Prepared for:

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PHASE 4 SITE INVESTIGATION WORK PLAN

Olancha Spring Water Bottling Facility
1210 South U.S. Highway 395
Olancha, California

Prepared by:

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engineers | scientists | innovators

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Project Number: SB0835

Revised December 15, 2017

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Olancha Spring Water Bottling Facility

1210 South U.S. Highway 395
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Prepared for:

Crystal Geyser Roxane

Revised December 15, 2017

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TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

LIST OF APPENDICES

1.0 INTRODUCTION

Geosyntec Consultants, Inc. (Geosyntec), on behalf of Crystal Geyser Roxane (CGR), is submitting the following Phase 4 Site Investigation Work Plan (Work Plan) for the CGR Bottling Facility (site) located at 1210 South U.S. Highway 395, near Olancha, California (**Figure 1**). This Work Plan is being submitted in response to the Lahontan Regional Water Quality Control Board (LRWQCB) Amended Investigative Order (R6V-2014-0063A2; Order), dated July 20, 2017. Based on past waste water discharges from the CGR facility, LRWQCB issued the Order, requiring a Work Plan for the site to 1) determine site background soil concentrations, 2) evaluate the full lateral and vertical extent of potential soil impacts above background concentrations in the vicinity of the Former Arsenic Pond (AP) and associated appurtenances, and 3) perform an evaluation of existing groundwater data to determine statistically significant site-specific background groundwater concentrations. This Work Plan is designed to address the requested investigation requirements presented by LRWQCB in the Order and presents the proposed methodology for soil sampling in response to the Order. Additionally, this Work Plan was prepared in accordance with the scope of work discussed between LRWQCB, CGR and Geosyntec in meetings conducted on October 27, 2016 and September 29, 2017. The remainder of this Work Plan is organized as follows:

- Section 1.0 – *Introduction*.
- Section 2.0 – *General Site Description*. A brief description of the site is presented, including the locations of three waste water ponds located on the site.
- Section 3.0 – *Previous Environmental Site Studies*. A summary of the recent environmental investigations is presented.
- Section 4.0. – *Hydrogeological Site Conceptual Model*. This section includes a description of the general site hydrogeological conditions.
- Section 5.0. – *Investigation Objectives and Design*. Provides the investigation objectives and a basis for the approach to the Phase 4 site investigation.
- Section 6.0. – *Data Collection Plans and Methodologies*. Presents procedural information to fill the remaining data gaps as outlined in the Order.
- Section 7.0 – *Reporting*. Presents the proposed report preparation following completion of the Phase 4 site investigation.
- Section 8.0 – *Schedule*. Presents the proposed schedule for the work.
- Section 9.0 – *References*. Presents the references cited in the Work Plan.

2.0 GENERAL SITE DESCRIPTON AND HISTORY

The site property is irregularly shaped and consists of approximately 170 acres located adjacent to Highway 395, approximately 3 miles north of Olancha, California (**Figure 1**). CGR operates a spring water bottling facility using groundwater production wells for bottled water supply and for domestic and industrial purposes. The facility consists of two large bottling production and warehouse buildings, CGR North and CGR South (**Figure 2**). A complete description of the bottling facility processes was submitted in the *Facility Waste Generation and Discharge Systems Report* dated October 16, 2014 (CGR, 2014).

Regionally, the site is located in the southern portion of the Owens Valley, approximately 1 mile east of the Sierra Nevada Mountains. East of the site is the dry Owens Lake, west of the site is the Los Angeles Aqueduct (approximately ½-mile from the site), and Highway 395 runs north-south crossing the western portion of the site.

2.1 Site History

In the past, CGR discharged waste water into three ponds on the site: The Fire Pond (FP); the Arsenic Pond (AP); and the East Pond (EP) (**Figure 2**). The AP was taken out of service and decommissioned in May and June 2015, while the EP and FP are still in use. The EP and FP wastewater discharges are permitted under a Waste Discharge Requirements (WDR) industrial discharge permit. The locations of these ponds are shown on **Figure 2**. The *Facility Waste Generation and Discharge Systems Report* describe wastewater discharge processes to these ponds (CGR, 2014). The FP and EP primarily receive ozonated filtered rinse water with low concentrations of ammonia, chlorine and phosphoric acid. The AP previously received wastewater generated during the regeneration process of the arsenic filtration systems. Past environmental investigations at the site have been primarily focused on potential impacts to soil and groundwater caused by discharge to these ponds. Previous site investigations are discussed in the following section.

3.0 PREVIOUS ENVIROMENTAL SITE STUDIES

There have been numerous hydrogeological studies at the site relating to the CGR bottling operations. These studies and associated reports are listed in the Phase 2 Site Groundwater Report prepared by Geosyntec, dated August 14, 2015 (Geosyntec, 2015c). Additionally, in July 2016, a Revised Additional Site Investigation Work Plan was prepared in response to the LRWQCB Amended Investigative Order dated July 24, 2014 and subsequent email correspondence dated October 26, 2015. In the response to the July 2014 Amended Order, a Phase 3 site investigation was implemented to further evaluate soil and groundwater conditions in the areas around the Former AP, EP, and FP, and to evaluate the groundwater gradient and flow patterns in the shallow groundwater aquifer beneath the site (Geosyntec, 2017a). The following sub-sections describe the three previous phases of investigation.

3.1 Phase 1 Investigation

The Phase 1 groundwater investigation at the site was completed as a screening evaluation to preliminarily evaluate the groundwater conditions in the areas around the AP, the EP, and the FP, as well as near the cooling tower on the north side of the northern site bottling facility. A total of 10 grab groundwater samples were collected to gather screening level data in order to better evaluate groundwater quality conditions and identify appropriate locations for groundwater monitoring wells. Additionally, production waste water samples were collected from both the northern and southern bottling plants and at water discharge locations of the AP, EP, and FP for characterization and comparison to groundwater quality.

The results of the Phase 1 Investigation indicated that the primary constituents of concern in the groundwater in the investigation areas are metals. Of the metals detected, the primary metal of concern exceeding the corresponding Maximum Contaminant Level (MCLs) was arsenic. Additionally, elevated concentrations of sulfate and total dissolved solids (TDS) were also detected at concentrations exceeding their secondary MCLs in borings adjacent to the AP. Based on the data collected during the Phase 1 Site groundwater investigation, installation of groundwater monitoring wells was recommended for the areas surrounding the AP, EP, and FP to verify the Phase 1 screening data. The additional site investigation Work Plan Addendum dated May 29, 2015 (Geosyntec, 2015b) was approved by the RWQCB in correspondence dated June 29, 2015.

3.2 Phase 2 Investigation

The Phase 2 investigation was conducted in June and July 2015 to further evaluate the soil, soil vapor, and groundwater conditions in the areas around the AP, the EP, and the

FP (Geosyntec, 2015c). The monitoring well and soil vapor probe sampling locations were selected based on data obtained from the Phase 1 Site screening level investigation (Geosyntec, 2015a). Additionally, quarterly groundwater monitoring was completed in 2015.

During the Phase 2 investigation, a total of nine groundwater monitoring wells and one temporary soil vapor probe were installed and soil, soil vapor, and groundwater samples were collected and analyzed. The primary constituents-of-concern identified in soil and groundwater were metals. Of the metals detected in soil, only detections of arsenic and molybdenum exceeded the California median background for soil concentrations (UCR/DTSC, 1996). Arsenic exceeded the California median background concentration in soil samples collected across the site indicating relatively high naturally occurring concentrations of arsenic in site soil. In groundwater, antimony and arsenic were detected at concentrations above background levels and exceeding their MCLs of 6 and 10 µg/L, respectively. The elevated occurrences of antimony and arsenic were primarily located in wells adjacent and downgradient of the AP (wells MW-4, MW-5, and MW-9; **Figure 2**). A slightly elevated level of dissolved arsenic was also reported in well MW-7 (47.9 micrograms per liter (µg/L)). No other metals in groundwater samples collected from monitoring wells were detected above background levels. The groundwater sample analytical results did not contain detections of volatile organic compounds (VOCs) or semi-VOCs (SVOCs) indicating there are no significant VOC or SVOC impacts to groundwater due to waste water discharges at the site.

A soil vapor sample was collected from probe SV-01 located adjacent to the AP and the valve distribution box (**Figure 2**). Soil vapor sample results were lower than the most stringent screening levels for even residential vapor intrusion concerns. Based on the soil vapor sample, soil and groundwater sample results, there has not been a significant release of VOCs in the area around the valve distribution box.

