	373813N1207782W001	37.3813	-120.7782	Above
6	06S11E32L001M	28447	373671N1207879W001	37.3671	-120.7879	Above
6	11S10E14L001M	39066	369760N1208485W001	36.976	-120.8485	Above
6	10S10E33M001M	38977	370185N1208904W001	37.0185	-120.8904	Above
6	08S10E30E001M	8754	372110N1209213W001	37.211	-120.9213	Above
6	06S11E18E001M	7346	374157N1208129W001	37.4157	-120.8129	Above
3	08S13E31A001M	9628	371971N1205813W001	37.1971	-120.5813	Above

6	08S12E14D001M	9459	372438N1206335W001	37.2438	-120.6335	Above
3	08S13E19H002M	9482	372235N1205793W001	37.2235	-120.5793	Above
6	06S09E13H001M	5738	374130N1209224W001	37.413	-120.9224	Above
6	11S10E23B002M	13930	369691N1208427W001	36.9691	-120.8427	Above
6	10S10E32P002M	11671	370157N1209004W001	37.0157	-120.9004	Above
6	10S10E22J001M	10741	370463N1208554W001	37.0463	-120.8554	Above
6	10S10E33H001M	11269	370216N1208746W001	37.0216	-120.8746	Above
6	10S10E34A001M	11270	370271N1208571W001	37.0271	-120.8571	Above
3	10S10E34C001M	11271	370271N1208654W001	37.0271	-120.8654	Above
6	10S10E36N002M	11276	370132N1208329W001	37.0132	-120.8329	Above
6	10S11E07K002M	11281	370768N1208074W001	37.0768	-120.8074	Above
3	10S09E13J001M	12681	370630N1209266W001	37.063	-120.9266	Above
6	10S10E26E001M	10749	370368N1208502W001	37.0368	-120.8502	Above
6	10S10E32A002M	10765	370263N1208982W001	37.0263	-120.8982	Above
6	09S10E36P001M	12397	370993N1208213W001	37.0993	-120.8213	Above
3	11S12E30H001M	14768	369485N1206907W001	36.9485	-120.6907	Above
3	10S11E30D001M	11308	370416N1208127W001	37.0416	-120.8127	Above
6	11S10E03P001M	13896	369982N1208671W001	36.9982	-120.8671	Above
3	11S10E04R001M	13900	369985N1208766W001	36.9985	-120.8766	Above
6	11S10E14N001M	13921	369696N1208527W001	36.9696	-120.8527	Above
6	10S12E17M001M	15004	370593N1206893W001	37.0593	-120.6893	Above
6	06S10E15Q002M	6603	374063N1208568W001	37.4063	-120.8568	Above
6	11S11E12P003M	15328	369857N1207177W003	36.9857	-120.7177	Above
3	06S10E28K001M	6626	373821N1208752W001	37.3821	-120.8752	Above
6	10S10E32K003M	10768	370202N1208985W001	37.0202	-120.8985	Above
3	10S10E35K001M	30307	370185N1208416W001	37.0185	-120.8416	Above
6	10S09E01R001M	11984	370880N1209257W001	37.088	-120.9257	Above
6	10S10E01M001M	12838	370899N1208316W001	37.0899	-120.8316	Above
3	10S10E02J001M	12840	370916N1208427W001	37.0916	-120.8427	Above
6	10S10E05P001M	12846	370866N1208993W001	37.0866	-120.8993	Above
6	10S10E11D001M	12854	370843N1208527W001	37.0843	-120.8527	Above
3	10S11E18K001M	30430	370605N1208038W001	37.0605	-120.8038	Above
7	10S10E32J002M	31586	370185N1208941W001	37.0185	-120.8941	Above
3	10S09E01J001M	11982	370916N1209279W001	37.0916	-120.9279	Above
7	08S09E09A003M	8033	372605N1209763W001	37.2605	-120.9763	Above
7	08S09E21N002M	8046	372166N1209943W001	37.2166	-120.9943	Above
7	08S09E34P001M	8733	371893N1209693W001	37.1893	-120.9693	Above
3	11S10E13N001M	13919	369699N1208371W001	36.9699	-120.8371	Above
7	10S10E04K001M	12845	370921N1208771W001	37.0921	-120.8771	Above
7			SD-7	37.3452926	-120.9447874	Above
7			SD-6	37.33958375	-120.9340626	Above
7			SD-4	37.32521116	-120.8297079	Above
7			SD-3	37.34364282	-120.8335678	Above
