TECHNICAL MEMORANDUM

# Paso Robles Basin Well Impacts Analysis using data from the DWR Household Water Supply Shortage Reporting System

**To:** Blaine Reely, Groundwater Sustainability Director, County of San Luis Obispo

**From:** Lee Knudtson, GSI Water Solutions, Inc.
Nathan Page, GSI Water Solutions, Inc.

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## 1. Introduction

GSI Water Solutions (GSI) was retained by the County of San Luis Obispo Groundwater Sustainability Director to perform an analysis of the Department of Water Resources (DWR) Household Water Supply Shortage Reporting System (HWS) within the Paso Robles Groundwater Basin (Basin). The purpose of this analysis is to identify and evaluate trends of reported dry well occurrences in the Basin.

## 2. Methods

GSI geospatially and temporally analyzed data collected by the HWS. The results are presented below in context of geographic areas, shown in Figure 1. These areas were delineated by grouping clusters of domestic wells that have gone dry as reported by the HWS while considering potential Basin compartmentalization identified using the SkyTEM geophysical model[1] and hydrogeologic understanding of the Basin. HWS dataset statistics including the earliest and most recent reported dry wells, and the year and month that the most dry wells were reported are presented below.

Groundwater elevation (GWE) rate of change values of each area are included in Table 1. Area specific groundwater elevation rate of change values were determined by calculating the rate of change of groundwater elevations from Spring 2010 to Spring 2021 for each groundwater sustainability plan (GSP) representative monitoring site (RMS) well in an area and then calculating an average rate of change value specific to that area.

## 3. Results

Collectively, there have been 236 dry wells reported to HWS in the Basin since 2013. Dry wells were reported for 141 wells between 2013 and the end of 2017. Locations of these wells are shown on Figure 2. Dry well conditions were reported for 95 wells between January 2018 and 2022. The locations of these wells are shown on Figure 3. Most of these wells are domestic wells used for household water supplies. At least 74 of these dry well issues have been resolved by lowering the pump, deepening the well, or replacing the well. Table 1 shows the number of reported dry wells by area in the years 2013 through 2017 and 2018

[1] An ongoing basin-wide groundwater recharge desktop study has resulted in the creation of a digital 3D geologic model of the Paso Robles Subbasin incorporating SkyTEM geophysical survey results developed in Leapfrog Works®. A demonstration of this 3D geologic model can be found at this link: https://youtu.be/C4F08rJc8ak.

through 2022. The year that the most dry wells were reported in is 2017. This year corresponds to the end of the drought. The month that the most dry wells were reported in is August. In general, groundwater elevations continue to decline in the areas where dry wells have been reported. The following sections summarizes dry well statistics by area.

There are a total of 37 dry wells reported in the HWS in the Western Pomar Junction area. The years that dry wells were reported range from 2014 to 2021. There were 29 dry wells reported between 2013 and 2017, and 8 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2016. The month that the most dry wells were reported in is July. RMS wells in the Western Pomar Junction area are 27S/12E-13N01, 27S/13E-30F01, 27S/13E-30J01, 27S/13E-30N01. Groundwater levels are declining at an approximate rate of 6 feet per year in the Western Pomar Junction area.

There are a total of 8 dry wells reported in the HWS in the Eastern Pomar Junction area. The years that dry wells were reported range from 2014 to 2021. There were 5 dry wells reported between 2013 and 2017. There were 3 wells reported between 2018 and 2021. The year that the most dry wells were reported in is 2016. The month that the most wells were reported in is June. The RMS well in the Eastern Pomar Junction area is well 27S/13E-28F01. Groundwater levels are declining at an approximate rate of 4 feet per year in the Eastern Pomar Junction area.

There are a total of 8 dry wells reported in the HWS in the Southern Huer Huero area. The years that dry wells were reported range from 2015 to 2021. There were 4 dry wells reported between 2013 and 2017, and 4 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2017. The month that the most dry wells were reported in is August. The RMS well in the Southern Huer Huero area is well 28S/13E-01B01. Groundwater levels are declining at an approximate rate of 2 feet per year in the Southern Huer Huero area.

There are a total of 16 dry wells reported in the HWS in the Western Central area. The years that dry wells were reported range from 2014 to 2022. There were 12 dry wells reported between 2013 and 2017, and 4 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2017. The month that the most dry wells were reported in is June. There are no RMS wells in the Western Central area.