3.3 Phase 3 Investigation

The Phase 3 investigation was conducted at the site in July 2016 and included additional soil and groundwater sampling, groundwater monitoring well installation, and the third quarter 2016 routine groundwater sampling event. As part of the investigation, the LRWQCB requested that soil samples be collected near the FP due to an unsubstantiated third-party report indicating that CGR allegedly disposed of arsenic filter media in this area. Results of Phase 3 soil samples collected near the FP indicate that concentrations of arsenic and molybdenum are representative of naturally occurring regional background levels (which are higher than the median California background levels). Based on the Phase 3 soil sample results, there was no evidence of a release found in the vicinity of the FP (Geosyntec, 2017a).

Soil vapor sample results indicated the presence of low concentration VOCs; however, soil vapor results were lower than the most conservative screening levels for residential vapor intrusion concerns. Based on these soil vapor, soil, and groundwater sample results, there has not been a significant release of VOCs at the site (Geosyntec, 2017a).

Phase 3 groundwater grab results indicate that elevated dissolved arsenic concentrations are present at the site near the Former AP (**Figure 3** summarizes dissolved arsenic concentrations from the second quarter 2017 groundwater monitoring event). However, results suggest that naturally occurring elevated arsenic concentrations are associated with the fine-grained lacustrine deposits in the vicinity of the site (i.e., Cabin Bar Ranch and dry Owens Lake). Therefore, any potential impacts from the Former AP to shallow site groundwater appear to be within the range of natural background concentrations. Natural background arsenic concentrations are presented in the *Technical Memorandum – Arsenic Distribution and Background Analysis at the CGR Facility in Olancha, CA* (Geosyntec, 2016b). Additionally, the groundwater gradient in the area of the Former AP and EP was calculated to be towards the northeast at a magnitude of approximately 0.009 feet/ft and a significant upward gradient was observed in the vicinity of the Former AP. Groundwater gradient data and modeling indicate that groundwater near the Former AP containing elevated arsenic concentrations will migrate to an area beneath the dry Owens Lake, where concentrations of arsenic are one to two orders of magnitude higher than concentrations found beneath the site (Geosyntec, 2017a). The hydrogeologic site conceptual model (CSM) is discussed in Section 4.0 below.

4.0 HYDROGEOLOGICAL SITE CONCEPTUAL MODEL

A hydrogeological site conceptual model (SCM), based on the information collected during Phase 1 - 3 investigations and past hydrogeological investigations, is presented in this section.

The site is located in the southern portion of the Owens Valley Groundwater Basin (DWR, 2003). The basin occupies a structural valley that, in the vicinity of the site, is bounded on the west by the granitic bedrock of the Sierra Nevada Mountains and on the east by the sedimentary bedrock of the Inyo Mountains. To the east of the site and in the middle portion of the valley is the Owens Dry Lake. The Owens Dry Lake is a desert playa where salts are generated at the surface via evaporation processes.

A hydrogeological conceptual model illustration of the Site is provided on **Figure 4**[1]. The major groundwater bearing unit at the site is a thick sequence of alluvium that has been derived from erosion of bedrock in the bordering mountain areas. The alluvium beneath the site is principally derived from the Sierra Nevada Mountains to the west and generally consists of sands and gravels. These alluvial sands and gravels are interbedded or interfingered with finer-grained lacustrine deposits (i.e., lake deposits from the ancient Owens Lake). The sequence of alluvium and lacustrine deposits beneath the site is at least 750 feet thick (Montgomery, 1993).

The alluvial sand and gravels, and lacustrine clays and silts were encountered during drilling investigations at the site. The observed sequence of lacustrine and alluvial sediments beneath the site is the result of deposition associated with ancient fluctuations of water levels at the southwestern shoreline in Owens Lake. Alluvial materials derived from the Sierra Nevada Mountains were deposited along the shoreline while fine-grained lacustrine materials were deposited in the shallow lake waters. As the elevation of the lake varied, the shoreline moved laterally, causing interfingering of the coarse alluvial materials and the fine-grained lake deposits. The lacustrine deposits generally consist of silts, clays and very fine sands and have a relatively high organic content. Based on regional models and site boring logs, the percentage of fine-grained material (lacustrine deposits) generally increases to the east. That is, the occurrence or presence of fine-grained silts and clays in the subsurface increases as one moves from the Sierra Nevada Mountain range towards Owens Dry Lake. It should also be noted that a shoreline deposit, generally consisting of light brown to white, fine to coarse sands with some gravel, is located at the ground surface to a depth of approximately 12 to 15 ft bgs (feet below ground surface) on the southeastern portion of site. The shoreline deposit is shown

[1] Note that this illustration is not to scale and site features are not included. It is intended for general visualization purposes only.

on **Figure 2** as the large non-vegetated area east of the bottling facility. The Former AP and the EP are located on the shoreline deposit.

Groundwater beneath the site is mostly derived from precipitation (rainfall) and snowmelt in the Sierra Nevada Mountains to the west. Surface water runs off the Sierra Nevada mountain front and infiltrates the alluvium near the mountain base. Surface water or runoff quickly percolates into the sandy and gravelly alluvium and moves downward to the groundwater table. Some groundwater recharge may also occur from underflow through bedrock fractures and from direct precipitation on the valley floor.

Groundwater in the alluvium flows eastward, away from the Sierra Nevada Mountains, towards the central portion of the basin or towards Owens Dry Lake. The Owens Dry Lake is a groundwater discharge area where up-flowing groundwater is evaporated and, consequently, evaporite salts are produced.

Shallow groundwater beneath the site occurs under unconfined conditions; although where fine-grained layers are present, local semi-confined conditions may occur. The upper aquifer material beneath the site is referred to as the Shallow Zone. The Shallow Zone is defined herein as the saturated sand and gravel aquifer that overlies the fine grained lacustrine layer that occurs at a depth of approximately 80 feet. All monitoring wells, with the exception of MW-15, installed during the investigation phases are completed in the upper-most portion of the Shallow Zone. Based on groundwater elevation data obtained from quarterly monitoring events, the average groundwater gradient is 0.008 ft/ft toward the northeast with an approximate groundwater velocity of 2,400 ft/year.

The depth to the shallow groundwater table beneath the site gradually decreases towards the northeast. A small and subtle escarpment extends from the area north of the Site (Cabin Bar Ranch) along an approximate north-south trend to the southern portion of the site. A series of linear trending springs occurs along this subtle escarpment. The easterly groundwater flow is impeded and subsequently produces a rise of the groundwater table resulting in observed linear springs/seeps in the central and eastern portions of the site. This escarpment is interpreted to be associated with the presence of an underlying fault referred to as the Spring-line fault (**Figure 2**). The Former AP and EP are located east of the fault, whereas the FP is located west the fault. The fault is generally interpreted to act as a leaky groundwater barrier and the aligned springs and seeps are caused by a small rise of shallow groundwater and the subsequent intersection of groundwater with the ground surface along the fault. An alternate interpretation is that the rise of groundwater is associated with the increase of fine-grained lacustrine deposits towards the east causing a slightly impermeable barrier. However, the linear nature of the spring locations suggests the fault interpretation is more likely. The rise of groundwater in the area as a result of this interpreted fault, together with the high regional evaporation rate, has resulted in soils with high salt content.

Located on the Cabin Bar Ranch property adjacent to and north of the site are production wells, domestic water supply wells, observation monitoring wells, and piezometers. Additionally, there are active domestic water supply wells and one municipal production well in the town of Cartago, located approximately 1-mile north of the site. The production wells and domestic wells at the site and at Cabin Bar Ranch are completed in the deeper portions of the Shallow Zone. Some observation wells at the site and at Cabin Bar Ranch are completed in the Deep Zone. Based on previous studies completed by Geosyntec and others, there is some leakage between the Deep and Shallow Zones, however, based on comparison of water levels in co-located observation wells completed in the Deep and Shallow zones, it appears that there is a site-wide upward groundwater gradient. That is, wells completed in the Deep Zone have static water level at a higher elevation than those completed in the Shallow Zone. This condition is documented at observation wells OW-7U and OW-7M, and at OW-10U and OW-10M (Geosyntec, 2017a). The majority of the site wells, except for monitoring wells associated with the investigation, have been installed west of the Spring-line fault. Groundwater quality and water levels are monitored at the Cabin Bar Ranch on a quarterly basis in accordance with the Groundwater Monitoring, Mitigation, and Reporting Plan (GMMRP) dated June 18, 2014 (Geosyntec, 2014). The GMMRP monitoring program was developed to evaluate potential water level and water quality impacts due to proposed pumping at the Cabin Bar Ranch facility. The GMMRP quarterly groundwater monitoring program was initiated in March 2016.

