KAWEAH BASIN WATER QUALITY ASSOCIATION

# Groundwater Trend Monitoring Workplan – Phase II Addendum 2

Tulare County, California
July 19, 2019

*Prepared for:*

KAWEAH BASIN WATER QUALITY ASSOCIATION

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## Certifications

This Groundwater Trend Monitoring Workplan Phase II – Addendum is signed by the following certified professionals:

**Provost & Pritchard Consulting Group**



## Project Team

This Groundwater Trend Monitoring Workplan Phase II – Addendum 2 was prepared by the following project team members:

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**Kaweah Basin Water Quality Association**

- Donald Ikemiya, Executive Director

# ADDENDUM 2

The Kaweah Basin Water Quality Association (**KBWQA**) is submitting this "Groundwater Trend Monitoring Work Plan - Phase II Addendum 2" (**Addendum 2**) in accordance with the monitoring requirements described in the Monitoring and Reporting Program, required by Waste Discharge Requirements, General Order for Growers in the Tulare Lake Basin that are Members of a Third-Party Group, Order No. R5-2013-0120 (**General Order**). This Addendum 2 is prepared in response to the Conditional Approval letter dated August 22, 2018, from the Central Valley Regional Water Quality Control Board's (**Regional Board**) review of the KBWQA Groundwater Trend Monitoring Work Plan – Phase II Addendum (**Addendum 1**), submitted on July 31, 2018.

This Addendum 2 fulfills the requirements of Attachment B MRP Section IV.E of the General Order and addresses staff's comments by providing:

- List of well details for the completed Groundwater Trend Monitoring (**GTM**) Network, for the remaining 10 of 24 proposed wells.
- A map showing the locations of the GTM wells.
- All information required by the General Order for trend monitoring wells.

Attachment B, Section IV.E.2 of the General Order requires details for wells proposed for trend monitoring, including:

- Global Positioning System (**GPS**) coordinates.
- California State Well Number (if known).
- DWR Well Completion Report/Driller's Log Number.
- Well depth.
- Top and bottom perforation depths.
- A copy of the well driller's log (if available).
- Depth of standing water (static water level), if available.
- Well seal information (type of material and length of seal).

Well details for wells within KBWQA monitoring network, including construction and location information, are provided in **Table 2**. The KBWQA has permission from all land owners to monitor all wells listed in **Table 2.** A map showing the location of the KBWQA's trend monitoring well network is provided in **Figure 1**. Section 5 of the KBWQA's GTM Work Plan – Phase II describes the methodology used for selecting wells that meet the requirements of Attachment B, MRP Section IV.C.2, including the rationale for the spatial distribution of selected wells, well location, and position of wells within the upper zone of the aquifer.

Design of the GTM considered:

- The types of agricultural crops grown within the KBWQA area, particularly those with the most irrigated agricultural acreage.
- Hydrogeologic conditions, such as relative groundwater depths, groundwater flow direction in relation to disadvantaged communities (**DACs**), dairy land, and significant recharge areas as determined in the Groundwater Assessment Report (**GAR**).

The spatial distribution of monitoring areas was defined by specific criteria, rather than acreage or a location (grid). Potential general monitoring areas were initially selected by reviewing crop maps for the largest crop types (by acreage) and selecting areas near each of the crop types that were:

1. Located above relatively shallow groundwater.
2. Generally, upgradient of a DAC or within relatively close proximity of a DAC.
3. Located in both low vulnerability areas (**LVAs**) and high vulnerability areas (**HVAs**).
4. In areas with greater potential recharge as documented in the GAR.
5. Generally representative of Natural Resources Conservation Service (**NRCS**) soil textural classes present in the KBWQA area.
6. Not downgradient from an area where other land application practices would potentially lead to water quality issues that could not be differentiated from those resulting from farming practices.

As discussed in Addendum 1, due to the long-term monitoring requirement, it is anticipated that the well network will be modified over time. Necessary changes will be made to maintain a regional representation of groundwater quality. The KBWQA will maintain information for backup wells to ensure the continuity of the trend monitoring program. Furthermore, the KBWQA supports the concept presented in Section 3.6, "Dynamic Network: Adaptive Design and Refinement", of the Central Valley Groundwater Monitoring Collaborative (**CVGMC**) Technical Workplan.