There are a total of 128 dry wells reported in the HWS in the Eastern Airport area. The years that dry wells were reported range from 2014 to 2021. There were 72 dry wells reported between 2013 and 2017, and 56 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2017. The month that the most dry wells were reported in is August. RMS wells in the Eastern Airport area are 26S/13E-16N01 and 26S/13E-08M01. Groundwater levels are declining at an approximate rate of 2.5 feet per year in the Eastern Airport area.

There are a total of 15 dry wells reported in the HWS in the Western Airport area. The years that dry wells were reported range from 2014 to 2021. There were 10 dry wells reported in between 2013 and 2017, and 5 dry wells reported in between 2018 and 2022. The year that the most dry wells were reported in is 2017. The month that the most dry wells were reported in is September. RMS wells in the Western Airport area are 26S/12E-14H01, 26S/12E-14G01 & G02, 26S/12E-14K01, and 26S/12E-26E07. Groundwater levels are declining at an approximate rate of 3 feet per year in the Western Airport area.

There are a total of 10 dry wells reported in the HWS in the Western Gabilan Foothills area. The years that dry wells were reported range from 2014 to 2020. There were 4 dry wells reported between 2013 and 2017, and 6 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2018. The month that the most dry wells were reported in is July. RMS well 25S/13E-08L02 is the only RMS well in the Western Gabilan Foothills area. Groundwater levels are declining at an approximate rate of 5 feet per year in the Western Gabilan area.

There are a total of 5 dry wells reported in the HWS in the San Miguel area. The years that dry wells were reported range from 2015 to 2020. There was 1 dry well reported between 2013 and 2017, and 4 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2018. The month that the most dry wells were reported in is July. RMS wells in the San Miguel region are 25S/12E-16K05 and 25S/12E-26L01. Groundwater levels are declining at an approximate rate of 3 feet per year in the San Miguel area.

There are a total of 4 dry wells reported in the HWS in the Western Paso Robles area. The years that dry wells were reported range from 2017 to 2020. There was 1 dry well reported between 2013 and 2017, and 3 dry wells reported between 2018 and 2022. The year that the most dry wells were reported in is 2020. The month that the most dry wells were reported in is August. There are no RMS wells in the Western Paso Robles Area.

There are a total of 3 wells reported in the HWS in the Southwestern area. The years that dry wells were reported range from 2014 to 2021. There were 2 dry wells reported between 2013 and 2017. There was one dry well reported between 2018 and 2022. The year that the most dry wells were reported in is 2014. The month that the most dry wells were reported in is August. There are no RMS wells in the Southwestern area.

There is 1 dry well reported in the HWS in the Northeastern area. The dry well was reported in December 2021. RMS wells in the Northeastern area are 26S/15E-19E01, 26S/15E-20B04, 26S/15E-30J01, 26S/15E-29N01, 26S/15E-29R01, and 27S/14E-11R01. Groundwater levels are declining at an approximate rate of 1.5 feet per year in the Northeastern area.

There is 1 dry well in the HWS in the Southeastern area. The dry well was reported in January 2016. There are no RMS wells in the Southeastern Area.

There are no reported dry wells in the Northwestern area. There are no RMS wells in the Northwestern area.

## 4. Summary

Table 1 summarizes the number of dry wells by area. The greatest number of dry wells occurred in the Western Airport and Eastern Pomar Junction areas. In general, more dry wells were reported before 2018 when compared to the number of dry wells reported since 2018. This is likely due to drought conditions ending in 2017. Groundwater elevations continue to decline across most areas in the basin where dry wells have occurred. An averaged groundwater elevation rate of change value is included in Table 1 for each area. Until groundwater elevations stabilize, this continued rate of groundwater elevation decline is likely to cause more dry wells.