Groundwater quality is an important component of the groundwater investigation at the site. Generally, concentrations of TDS, sodium, carbonate, and metals, including arsenic in the Shallow Zone, substantially increase to the east toward Owens Dry Lake where up-flow of groundwater and evaporation processes have created salt pans. As noted in previous reports (Geosyntec, 2015a, 2015c, 2016b, and 2017a) and based on previous investigations at the site, arsenic is well known to be a naturally occurring element in the soil, alluvium, and groundwater in the region of the site. Generally, elevated arsenic concentrations (greater than the MCL) are characteristic of groundwater derived from the Eastern Sierra Nevada watershed. Site production wells located west of the Spring-line fault, which produce from deeper portions of the Shallow Zone, have arsenic in the approximate range of 16 to 28 μg/L[2]. It is reasonably concluded that naturally occurring arsenic concentrations in groundwater increases east of the Spring-line fault as a result of the increasing presence of the lacustrine sediments toward Owens Dry Lake. Shallow groundwater sampling (< ~10 ft bgs) by others beneath the eastern portion of Owens Dry

[2] Range of arsenic concentrations based on annual sample results in 2012 and 2013 from CGR production wells CGR-1, CGR-3, CGR-5, CGR-6, and CGR-7.

Lake documented arsenic concentrations in the range of 1,400 – 163,000 µg/L (Levy et. al., 1999). Levy et. al. (1999) also report very high salinity [up to 300,000 milligrams per liter (mg/L)] in the shallow Owens Dry Lake groundwater. Further, arsenic concentrations in shallow groundwater in the southern Owens Dry Lake area, i.e. the Dirty Socks-Cartago Creek Area near the Site, average 32,055 µg/L at 4 ft bgs and 5,596 µg/L at 10 ft bgs (Great Basin Unified APCD, 2009). It is very likely that these elevated concentrations are associated with the fine-grained lacustrine deposits and salt deposits in this area. Thus, as the presence of these layers increases, it is expected that naturally occurring arsenic concentrations, as well as TDS, will likewise increase substantially. However, this expected eastward increase in arsenic and salinity is a general trend that is locally dependent on the volume of fine-grained lacustrine sediment and its impact of groundwater encountered in each area. Recent shallow groundwater samples collected at a location north of the Former AP and east of the Spring-line fault on Cabin Bar Ranch provide a reasonable environmental analog to the Former AP location. Naturally occurring arsenic concentrations of up to 521 µg/L have been detected at this analog location indicating that high arsenic background concentrations occur locally, east of the Spring-line fault (Geosyntec, 2016b).

As noted above, the Former AP and EP are located east of the Spring-line fault. The groundwater gradient in this area is towards the northeast. Therefore, migration of groundwater containing elevated arsenic and other compounds is towards Owens Dry Lake where groundwater is extremely saline with elevated natural concentrations of arsenic in the shallow groundwater. Although the shallow groundwater in the Owens Valley Groundwater Basin is designated for beneficial use, the groundwater beneath the Owens Dry Lake, proximal to the site is not currently nor can foreseeably be used as a drinking water or agricultural resource in the future.

4.1 MODFLOW Groundwater Model

A hydrogeological groundwater model originally developed for the Cabin Bar Ranch in 2014 was updated in 2016 to evaluate groundwater flow conditions in the vicinity of the Former AP (**Appendix A**). The model was prepared using MODFLOW™ software, calibrated based on data collected from hydrogeologic investigations conducted on the Cabin Bar Ranch property as well as at the site. The original model for the Cabin Bar Ranch property was used to estimate the impacts to groundwater levels, spring flow, and other water supply wells in the area based on future pumping scenarios. The 2016 model was updated to include water levels based on data collected at the Site and vicinity in September 2016. The updated model is provided as **Appendix A** and includes the following:

1. A description of the numerical modeling approach used in the simulations;

2. An assessment of the groundwater flow and potential mounding at the Former AP and EP under historical wastewater discharge conditions;

3. Capture zones of all significant production wells based on current and projected pumping rates; and

4. Groundwater particle tracks for all site waste discharge ponds under current and projected pumping conditions.

Updates to the 2014 model included groundwater levels from site wells based on groundwater level monitoring conducted in September 2016, inclusion of all the monitoring wells associated with the investigation (MW-01 through MW-15), as well as monitoring wells and piezometers installed as part of the Cabin Bar Ranch project and the GMMRP program. Additionally, the model includes a sensitivity analysis using a range of hydraulic conductivity[3] values in the areas east of the Spring-line fault to represent the inter-fingered, fine-grained lacustrine deposits found in these areas. This analysis was conducted to determine the potential for groundwater mounding to have occurred in the area of the Former AP and the EP.

The 2016 model results are provided in **Appendix A**. The results of the updated model indicate that groundwater flows to the east from the Sierra Nevada Mountains and into the alluvial deposits west of the Spring-line fault, then rises to the ground surface along a line of springs identified near the Spring-line fault. East of the Spring-line fault, groundwater flows to the northeast and ultimately discharges at Owens Dry Lake. The model results indicate that under historical typical and maximum discharge flow rates, the impacts to water levels in the vicinity of the Former AP and EP is minimal with no groundwater mounding evident. Therefore, it is unlikely that any potential leak from the Former AP migrated significantly up- or cross-gradient towards the area of monitoring wells MW-03, MW-08, MW-09, MW-14, or MW-15 and impacted groundwater quality.

Additionally, the capture zone and particle track analysis indicates that proposed future pumping at the Site or at Cabin Bar Ranch will not draw water from east of the Spring-line fault towards the west. The particle track analysis also indicates that groundwater in the area of all waste discharge ponds will migrate to the northeast and discharge at Owens Dry Lake (an area of very high TDS and arsenic in groundwater). The model indicates that groundwater originating at and near the Former AP will not impact any pumping

[3] The hydraulic conductivity east of the Spring-line fault was estimated at approximately 250 ft/day to account for the interbedded sands and fine-grained silts and clay lacustrine deposits found east of the Spring-line fault.

wells (current or foreseeably planned) including those of the Cartago Mutual Water District.

5.0 INVESTIGATION OBJECTIVES

The Phase 4 objectives and field investigation outlined in this Work Plan are based on the requirements of the LRWQCB Amended Order dated July 20, 2017 and results of the September 29, 2017 meeting between LRWQCB, CGR, and Geosyntec. The following activities are proposed to be performed at the site in response to the LRWQCB Order and are discussed in further detail in Section 6.

- Determination of background soil concentrations at the site, which will include an evaluation of soil background concentrations performed up and cross-gradient of site features on both the east and west side of the Spring-line fault;
- Additional site investigation to determine the full lateral and vertical extent of impacts to soils in the vicinity of the Former AP and associated appurtenances. Therefore, a soil sampling investigation will be performed within the footprint of the Former AP and along the wastewater discharge conveyance piping leading from the bottling facility to the Former AP and EP; and
- Evaluation of site groundwater data to determine statistically significant site-specific background groundwater concentrations.

Following completion of the Phase 4 investigation, a site human health and ecological risk assessment will be performed using data from this investigation, previous site investigations, and background data from the region and general area. Human and ecological risk receptors will be evaluated based on the site soil and groundwater investigations. Risk to groundwater will be assessed using the established site, regional, and general area groundwater data, including the existing downgradient groundwater conditions at the dry Owens Lake. The risk assessment will be submitted to LRWQCB as a separate report in accordance with the schedule indicated in the Order.

6.0 DATA COLLECTION PLANS AND METHODOLOGIES

The following sections discuss the data collection plans and methodologies to be implemented in the Phase 4 investigation and to fill the remaining data gaps as outlined in the Order. A Sampling and Analysis Plan (SAP) detailing sample collection and direct push drilling procedures is presented in the 2014 *Site Investigation Work Plan* (Geosyntec 2014).

6.1 Pre-field Preparation

The Health & Safety Plan (HASP) prepared for the previous phases of investigations will be reviewed and modified as necessary. The HASP includes an analysis of the site work hazards and potential exposures to constituents-of-concern associated with the field work proposed for this Work Plan. Sub-contractors working on the project will be required to provide their personnel with Health & Safety Plans. All site personnel will be required to have 40-hour health and safety training (CFR 1919.120).