7			SD-2	37.32706709	-120.9047712	Above
7			SD-15	37.35451934	-120.9141781	Above
7			SD-13	37.32413175	-120.9246743	Above
7			SD-1	37.30562036	-120.8313328	Above
7			S-9	37.32270621	-120.8237292	Above

7			S-22	37.32884793	-120.828257	Above
7			S-11	37.33524778	-120.829408	Above
7			S-10	37.33046276	-120.8153162	Above
7			MW-3D	37.33914798	-120.9420335	Above
7			MW-2C	37.32795302	-120.9297464	Above
7			MW-1D	37.307877	-120.9032049	Above
7			MW-1C	37.30788535	-120.9031535	Above
7			MP-4	37.27576924	-120.7587965	Above
7			MP-20	37.26632506	-120.7576852	Above
7			MP-18	37.2943797	-120.7771307	Above
7			MP NG	37.28632442	-120.7707415	Above
7			M-9	37.31954964	-120.8588186	Above
7			M-22	37.33038376	-120.8885136	Above
7			M-2	37.31349746	-120.8258916	Above
7			M-18	37.33107453	-120.8446857	Above
7			M-17	37.32063628	-120.891628	Above
7			M-11	37.33062482	-120.8659495	Above
7			M-10	37.32143892	-120.8520739	Above
7			SD-8	37.31108435	-120.914872	Above
7			SD-19	37.29844443	-120.8328856	Above
7			SD-10	37.34824149	-120.9454131	Above
7			MW-3B	37.33918998	-120.9420364	Above
7			MW-3A	37.33922591	-120.9420386	Above
7			MW-2B	37.32794892	-120.9296964	Above
7			MW-1B	37.30789087	-120.9031036	Above
7			MW-1A	37.30789673	-120.9030538	Above
7			Grasslands Well #13	37.26135	-120.9540361	Above
7			CCID WELL #22B	37.26	-121.02	Above
7			SD-11	37.34645143	-120.9341226	Above
7			SD-14	37.35614812	-120.9139869	Above
7			MP-24	37.28160225	-120.7785194	Above
8			CCID WELL #48A	37.07	-120.88	Above
8	12S11E17R001M	5255	PWD 5	36.8941	-120.793	Above
3 (estimate)			MW-14D	37.289976	-120.670523	Above
3 (estimate)			MW-9	37.269646	-120.665254	Above
3 (estimate)			MW-4D	37.284225	-120.636533	Above
3 (estimate)			MW-6D	37.273414	-120.658586	Above
3 (estimate)			MW-7D	37.273363	-120.648103	Above
3 (estimate)			DW9	37.320231	-120.859135	Above
3 (estimate)			DW16	37.326273	-120.892069	Above
3 (estimate)			DW17	37.320796	-120.891895	Above
3 (estimate)			DW18	37.330651	-120.843364	Above
2	09S10E16R001M	12242	371435N1208713W001	37.1435	-120.8713	Below
2	09S14E33A001M	31740	371116N1204374W001	37.1116	-120.4374	Below
2	05S11E33N003M	27312	374507N1207741W001	37.4507	-120.7741	Below
3	09S13E14A001M	47696	371428N1205110W001	37.142765	-120.51097	Below
3	10S10E32L001M	48599	370173N1208999W001	37.0173	-120.8999	Below
3		48499	373968N1208146W001	37.396679	-120.813493	Below

3	07S14E35E001M	47542	372904N1204207W001	37.290377	-120.452882	Below
3	07S14E35E002M	47543	372904N1204529W001	37.290377	-120.452882	Below
3	07S14E35E003M	47544	372904N1204529W002	37.290377	-120.452882	Below
3	07S14E35E004M	47545	372904N1204529W003	37.290377	-120.452882	Below
3	07S14E30R002M	47547	372964N1204867W002	37.296393	-120.486709	Below
3	07S14E30R003M	47548	372964N1204867W003	37.296393	-120.486709	Below
3	07S14E30R004M	47549	372964N1204867W004	37.296393	-120.486709	Below
3	07S13E34G001M	47564	372806N1205241W001	37.280602	-120.524113	Below
3	08S14E06G001M	47565	372617N1204747W001	37.26173	-120.474609	Below
3	12S11E03Q003M	48544	369094N1207520W001	36.9094	-120.752	Below
3	10S10E25N001M	10747	370291N1208357W001	37.0291	-120.8357	Below