**Table 1. HWS Area Summary**

| Area | Number of Dry wells 2013-2017 | Number of Dry wells 2018-2022 | Count of RMS wells in HWS Analysis Area | Approximate GWE rate of change based on trends in local RMS well(s) |
|---|---|---|---|---|
| Southwestern | 2 | 1 | | - |
| Western Pomar Junction | 29 | 8 | 4 | -6.3, -3.7, -3.4, -16.4<br>**-6** |
| Eastern Pomar Junction | 5 | 3 | 1 | -3.9<br>**-4** |
| Southern Huer Huero | 4 | 4 | 1 | -2.4<br>**-2** |
| Western Central | 12 | 4 | | - |
| Western Airport | 72 | 56 | 4 | -2.9, -4.9, -4.2, -1.2<br>**-3** |
| Eastern Airport | 10 | 5 | 2 | -2, -3<br>**-2.5** |
| San Miguel | 1 | 4 | 2 | -2.8, -3.8<br>**-3** |
| Western Gabilan foothills | 4 | 6 | 1 | -4.9<br>**-5** |
| Western Paso Robles | 1 | 3 | | - |
| Northeastern | 0 | 1 | 6 | -1.8, +0.5, -2.3, -3, -2.5, -1<br>**-1.5** |
| Southeastern | 1 | 0 | | |
| Northwestern | | | | |
| Total | 141 | 95 | 21 | |

[1] Values in **bold** are the average of multiple RMS well groundwater elevation rates of change.
HWS - Household Water Supply Shortage Reporting System, RMS – representative monitoring site, GWE – groundwater elevation

## 5. Conclusion and Recommendations

The HSW dataset shows that 141 wells were reported to have gone dry between 2013 and the end of 2017. The dataset also shows that an additional 95 wells were reported to have gone dry since 2017. Current groundwater levels are above the minimum threshold elevations in all but one RMS well, suggesting that additional dry well occurrences would result if minimum threshold groundwater elevations were reached in all RMS wells simultaneously. The number of dry well occurrences in the Basin is expected to increase due to continued declining groundwater levels in areas containing domestic well clusters. Some well owners that reported dry wells to the HSW may have utilized the County of San Luis Obispo's Dry Well Fee Waiver Program when deepening their well. However, many of the wells in the dataset do not have well coordinates and it cannot be confirmed how many of the permits are for wells in the basin without assigning permits to an address. There are approximately 20 permits assigned to wells that may be in the basin based on an address.