Two monitoring areas were relocated after Addendum 1 was submitted to the Regional Board. To improve spatial representation, the well previously selected for Area 3 was replaced with a well west of Highway 99. As recommended by Regional Board staff comments, this increases the total number of wells west of Highway 99 to 4, including the well selected for Area 24. Area 2 was previously located north of Lemon Cove. It was determined that many wells in this region were representative of the same characteristics. In order to increase the diversity of wells represented in the network, Area 2 was subsequently relocated south of Farmersville.

Collected groundwater quality data will be reported by the KBWQA in the annual monitoring report (**AMR**). Once each annual data set is tabulated, it will be assessed for data sufficiency. Some trend analysis methods require an accumulation of data over time, and others require minimum analytical suites. Specifically, groundwater elevation graphs (hydrographs) will be prepared from the initial monitoring event and updated annually. To be meaningful, these graphs rely on the change in groundwater elevation over time. It is anticipated that a minimum of five to ten data points will be needed to begin to provide a representation of the changes in groundwater levels. Time-series concentration graphs will be prepared as appropriate. As with the hydrographs, these graphs rely on the change in constituent concentrations over time. A minimum of five to ten data points will be needed to begin assessing concentration changes.

As a member of the CVGMC, the KBWQA began sampling of the GTM network in Fall of 2018. As requested in the Conditional Approval, these results will be reported and evaluated with the Coalition's Annual Monitoring Report by August 31, 2019. The KBWQA has coordinated with other CVGMC members to schedule the annual sampling for 2019 from May 1 to August 31. As stated in Section 6 of the KBWQA's GTM Work Plan – Phase II, well sampling will recur at each well location during the same timeframe each year. **Table 1** describes methods and reporting units for monitoring constituents required by Table 3 of Attachment B, MRP Section IV.E. to be collected at all monitoring wells during the 2019 sampling period.

**Table 1. Initial Groundwater Sampling Analyses**

| Indicator Parameter | Reporting Units | Field Measurement | Laboratory Analysis | Analysis Method |
|---|---|---|---|---|
| Electrical Conductivity (**EC**) | µmhos/cm | ✓ | | Field Instrument |
| pH | pH units | ✓ | | Field Instrument |
| Dissolved Oxygen (**DO**) | mg/L | ✓ | | Field Instrument |
| Temperature | °C | ✓ | | Field Instrument |
| Nitrate as Nitrogen | mg/L | | ✓ | Method 300.0 |
| Total Dissolved Solids (TDS) | mg/L | | ✓ | Method 2540C |
| General Minerals<br>Anions (carbonate, bicarbonate, chloride, sulfate) | mg/L | | ✓ | Method 2320B |
| General Minerals<br>Cations (boron, calcium, sodium, magnesium, potassium) | mg/L | | ✓ | Method 200.7 |

As required by Attachment B, MRP Section IV.E.3 and MRP Section V.B, the KBWQA will submit groundwater monitoring results as an Excel workbook containing an export of all data records uploaded to the State Water Resources Control Board's GeoTracker database. Samples collected during the early part of the 2018-2019 water year (after October 1, 2018) will be reported and evaluated in coordination with the CVGMC specified timelines.