At least 48 hours prior to initiating subsurface activities, Geosyntec will contact Underground Service Alert (Dig Alert) to delineate potential utilities in the vicinity of the proposed boring locations. As borings are not anticipated to be advanced to groundwater, Inyo County boring permits for the soil sampling investigation are not anticipated to be required.

6.2 Background Soil Sampling

As requested by LRWQCB in the Order, an evaluation of soil background concentrations in the vicinity of the site will be performed. A statistically significant set of soil samples will be collected from 20 locations that have not been impacted by past wastewater discharges at the site[4]. To assess background soil concentrations across the Spring-line fault, (located east of the bottling facility and trending north-south), 10 locations will be sampled on the west and 10 locations will be sampled on the east side of the fault line as shown on **Figure 5**[5].

Based on the previous investigations at the site, shallow soil horizons consist of primarily two generalized soil types; a coarse-grained (majority sand) and fine-grained (majority silt) unit. To assess the variability between the soil types and to establish background

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[4] The proposed dataset is based on recommendations in the United States Environmental Protection Agency (USEPA) statistical software technical guidance document (USEPA, 2015).

[5] Sample locations may be subject to slight change based on accessibility.

concentrations for the site, one sample will be collected from each soil type at each background sample location.

6.2.1 Background Soil Sample Collection Methodology

Background samples will be collected via hand auger and/or direct-push methodology, depending on drilling conditions at each location. Based on previous site investigations, the contact between the varying lithologic units varies from approximately 2 to 9.5 ft bgs. Samples will be collected from representative soils within the varying lithologic units above the water table as encountered during sampling activities. During sampling activities, the lithology will be logged by Geosyntec personnel working under the direct supervision of a California Professional Geologist. Following soil sample collection, samples will be placed on ice in a cooler and transported on overnight delivery to a State-certified laboratory under standard Chain-of-Custody documentation. Each boring will be backfilled with hydrated bentonite chips or a cement-bentonite grout mixture from total depth to ground surface.

6.2.2 Background Soil Sample Analyses

Background soil samples will be analyzed for CAM 17 metals by USEPA Method 6010B/7471A and pH. Soil pH will be measured in the field by collecting a representative sample from the target soil sampling depth, homogenizing the sample (using a mixing bowl or plastic bag), and mixing equal parts of soil with distilled or deionized water in a 1:1 ratio (i.e., 20 grams soil with 20 milliliters DI water). Following mixing of the soil slurry, a portable pH tester (Hanna instrument pH tester or similar) will be used to measure the pH value of the sample collected[6]. Background soil samples for CAM 17 metals analysis will be sent to Eurofins Calscience Environmental Laboratories in Garden Grove, California. Shipping packages containing the samples will be delivered to the laboratory via overnight delivery. Soil samples will be shipped in coolers on ice and will be transferred to the analytical laboratory under proper Chain-of Custody (COC) protocol.

6.2.3 Background Soil Results Memorandum

Following receipt and validation of analytical results, the soil background concentrations will be evaluated and a range of metals concentrations and pH measurements for each soil type on each side of the fault will be prepared. Background results from soil samples collected in August 2017 under the same methodology outlined in this work plan will also

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[6] The proposed field pH measurement methodology is in accordance with EPA Method 9045D employed in a fixed laboratory. The short hold time for pH measurement is not feasible for laboratory analysis.

be included in the background concentration ranges. The range of concentrations will be submitted to the LRWQCB in a memorandum for concurrence and approval prior to implementing the additional site investigation as presented in Section 6.3. The background range of metals and pH will be used as a guideline to determine the locations of contingent step-out borings as discussed in Section 6.3 below.

Background ranges for metals and pH will be determined using the ProUCL statistical analysis software. Since the locations for these samples have been chosen specifically to avoid areas of past waste-water discharge, it is assumed that these locations will be representative only of background concentrations. The full dataset will be divided into four datasets representing east and west of the fault, and majority-sand and majority-silt units.

The first step in the analysis will be to determine if any outliers exist in each dataset. A visual inspection of the data will be used to identify potential outliers using box plots and Q-Q plots. Using the Dixon and Rosner tests, potential outliers will be further examined and qualified if needed.

The second step will be to plot the data from each dataset to show the mean and range of concentrations. It is expected these plots will clearly show the range of background concentrations for each constituent and each dataset. An Upper Confidence Level (UCL) at the 95% confidence limit may be calculated for each dataset using ProUCL if deemed appropriate.

6.3 Site Soil Investigation - Former AP and Appurtenances

To further delineate potential impacts to soil in the vicinity of the Former AP and wastewater conveyance piping, soil samples will be collected from four (4) locations within the footprint of the Former AP and at four (4) adjacent step-out locations (at approximately 15 feet from the Former AP in each direction). It is anticipated that soil samples will be collected at approximately 2 ft bgs and 1 foot above the water table. Additionally, soil samples will be collected along the length of the wastewater collection and conveyance system piping, extending to the Former AP and EP. Samples will be collected from approximately 1 foot below the pipeline at approximately every 500' lateral distance at the joint/connection elbows where the laterals enter the main wastewater line running adjacent to the site buildings and in the vicinity of the arsenic treatment systems located in the Olancha North and South buildings. The proposed soil sampling locations are provided on **Figure 6**[7].

It is anticipated that soil sampling will be performed using direct-push drilling methodology. To facilitate soil sample collection from beneath the Former AP, immediately prior to sampling, the overlying sand cover will be removed to expose the underlying plastic pond liner. Conditions of the existing liner will be documented prior to removal and sampling. If the plastic liner is observed to be in a deteriorated condition or if compromised during removal of the liner, a new pond liner will be installed in accordance with the Pond Liner Plan specifications as discussed with LRWQCB. Prior to sampling activities, the plastic liner on the ground surface at these locations will be carefully removed to allow for direct push drilling access and sampling of the soil beneath the pond liner. Sampling activities from within the Former AP will be planned to be performed during a dry weather period between the liner removal and re-installation.

During sampling activities, lithology will be logged by Geosyntec personnel working under the direction of a State of California Professional Geologist. Following soil sample collection, samples will be placed on ice in a cooler and transported for overnight delivery to a State-certified laboratory under standard Chain-of-Custody documentation. Site investigation soil samples will be analyzed as agreed upon between the LRWQCB, CGR, and Geosyntec in the September 29, 2017 meeting, as further discussed in section 6.3.1.

Following sampling, the borings will be backfilled with hydrated bentonite chips or a cement-bentonite grout mixture from total depth to ground surface. Results of the soil sampling will be presented in a Phase 4 Site Investigation Report as discussed in Section 7.0 of this Work Plan.

6.3.1 Site Soil Investigation Analyses

Site soil investigation samples will be analyzed for CAM 17 metals by USEPA Method 6010B/7471A and field tested for pH as described in section 6.2.2. In additional to metals and pH analysis, samples collected beneath the Former AP and the two samples collected adjacent to the filtration rooms at the northern and southern buildings will be analyzed for VOCs by EPA Method 8260B. All soil samples will be sent to Eurofins Calscience Environmental Laboratories in Garden Grove, California for analysis. Shipping packages containing the samples will be delivered to the laboratory via overnight delivery. Soil

[7] Sample locations may be subject to slight change based on accessibility.

samples will be shipped in coolers on ice and will be transferred to the analytical laboratory under proper COC protocol.

6.3.2 Investigative Derived Waste

Soil cuttings from the soil investigation activities will be placed into Department of Transportation (DOT) approved 55-gallon steel drums and clearly labeled. Decontamination water will also be placed in separate DOT approved 55-gallon steel drums and labeled appropriately. A composite soil sample and composite waste water sample will be collected from the drums and analyzed for a waste profile as required by the selected licensed waste disposal facility.

6.4 Background Groundwater Evaluation

As requested in the Order, an evaluation of the site-specific background groundwater concentrations will be performed using existing site groundwater data collected during ongoing quarterly groundwater monitoring at the site.

Mann-Kendall (MK) trend analysis for dissolved arsenic, as presented in the Second Quarter 2017 Groundwater Monitoring Report (Geosyntec, 2017b), indicates that wells located up, cross-, and downgradient of the Former AP demonstrate stable to decreasing concentration trends. Based on the MK results, background groundwater data will be evaluated from monitoring wells MW-01, MW-02, MW-03, MW-06, MW-08, MW-09, MW-14, and MW-15 (**Figure 3**). The groundwater monitoring data from these wells will be used to estimate the statistically significant background groundwater concentrations of constituents that have exceeded their respective MCLs, including; metals (total and dissolved), total dissolved solids (TDS), chloride, and sulfate.