8	07S13E30R002M	10213	372907N1205779W001	37.290771	-120.578124	Below
3	07S13E32H001M	38974	372838N1205602W001	37.283902	-120.560075	Below
3	12S11E03P001M	48541	369112N1207584W001	36.9112	-120.7584	Below
3	12S11E03Q001M	48542	369097N1207554W001	36.9097	-120.7554	Below
3	12S11E11C001M	48548	369057N1207373W001	36.9057	-120.7373	Below
8	07S11E07H001M	8454	373388N1207968W001	37.338796	-120.798821	Below
3	06S10E08H001M	5909	374296N1208907W001	37.42986	-120.890656	Below
3	08S14E15R002M	10200	372335N1204199W001	37.232376	-120.420027	Below
3	09S09E06Q001M	31799	371743N1210224W001	37.1743	-121.0224	Below
3	09S15E06P001M	10851	371710N1203746W001	37.171	-120.3746	Below
3	09S15E02A001M	10849	371821N1202927W001	37.1821	-120.2927	Below
3		51142	372604N1210611W001	37.2604	-121.0611	Below
3	06S11E17C001M	28534	374177N1207888W001	37.41791	-120.787941	Below
3	09S14E27R001M	10832	CH7	37.116	-120.4207	Below
3	11S10E05L001M	33651	370021N1209010W001	37.0021	-120.901	Below
6	11S10E23R002M	39068	369574N1208393W001	36.9574	-120.8393	Below
3	08S14E03L001M	9638	372630N1204260W001	37.263	-120.426	Below
3	08S14E20J001M	7525	372213N1204527W001	37.2213	-120.4527	Below
3	08S14E30G001M	7530	372102N1204752W001	37.2102	-120.4752	Below
3	08S15E07J001M	7542	372496N1203632W001	37.2496	-120.3632	Below
3	08S12E15C001M	9461	372438N1206429W002	37.2438	-120.6429	Below
6	08S13E18A002M	9480	372438N1205793W001	37.2438	-120.5793	Below
3	08S16E31C001M	8235	371993N1202638W001	37.1993	-120.2638	Below
3	06S10E05D001M	5900	374485N1209029W001	37.4485	-120.9029	Below
3	10S09E12J002M	12680	370755N1209260W002	37.0755	-120.926	Below
6	08S14E13L002M	10194	372360N1203913W001	37.236	-120.3913	Below
3	05S11E27K001M	5685	374699N1207441W001	37.4699	-120.7441	Below
3	10S10E20H001M	10601	370513N1208938W001	37.0513	-120.8938	Below
3	09S14E01B001M	13120	371852N1203899W001	37.1852	-120.3899	Below
3	08S15E36G001M	27944	371935N1202799W001	37.1935	-120.2799	Below
7		47697	371115N1207377W001	37.356652	120.677443	Below
3	09S14E27R001M	10832	CH7	37.116639	-120.419273	Below
7			SD-18	37.30663007	-120.8973773	Below
7			S-18	37.33050506	-120.832503	Below
7			S-12	37.35674767	-120.9657456	Below
7			MP-5	37.2810467	-120.7799083	Below
8			Well 06	37.321012	-120.526746	Below

8			Well 05	37.329973	-120.545398	Below
8	07S1314E01M		Well 04	37.32839	-120.522394	Below
8			MP-23	37.29410196	-120.7737973	Below
8			MP-22	37.29354622	-120.797409	Below
8			MP-21	37.27410263	-120.7579631	Below
8			P17	37.16748	-120.66	Below
8			P18	37.1761	-120.6688	Below
2	09S13E32A001M	13117		37.113	-120.5654	Below
3	0	50938	09S15E01A	37.182	-120.2748	Below
2	08S15E34L001M	8096		37.1905	-120.3166	Below
2	08S12E31M001M	9468		37.1924	-120.706	Below
2	08S14E11K001M	30271		37.2507	-120.4032	Below
2	07S11E20Q001M	8611		37.3024	-120.7854	Below
2	07S11E21P001M	8612		37.3049	-120.7735	Below
3 (estimate)			DW106	37.29651	-120.63352	Below
2	05S12E27A001M	9603	374741N1206343W001	37.4741	-120.6343	Outside
2	05S12E08P001M	9587	375096N1206804W001	37.5096	-120.6804	Outside
2	05S12E18C001M	9596	375043N1206985W001	37.5043	-120.6985	Outside