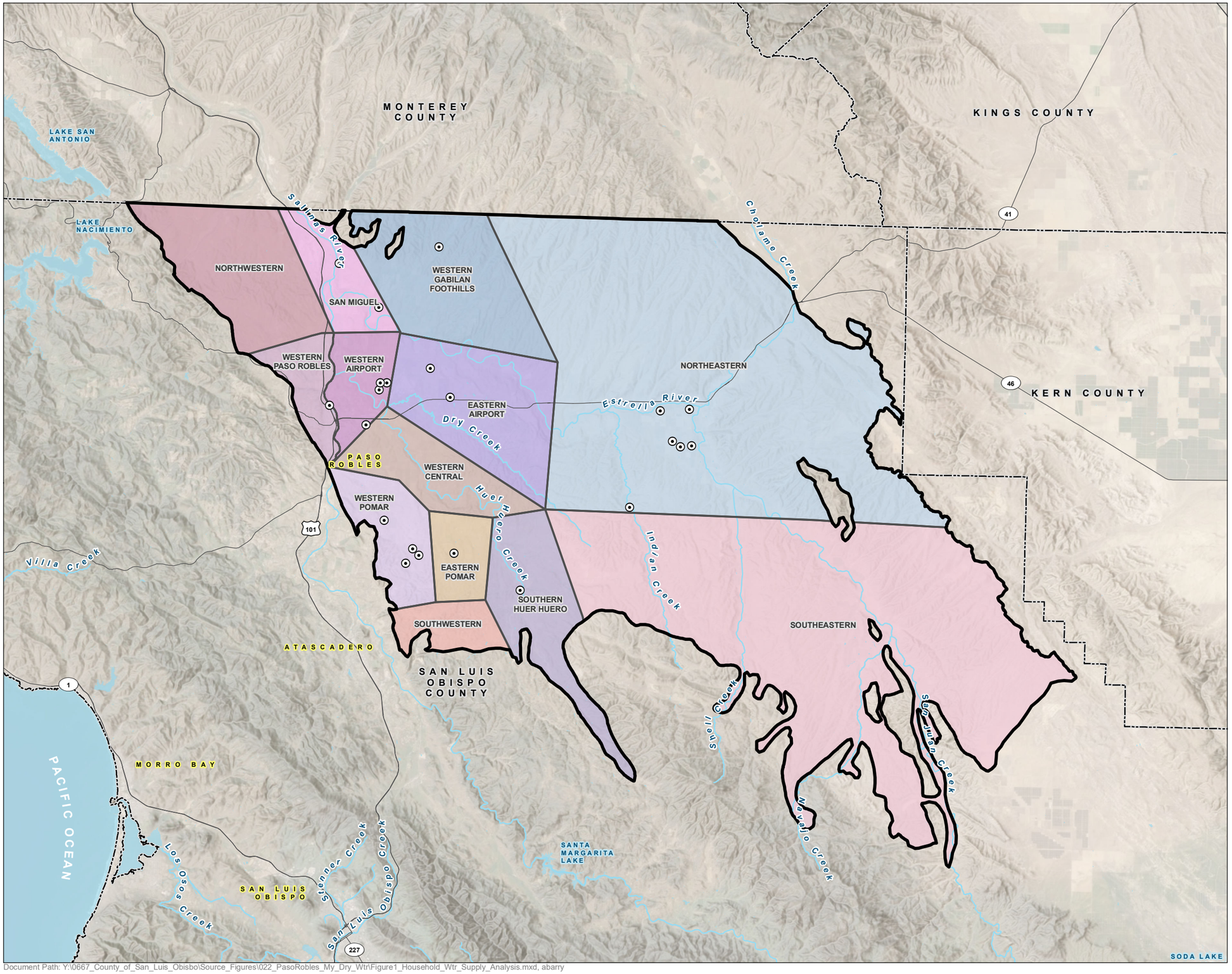
The following is GSI's recommended strategy for forecasting dry wells occurrences. Well completion reports digitized and precisely located by the County of San Luis Obispo Environmental Health Services (EHS) could be used to compile a comprehensive three-dimensional dataset of well completion information for existing wells in the Basin. For verification purposes the comprehensive well dataset can be used to model predicted impacts to existing wells based on various historical groundwater condition scenarios. The results of these predictions can be fact checked using empirical data collected by the HWS. Upon successful verification and/or recalibration, the model can be used to forecast groundwater elevations at specified time intervals to predict when and where dry wells may occur based on continuously updated basin wide water level monitoring data. This information can be used to perform outreach to households currently using wells at risk of becoming dry about the forecasted conditions and offer possible solutions. In addition, this information can be used to inform management actions to protect wells at risk of going dry.

# FIGURES

# FIGURE 1

## Geographic Areas for Household Water Supply Shortage Reporting System Analysis

Paso Robles Basin
Well Impacts Analysis




**LEGEND**

- GSP RMS Well

**Dry Well Domestic Well Cluster Areas**

- Eastern Airport
- Eastern Pomar
- Northeastern
- Northwestern
- San Miguel
- Southeastern
- Southern Huer Huero
- Southwestern
- Western Airport
- Western Central
- Western Gabilan Foothills
- Western Paso Robles
- Western Pomar

**All Other Features**

- Paso Robles Subbasin
- County Boundary
- Major Road
- Watercourse
- Waterbody

N

0 2 4 6
Miles

Date: April 21, 2022
Data Sources: BLM, ESRI, USGS, Maxar Imagery (2021)