Background ranges for constituents that have exceeded their MCLs (arsenic, antimony, lead, chromium, TDS, chloride, and sulfate) will be determined using the ProUCL statistical analysis software. It is assumed that these locations will be representative only of background concentrations, as detailed above. Historical groundwater concentrations extending back to the first sampling event in July 2015 will be included in the statistical evaluation for background ranges.

The first step in the analysis will be to determine if any outliers exist in the dataset. A visual inspection of the data for each analyte will be used to identify potential outliers using box plots and QQ plots. Using the Dixon and Rosner tests, potential outliers will be further examined and qualified if needed.

The second step will be to plot the data from each dataset to show the mean and range of concentrations. It is expected these plots will clearly show the range of background concentrations for each constituent and each dataset. In addition to the plots, an Upper Confidence Level (UCL) at the 95% confidence limit may be calculated for each analyte using ProUCL.

Once site specific background concentrations have been estimated, they will be further compared to regional and general area groundwater data (e.g. Cabin Bar Ranch) to evaluate context. That assessment will be included in a separately prepared risk assessment report.

6.5 Site Groundwater Monitoring Frequency

Quarterly groundwater sampling has been ongoing at the site since the third quarter 2015. Based on discussions with LRWQCB during the September 29, 2017 meeting, quarterly monitoring will continue through the first quarter 2018. The need for future monitoring will be assessed following collection and consideration of such data.

7.0 REPORTING

As indicated above, the range of background concentrations will be submitted to the LRWQCB in a memorandum for concurrence and approval prior to implementing the site investigation activities at the Former AP and associated appurtenances.

A separate Phase 4 Site Investigation Report will be prepared and submitted to the LRWQCB following the site investigation activities. The report will contain the following:

- A summary of the background soil and groundwater concentration ranges;
- Updated isoconcentration maps and cross sections; and
- A detailed discussion and assessment of the vertical and lateral extent of COCs to site soils and groundwater including appropriate comparison to estimated background ranges.

The site soil and groundwater data along with regional and general area groundwater data will be used to evaluate the human and ecological risk receptors in a site risk assessment report. The risk assessment will be submitted to LRWQCB as a separate report, and subsequently, a recommendations report will be prepared, if warranted.

8.0 SCHEDULE

Following LRWQCB approval of the Work Plan, Geosyntec is prepared to proceed with the investigation described herein. It is anticipated that field work will require approximately two days to complete the background soil scope of work. The background soil letter report will be submitted approximately three weeks following receipt of analytical results. Following concurrence from the LRWQCB on the ranges of background soil concentrations, the soil investigation associated with the Former AP/appurtenances scope of work will commence with an anticipated three days to complete. A Phase 4 Site Investigation Report will be prepared within thirty days of receipt of analytical results.

9.0 REFERENCES

CGR, 2014, Facility Waste Generation and Discharges Report, October 16, 2014.

Department of Water Resources (DWR) 2003, California's Groundwater, Bulletin 118.

Geosyntec 2014, Site Investigation Work Plan, Olancha Spring Water Bottling Facility, 1210 South U.S. Highway 395, Olancha, California, October 17, 2014.

Geosyntec 2015a, Phase 1 Site Groundwater Investigation Report, Olancha Spring Water Bottling Facility, 1210 South U.S. Highway 395, Olancha, California, February 16, 2015.

Geosyntec 2015b, Site Investigation Work Plan Addendum, Olancha Spring Water Bottling Facility, 1210 South U.S. Highway 395, Olancha, California, May 29, 2015.

Geosyntec 2015c, Phase 2 Site Groundwater Investigation Report, Olancha Spring Water Bottling Facility, Olancha, California. August 14, 2015.

Geosyntec 2016a, First Quarter 2016 Groundwater Report, Olancha Spring Water Bottling Facility, Olancha, California. April 28, 2016.

Geosyntec 2016b, Technical Memorandum – Arsenic Distribution and Background Analysis at the CGR Facility in Olancha, California. October 26, 2016.

Geosyntec 2017a, Revised Phase 3 Site Groundwater Investigation Report, Olancha Spring Water Bottling Facility, Olancha, California. February 28, 2017.

Geosyntec 2017b, Second Quarter 2017 Groundwater and Soil Vapor Monitoring Report, Crystal Geyser Roxane Spring Water Bottling Facility, Olancha, California. July 25, 2017.

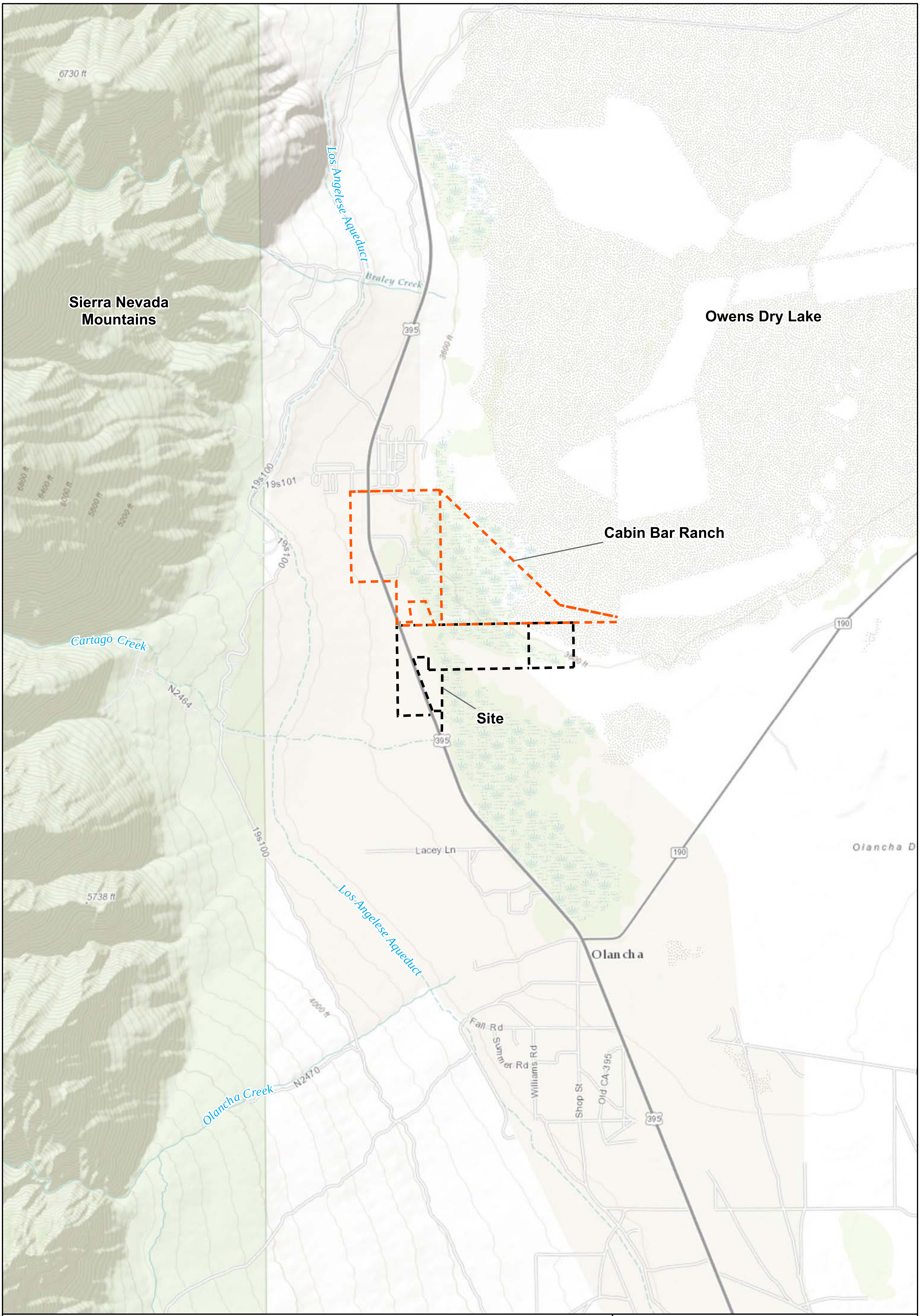
Great Basin Unified Air Pollution Control District (GBUAPCD), 2009, Owens Lake Shallow Hydrology Monitoring Data and Chemistry 1992-2004, Bishop California. February.