2	05S12E22H001M	9600	374852N1206310W001	37.4852	-120.631	Outside
2	05S11E22B001M	5682	374921N1207468W001	37.4921	-120.7468	Outside
2	08S08E15G001M	10781	372424N1210754W001	37.2424	-121.0754	Outside
2	05S11E13A001M	27305	375046N1207071W001	37.5046	-120.7071	Outside
2			Atwater Well #13	37.364594	-120.607616	Outside
2			Atwater Well #14	37.358638	-120.614426	Outside
2			Atwater Well #16	37.357586	-120.585896	Outside
2			Atwater Well #17	37.360085	-120.601194	Outside
2			Atwater Well #18	37.349565	-120.587247	Outside
2			Atwater Well #19	37.366942	-120.595296	Outside
2	07S13E07H001M		Atwater Well #20	37.3407	-120.5774	Outside
2			WELL CMP 01A	37.3144779	-120.4760419	Outside
2			WELL CMP 01C	37.31412914	-120.4762414	Outside
2			WELL CMP 07C	37.3247192	-120.4432536	Outside
2			WELL CMP 09	37.32606709	-120.4878104	Outside
2			WELL CMP 10	37.32454101	-120.4439588	Outside
2			WELL CMP 11	37.33103407	-120.4665782	Outside
2			WELL PLN 1	37.28916327	-120.3242134	Outside
2			WELL PLN 3	37.28979735	-120.3150682	Outside
2			WELL PLN 7	37.31310283	-120.3250477	Outside
2			WELL WIN 14	37.39583835	-120.608396	Outside
2			WELL WIN 15	37.40326292	-120.5757904	Outside
3		48518	372173N1210767W001	37.2173	-121.0767	Outside
3	09S08E24R001M	48519	371334N1210349W001	37.1334	-121.0349	Outside
3	07S13E09A001M	10051	373457N1205429W001	37.346073	-120.540893	Outside
3	07S12E07C001M	47541	373496N1205890W001	37.349553	-120.588971	Outside
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3	07S14E16F002M	47551	373260N1204432W002	37.326034	-120.44316	Outside
3	07S14E16F003M	47552	373260N1204432W003	37.326034	-120.44316	Outside
3	07S14E16F004M	47553	373260N1204432W004	37.326034	-120.44316	Outside

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3	07S13E13H004M	47557	373260N1204880W004	37.326034	-120.48801	Outside
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3	07S15E18G001M	47561	373220N1203672W001	37.321989	-120.367155	Outside
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3	06S12E23C001M	47575	370000N1200000W002	37.403414	-120.622813	Outside
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3		48517	372406N1210751W001	37.2406	-121.0751	Outside
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3	07S14E12N001M	7955	373327N1203960W001	37.332776	-120.395745	Outside
3	07S15E32A001M	8673	372880N1203432W001	37.288	-120.3432	Outside
3			WELL WIN 16	37.40367653	-120.6225708	Outside
3			WELL PLN 5	37.28436835	-120.3226814	Outside
3			WELL PLN 4	37.29124817	-120.3208053	Outside
3			WELL LG 4	37.2329057	-120.2573823	Outside
3			WELL LG 2	37.23152459	-120.254924	Outside
3			WELL LG 1A	37.22721001	-120.2485223	Outside
3			WELL CMP 07B	37.32450258	-120.4439897	Outside
3			WELL CMP 07A	37.32446696	-120.444172	Outside
3			WELL CMP 01B	37.31432128	-120.4756878	Outside
3			WELL BRK 2	37.32372445	-120.448045	Outside
3			WELL BRK 1	37.32025423	-120.4449318	Outside
3			Atwater Well #21	37.377761	-120.55865	Outside
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3		50447	EWD 03	37.5136	-120.6739	Outside
4			WELL 183P	37.4112082	-120.6564805	Outside
4			WELL 184	37.39675211	-120.6534174	Outside