**Table 2. KBWQA Well Locations and Construction Details**

| Area | Latitude | Longitude | Physical Address | TRS | Well Depth (feet) | Open Bottom Well? | Top Perforation Depth (feet) | Bottom Perforation Depth (feet) | Well Driller's Log Number | Depth of Standing Water (feet) | Well Seal Material | Well Seal Depth (feet) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 36.429063 | -119.108579 | 20800 Ave 352, Woodlake | T17S-R26E-24 | 116 | No | 56 | 116 | 498571 | 47 | Cement | 0-50 |
| 2 | 36.255494 | -119.230255 | 15348 Ave 256, Visalia | T19S-R25E-23 | 247 | Yes | NA | NA | 773597 | UK | Cement | 0-20 |
| 3 | 36.178740 | -119.465623 | UK | T20S-R23E-22 | 275 | No | 0 | 275 | 566974 | 176 | Cement | 0-20 |
| 4 | 36.384126 | -119.110619 | 20695 Ave 328, Woodlake | T18S-R26E-12 | 140 | No | 20 | 120 | 517596 | 22 | Bentonite | 0-20 |
| 5 | 36.395523 | -119.144009 | UK | T18S-R02E-03 | 176 | No | 96 | 166 | 468659 | 66 | Cement | 0-20 |
| 6 | 36.367014 | -119.073148 | UK | T18S-R27E-17 | 93 | Yes | NA | NA | 396547 | 40 | Cement | 0-21 |
| 7 | 36.344112 | -119.116969 | UK | T18S-R26E-26 | 192 | No | 92 | 192 | 415022 | 65 | Cement | 0-20 |
| 8 | 36.330722 | -119.146025 | 19071 Ave 300, Exeter | T18S-R26E-27 | 160 | Yes | NA | NA | 503768 | 53 | Bentonite | 0-20 |
| 9 | 36.163903 | -119.344966 | 7370 Ave 228, Tulare | T20S-R24E-26 | 141 | Yes | NA | NA | 517141 | 214 | Cement | 0-20 |
| 10 | 36.355412 | -119.165169 | UK | T18S-R26E-21 | 159 | No | 140 | 155 | e0181205 | 25 | Bentonite | 0-20 |
| 11 | 36.362781 | -119.188157 | 17282 Charter Oak Dr., Visalia | T18S-R26E-17 | 168 | No | 60 | 120 | e0174035 | UK | Bentonite | 0-20 |
| 12 | 36.387330 | -119.186580 | UK | T18S-R26E-05 | 210 | No | 90 | 130 | 488964 | 93 | Bentonite | 0-20 |
| 13 | 36.421159 | -119.231659 | 34818 Rd. 152, Ivanhoe | T17S-R25E-26 | 237 | No | 140 | 195 | 492812 | UK | Bentonite | 0-20 |
| 14 | 36.372770 | -119.257570 | 14136 Ave 320, Visalia | T18S-R25E-10 | 180 | Yes | NA | NA | 361402 | 111 | Cement | 0-20 |
| 15 | 36.358628 | -119.219952 | 15600 Mills Dr., Visalia | T18S-R25E-13 | 150 | Yes | NA | NA | 461065 | 70 | Cement | 0-20 |
| 16 | 36.368128 | -119.277349 | 31812 Rd. 132, Visalia | T18S-R25E-16 | 180 | No | 140 | 180 | 718552 | 104 | Cement | 0-23 |
| 17 | 36.381252 | -119.285407 | 32595 Rd. 132, Visalia | T18S-R25E-08 | 168 | Yes | NA | NA | 773617 | 117 | Cement | 0-20 |
| 18 | 36.334368 | -119.184547 | UK | T18S-R26E-30 | 150 | No | 88 | 120 | 381640 | 42 | Grout | 0-20 |
| 19 | 36.219640 | -119.385890 | 917 N. Enterprise, Tulare | T20S-R24E-05 | 210 | No | 90 | 130 | 488964 | 167 | Bentonite | 0-20 |
| 20 | 36.295544 | -119.174476 | 27854 Morgans Dr., Exeter | T19S-R26E-05 | 130 | No | 80 | 130 | 489256 | 102 | Cement | 0-55 |
| 21 | 36.267647 | -119.107291 | UK | T19S-R26E-24 | 225 | Yes | NA | NA | 582463 | 140 | Bentonite | 0-20 |
| 22 | 36.264795 | -119.265060 | 13802 Ave 260, Tulare | T19S-R25E-22 | 192 | Yes | NA | NA | 396550 | UK | Cement | 0-20 |
| 23 | 36.337056 | -119.361466 | 6306 W. Hurley, Visalia | T18S-R24E-27 | 196 | No | 189 | 209 | E005874 | 148 | Cement | 0-20 |
| 24 | 36.367278 | -119.436826 | 31818 Rd 60, Visalia | T18S-R23E-13 | 258 | No | 82 | 250 | e037234 | 119 | Bentonite | 0-25 |