Levy, D.B., Schramke, J.A., Esposito, K.J., Erickson, T.A., and Moore, J.C., 1999, The shallow ground water chemistry of arsenic, fluorine, and major elements: Eastern Owens Lake, California, Appl. Geochem. 14 (1999).

Montgomery, James M., 1993, Environmental Impact Report/Environmental Assessment for the Anheuser-Busch Companies Los Angeles Brewery Water Supply Study.

USEPA, 2015, ProUCL Version 5.1 Technical Guide, Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations. October, 2015.

FIGURES



Legend

Cabin Bar Ranch Property Boundary

Site Property Boundary

N

0 0.5 Miles

Site Location Map

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Santa Barbara | October 2017

Figure 1

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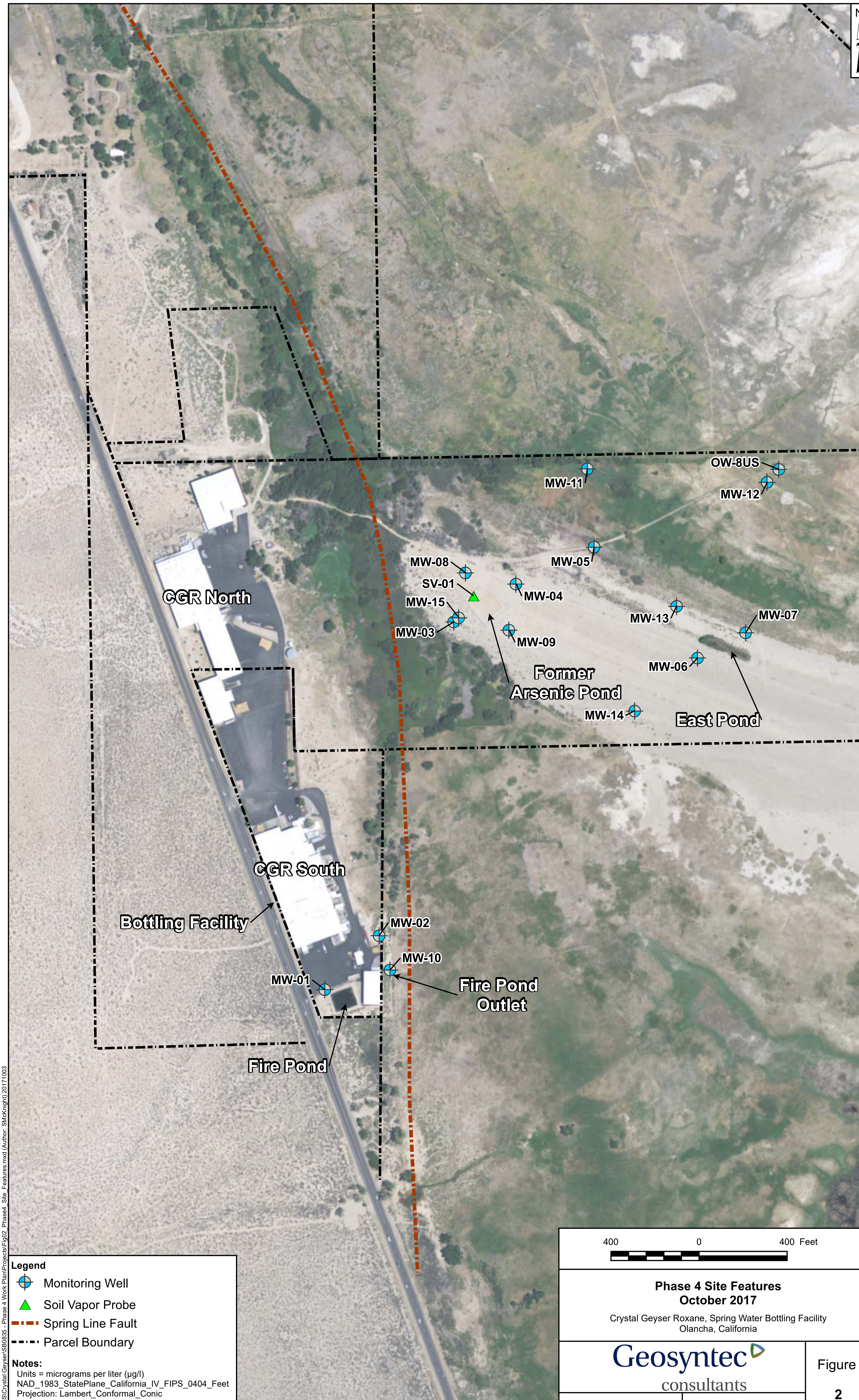

Phase 4 Site Features
October 2017

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Santa Barbara | October 2017

Figure 2

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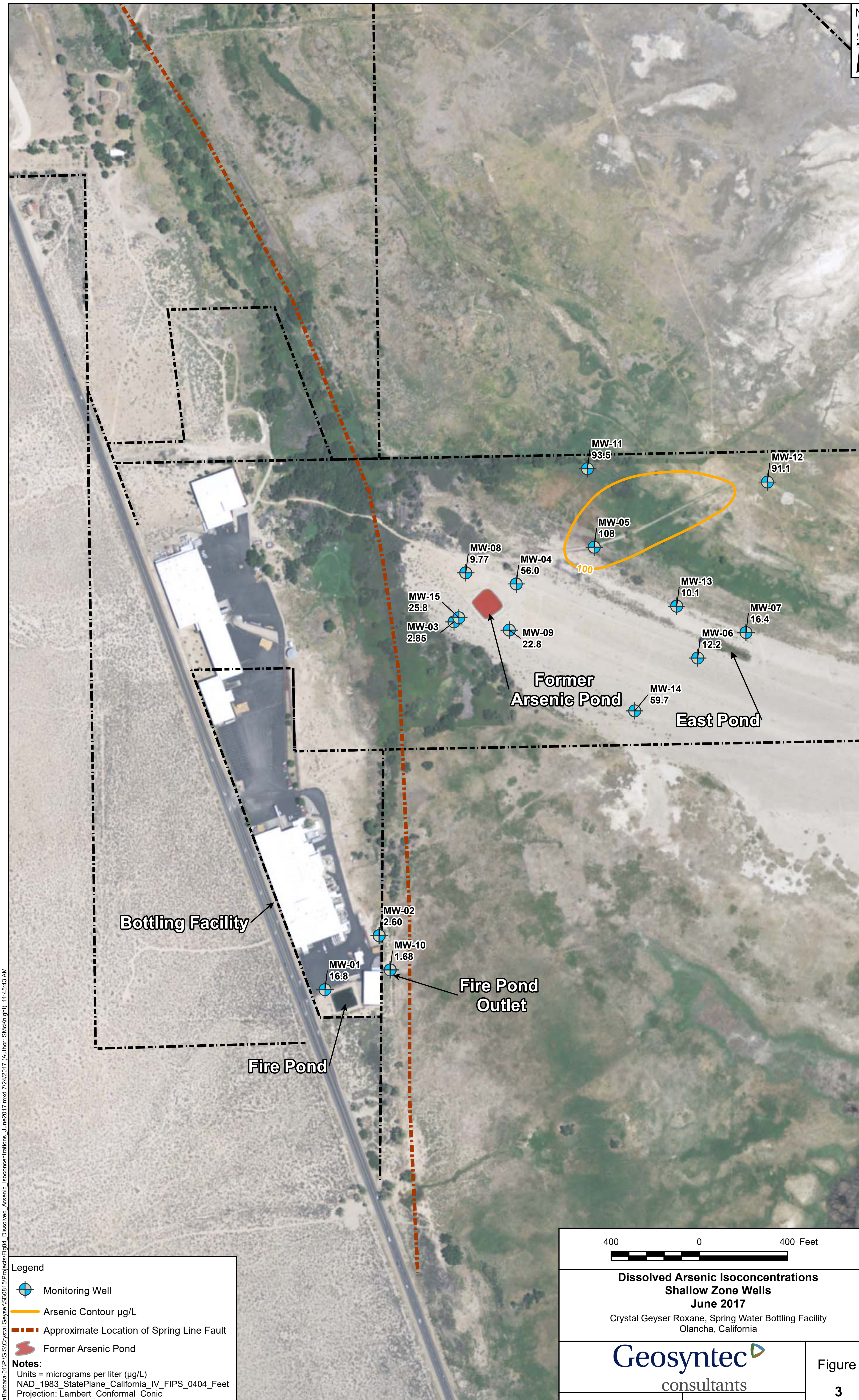