4			WELL 231P	37.42197826	-120.6151249	Outside
4			WELL 234P	37.41057178	-120.6312242	Outside
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6	07S14E22Q001M	27649	373055N1204238W001	37.3055	-120.4238	Outside
6	07S14E24H001M	27650	373124N1203788W001	37.3124	-120.3788	Outside
6	08S08E28B001M	27677	372166N1210949W001	37.2166	-121.0949	Outside
6	08S08E35R001M	27680	371891N1210504W001	37.1891	-121.0504	Outside
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6	09S08E13D001M	33077	371585N1210499W001	37.1585	-121.0499	Outside
6	09S08E24A001M	33079	371416N1210329W001	37.1416	-121.0329	Outside
6	09S08E24J001M	33080	371349N1210338W001	37.1349	-121.0338	Outside
6	07S15E32N001M	31519	372743N1203610W001	37.2743	-120.361	Outside
6	07S15E34R001M	31520	372735N1203071W001	37.2735	-120.3071	Outside
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6	06S12E17N001M	28453	374077N1206860W001	37.4077	-120.686	Outside	
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6	05S11E13J001M	27306	374963N1207046W001	37.4963	-120.7046	Outside	
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6	06S12E22N001M	28747	373899N1206488W001	37.3899	-120.6488	Outside	
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6	06S12E26D002M	28751	373891N1206285W001	37.3891	-120.6285	Outside	
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6	06S12E13E001M	5070	374118N1206085W001	37.4118	-120.6085	Outside
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6	06S12E16F001M	5073	374113N1206613W001	37.4113	-120.6613	Outside
6	06S12E17J001M	5074	374080N1206685W001	37.408	-120.6685	Outside
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7	07S13E03D001M	10042	373577N1205399W001	37.3577	-120.5399	Outside
7	07S13E06R002M	10048	373491N1205799W001	37.3491	-120.5799	Outside
7	07S13E11D001M	10053	373460N1205191W001	37.346	-120.5191	Outside
7	07S13E12M001M	10054	373355N1205038W001	37.3355	-120.5038	Outside
7	07S12E01E001M	31378	373549N1206104W001	37.3549	-120.6104	Outside
7	05S13E08C001M	29254	375193N1205699W001	37.5193	-120.5699	Outside
7	05S13E16K001M	29255	374960N1205482W001	37.496	-120.5482	Outside
7	05S14E05D001M	29256	375341N1204632W001	37.5341	-120.4632	Outside
7	05S14E16G001M	29257	375005N1204396W001	37.5005	-120.4396	Outside
7	05S17E17N001M	29258	374916N1201407W001	37.4916	-120.1407	Outside
7	08S08E26N001M	27383	372041N1210649W001	37.2041	-121.0649	Outside
7	08S08E27B001M	27384	372138N1210760W001	37.2138	-121.076	Outside
7	07S12E03H001M	31381	373532N1206316W001	37.3532	-120.6316	Outside
7	05S12E13N001M	31386	374930N1206088W001	37.493	-120.6088	Outside
7	08S08E15Q001M	10784	372349N1210757W001	37.2349	-121.0757	Outside
7	08S08E16G001M	10785	372421N1210935W001	37.2421	-121.0935	Outside
7	08S08E22N001M	10789	372177N1210852W001	37.2177	-121.0852	Outside
7	07S13E02F001M	29964	373566N1205157W001	37.3566	-120.5157	Outside
7	07S13E04R001M	29966	373466N1205413W001	37.3466	-120.5413	Outside
7	07S13E06A001M	29967	373599N1205771W001	37.3599	-120.5771	Outside
7	08S15E24R001M	27830	372141N1202710W001	37.2141	-120.271	Outside
7	04S13E29P001M	29318	375543N1205677W001	37.5543	-120.5677	Outside