Approved Monitoring Well
Proposed Monitoring Well – Addendum 2
UK = Unknown
NA = Not Applicable

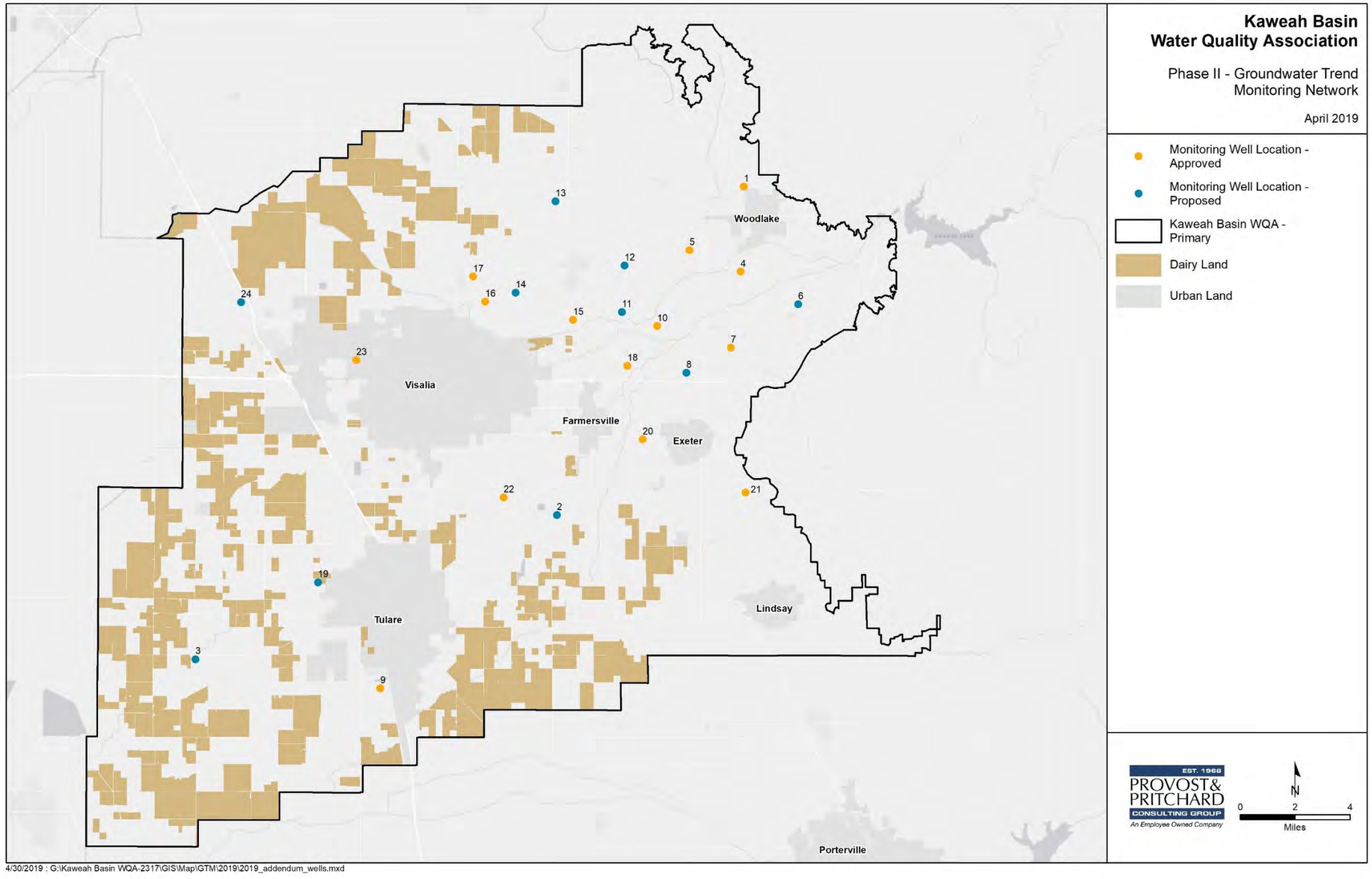


**Figure 1. KWBQA's Well Monitoring Network Map**