Dissolved Arsenic Isoconcentrations
Shallow Zone Wells
June 2017

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Figure 3

Santa Barbara | July 2017

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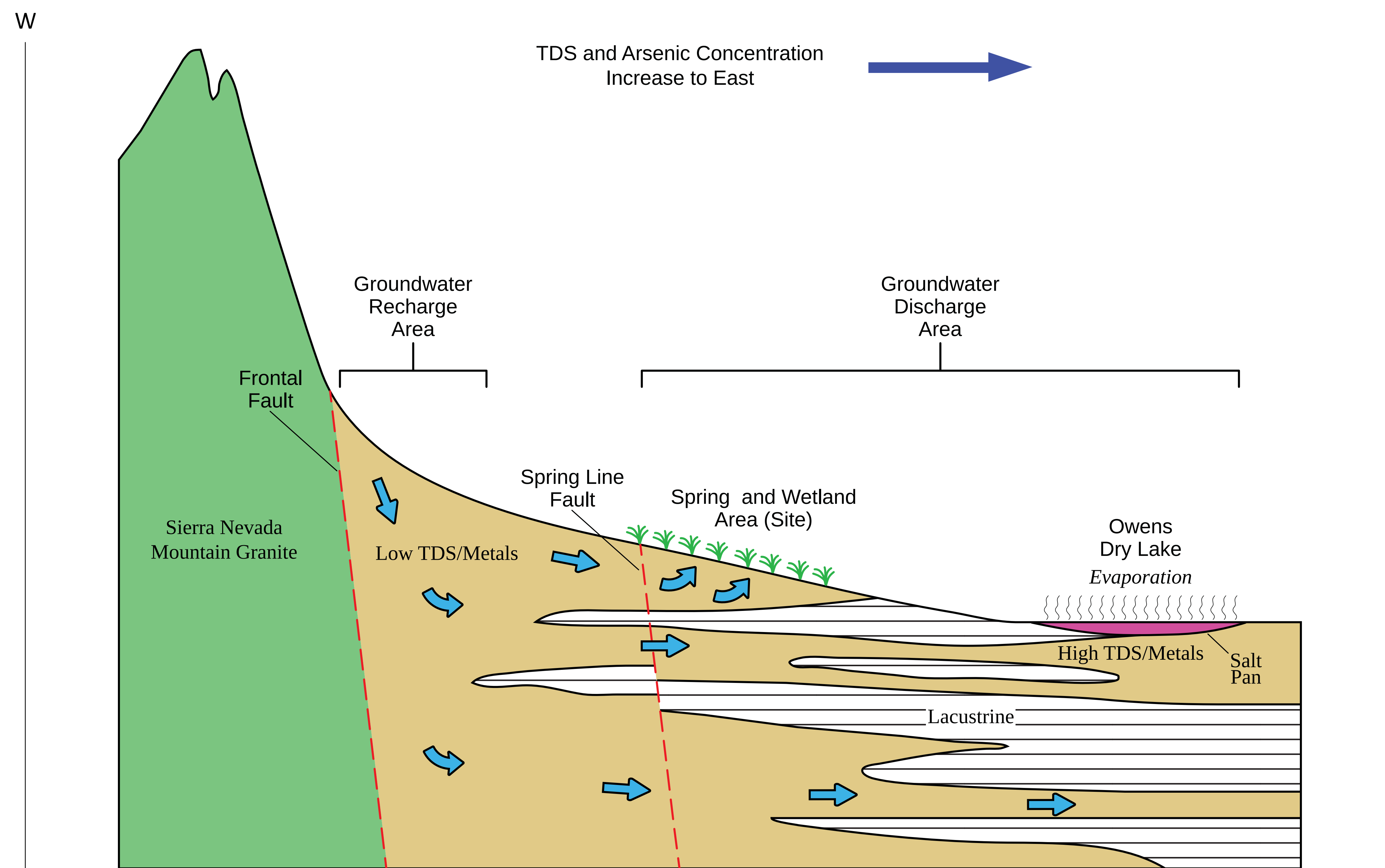


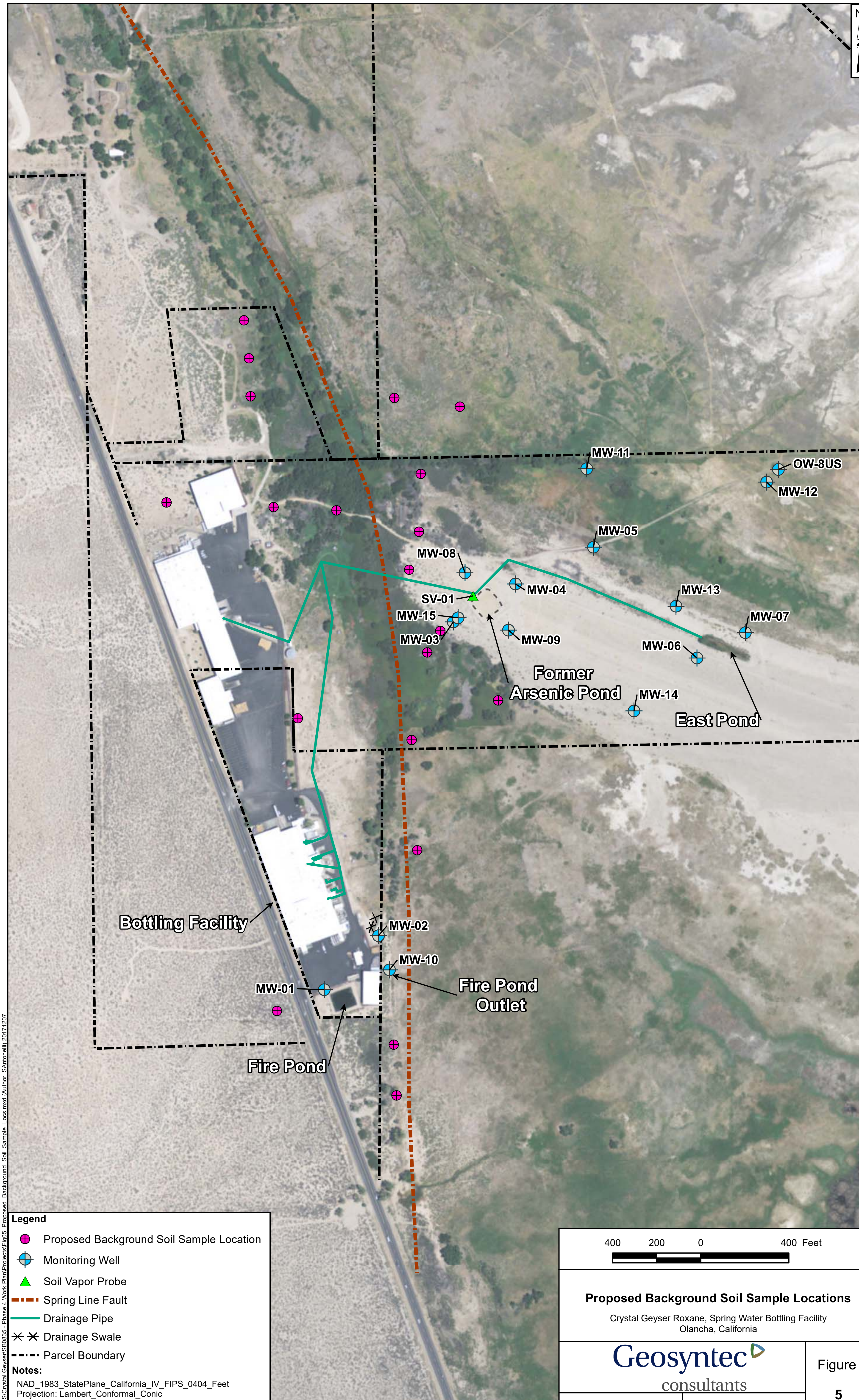
NOT TO SCALE

Hydrogeological Conceptual Model Illustration

Crystal Geyser Roxane, Spring Water Bottling Facility,
Olancha, California

Geosyntec consultants

Santa Barbara	October 2017	**Figure 4**



Legend

- Proposed Background Soil Sample Location
- Monitoring Well
- Soil Vapor Probe
- Spring Line Fault
- Drainage Pipe
- Drainage Swale
- Parcel Boundary

Notes:

NAD_1983_StatePlane_California_IV_FIPS_0404_Feet
Projection: Lambert_Conformal_Conic
GCS_North_American_1983