7	04S13E34H001M	29319	375457N1205218W001	37.5457	-120.5218	Outside
7	06S13E28A001M	27877	373896N1205438W001	37.3896	-120.5438	Outside

7	06S14E20N001M	27880	373927N1204677W001	37.3927	-120.4677	Outside
7	09S08E12B001M	13640	371721N1210385W001	37.1721	-121.0385	Outside
7	09S08E13E001M	13643	371532N1210460W001	37.1532	-121.046	Outside
7	09S08E14E001M	13644	371543N1210679W001	37.1543	-121.0679	Outside
7	09S08E14G001M	13645	371527N1210554W001	37.1527	-121.0554	Outside
7	09S08E25J001M	13646	371199N1210349W001	37.1199	-121.0349	Outside
7	09S08E36A001M	13647	371149N1210354W001	37.1149	-121.0354	Outside
7	09S08E36H001M	13648	371110N1210352W001	37.111	-121.0352	Outside
7	04S13E23C001M	27497	375785N1205099W001	37.5785	-120.5099	Outside
7	10S09E07N001M	12125	370735N1210335W001	37.0735	-121.0335	Outside
7	10S09E08P002M	12126	370716N1210074W001	37.0716	-121.0074	Outside
7	09S08E01N001M	24509	371741N1210493W001	37.1741	-121.0493	Outside
7	09S09E07N001M	24510	371591N1210316W001	37.1591	-121.0316	Outside
7	09S09E19D001M	24512	371438N1210321W001	37.1438	-121.0321	Outside
7	06S12E36K001M	27578	373649N1206038W001	37.3649	-120.6038	Outside
7	06S13E06N001M	27579	374335N1205941W001	37.4335	-120.5941	Outside
7	07S14E29D001M	27948	373027N1204693W001	37.3027	-120.4693	Outside
7	05S12E28K001M	30247	374660N1206543W001	37.466	-120.6543	Outside
7	06S14E32A001M	27881	373735N1204532W001	37.3735	-120.4532	Outside
7	06S14E32R001M	27882	373613N1204507W001	37.3613	-120.4507	Outside
7	09S16E09H001M	11563	09S16E09H001M	37.1643	-120.2213	Outside
7			WELL 154	37.29139876	-120.4155755	Outside
7			WELL 085	37.36275023	-120.6128142	Outside
7			McConnell SRA	37.41444	-120.7103	Outside
7			Atwater Well #6	37.35010938	-120.5994056	Outside
2	09S17E09D001M	11728		37.1702	-120.1271	Outside
3 (estimate)			Minturn DW2	37.15796	-120.26003	Outside
3 (estimate)			Buchanan Hollow DW1	37.20581	-120.25291	Outside
3 (estimate)			Ferguson DW1	37.22943	-120.22582	Outside
3 (estimate)			Jeff DW1	37.25775	-120.28954	Outside
3 (estimate)			Mission DW1	37.27593	-120.28149	Outside
3 (estimate)			Dhillon DW1	37.29406	-120.27042	Outside
3 (estimate)			Thompson DW1	37.23643	-120.31152	Outside
3 (estimate)			Soares DW1	37.26488	-120.32521	Outside
3 (estimate)			DDC DW2	37.25466	-120.34808	Outside
3 (estimate)			Domestic Well 1	37.3305	-120.310556	Outside
3 (estimate)			Agriculture Well 1	37.334639	-120.304167	Outside
3 (estimate)			Domestic Well 2	37.343861	-120.311528	Outside
3 (estimate)			Domestic Well 3	37.352917	-120.279056	Outside
3 (estimate)			Agriculture Well 2	37.351861	-120.252028	Outside
3 (estimate)			MID Well #240	37.39018	-120.459388	Outside

A.Wells with tier "3 (estimate)" were added manually based on information from stakeholders during the Data Gaps Plan development process. Outside Corcoran wells may or may not have associated construction information. This information would be required during the implementation phase if such wells were to be included in the monitoring network. Above/Below Corcoran Wells needed to already have construction information associated in order to sort them into the appropriate principal aquifer.