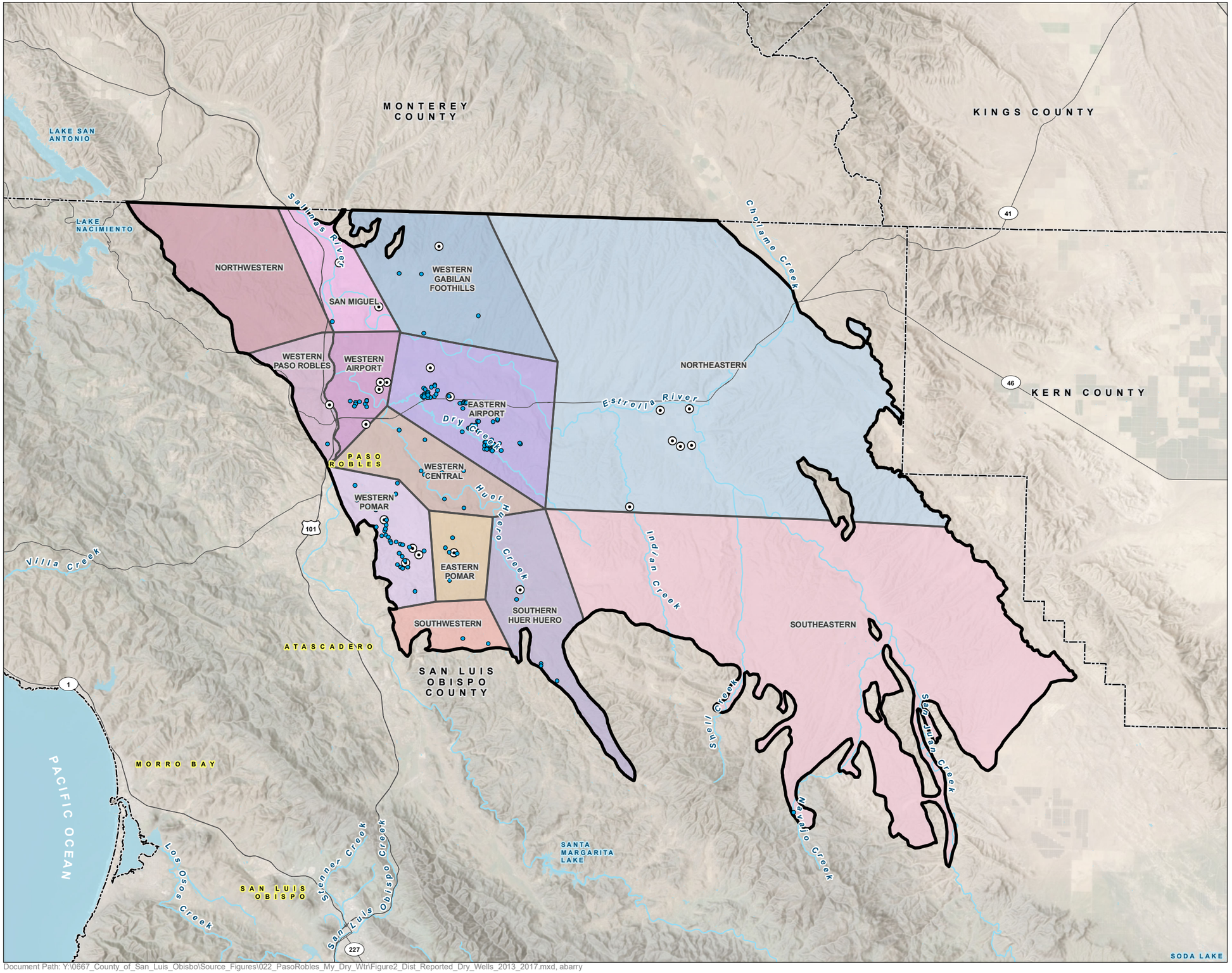
GSI Water Solutions, Inc.

Document Path: Y:\0667_County_of_San_Luis_Obisbo\Source_Figures\022_PasoRobles_My_Dry_Wtr\Figure1_Household_Wtr_Supply_Analysis.mxd, abarry

# FIGURE 2

## Distribution of Reported Dry Wells - 2013 through 2017

Paso Robles Basin
Well Impacts Analysis




**LEGEND**

- Reported Dry Well
- GSP RMS Well

**Dry Well Domestic Well Cluster Areas**

- Eastern Airport
- Eastern Pomar
- Northeastern
- Northwestern
- San Miguel
- Southeastern
- Southern Huer Huero
- Southwestern
- Western Airport
- Western Central
- Western Gabilan Foothills
- Western Paso Robles
- Western Pomar

**All Other Features**

- Paso Robles Subbasin
- County Boundary
- Major Road
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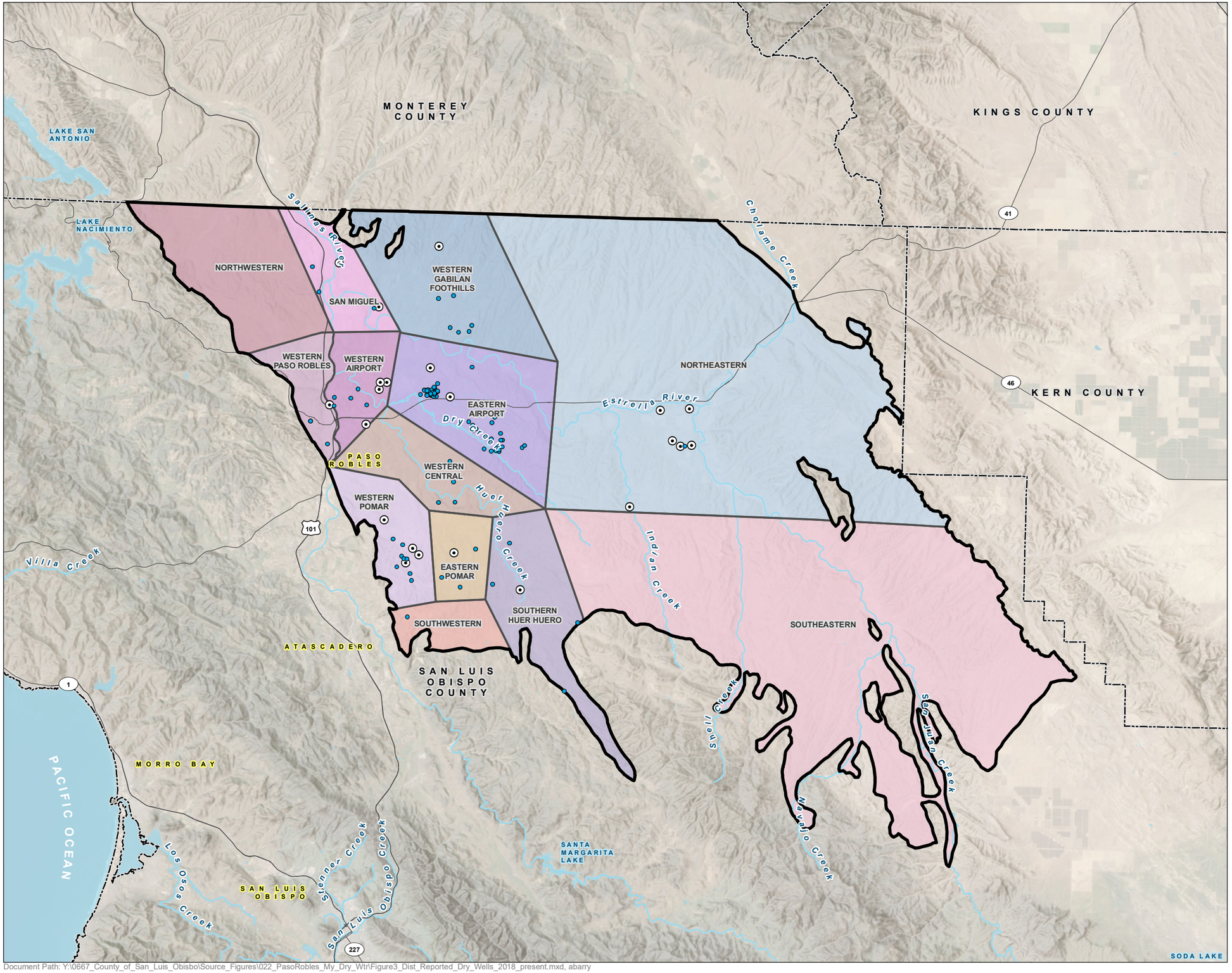
Document Path: Y:\0667_County_of_San_Luis_Obisbo\Source_Figures\022_PasoRobles_My_Dry_Wtr\Figure2_Dist_Reported_Dry_Wells_2013_2017.mxd, abarry

# FIGURE 3

## Distribution of Reported Dry Wells - 2018 through Present

Paso Robles Basin
Well Impacts Analysis




### LEGEND

- Reported Dry Well
- GSP RMS Well

**Dry Well Domestic Well Cluster Areas**

- Eastern Airport
- Eastern Pomar
- Northeastern
- Northwestern
- San Miguel
- Southeastern
- Southern Huer Huero
- Southwestern
- Western Airport
- Western Central
- Western Gabilan Foothills
- Western Paso Robles
- Western Pomar

**All Other Features**

- Paso Robles Subbasin
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0 2 4 6
Miles

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GSI Water Solutions, Inc.

Document Path: Y:\0667_County_of_San_Luis_Obisbo\Source_Figures\022_PasoRobles_My_Dry_Wtr\Figure3_Dist_Reported_Dry_Wells_2018_present.mxd, abarry