Proposed Background Soil Sample Locations

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Figure 5

Santa Barbara | December 2017

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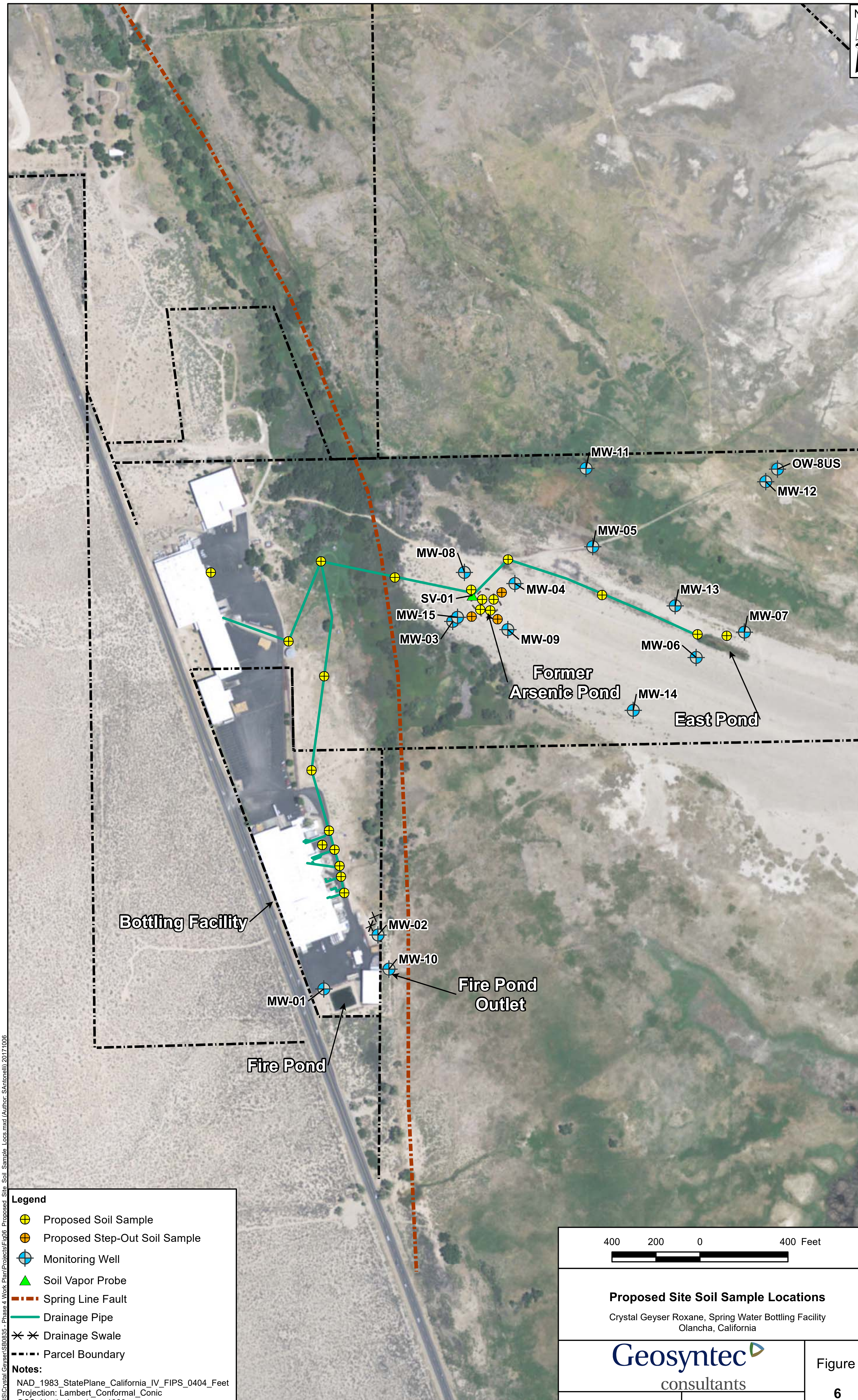

Proposed Site Soil Sample Locations

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Figure 6

Santa Barbara | October 2017

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APPENDIX A

GROUNDWATER MODFLOW MODELING

Geosyntec consultants

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APPENDIX A

Groundwater MODFLOW Modeling

Date: February 28, 2017

Subject: Groundwater MODFLOW Modeling
Crystal Geyser Roxane, Spring Water Bottling Facility,
Olancha, California

1. INTRODUCTION

Geosyntec Consultants, Inc., (Geosyntec) has prepared this memorandum describing the results of groundwater flow modeling for Crystal Geyser Roxane, Spring Water Bottling Facility, Olancha, California (site).

Numerical modeling was used to estimate the groundwater flow and particle tracking under current and future groundwater pumping conditions at site discharge ponds and to estimate historical mounding along with groundwater flow at the Former Arsenic Pond (AP) and the East Pond (EP). The numerical model used to perform this assessment was updated from an existing model developed by Geosyntec (Geosyntec, 2014 and 2016) in connection with the Cabin Bar Ranch bottling facility project. The updated model is described in this appendix.

1.1 Purpose

The purposes of this memorandum are to: 1) describe the numerical modeling approach used to assess the groundwater flow and potential mounding, and 2) present the model simulation results including particle tracking from the site discharge ponds under historical and future conditions.

2. MODEL CONSTRUCTION AND CALIBRATION

2.1 Conceptual Model and Overview

Groundwater beneath the site is mostly derived from precipitation (rainfall) and snowmelt that runs off the Sierra Nevada Mountains to the west and infiltrates into the alluvial fan near the mountain base or enters the alluvial aquifer through fractures in the bedrock. Groundwater in the alluvium flows eastward, away from the Sierra Nevada Mountains and towards the central portion of the Owens Valley basin. In the site vicinity, the alluvium layer is divided into two permeable layers, separated by a fine-grained lacustrine layer that occurs at a depth of approximately 80 feet below ground surface (bgs). The upper aquifer material is referred to as the Shallow Zone, and consists predominately of sand and gravel interspersed with fine-grained layers. The 80-foot deep fine-grained layer is an aquitard that separates the Shallow Zone from deeper sandy and gravely alluvium. This fine-grained layer pinches out towards the west. The Deep Zone in the site vicinity is found at depths of greater than 80-feet bgs, and generally consists of coarse sands and gravel layers. In the site vicinity, the Shallow Zone is an unconfined aquifer and the Deep Zone is a confined aquifer. A site-wide upward groundwater gradient exists based on comparison of water levels in co-located observation wells completed in the Deep and Shallow Zones. Groundwater flow direction in the upper shallow zone is generally in the northeast direction towards the Owens Dry Lake with a gradient of approximately 0.01 feet/foot.

The depth to the shallow groundwater table beneath the site gradually decreases towards the east. In the south-central portion of the site, shallow groundwater intersects the ground surface along an approximate line where springs and seeps are observed. These springs and seeps occur along a fault called the Spring-line fault. This fault appears to act as a barrier to groundwater flow in the Shallow Zone, resulting in a rise of the groundwater table, and the observed springs and meadowlands in the central and eastern portions of the site.

2.2 Numerical Model Domain, Grid, and Layers

The three-dimensional model for groundwater flow was developed using MODFLOW, an industry standard finite-difference code. Groundwater flow in the model is assumed to be steady-state.

The model domain is illustrated on Figure A-1. The model domain extends from the foothills of the Sierra Nevada Mountains on the west to the Owens Dry Lake bed on the east. In the north-south direction, the model extends to include the town of Cartago in the north and the Crystal Geyser-Roxanne facility in the south. The trapezoidal model domain is 11,900 feet (ft) wide in the north-south direction, 7,200 ft wide in the east-west direction at the north boundary, and 11,800 ft wide in the east-west direction at the south boundary.

The model domain simulates groundwater flow in the Shallow and Deep zones and includes simulation of pumping in active groundwater supply wells at the site, to the south of the Cabin Bar Ranch, and in the town of Cartago, to the north of the Cabin Bar Ranch. The three geological layers at the site, Shallow zone, clay/silt layer and deeper sandy and gravely alluvium, were simulated with three model layers. The top of the model domain was interpolated from a Digital Elevation

Model obtained from the USGS National Map Viewer (USGS, 2012)[1]. The top of the middle layer was defined based on well logs and previous hydrogeological investigations (Geosyntec, 2011) and was calculated as the minimum of either 3,550 ft mean sea level (ft msl) or the top of the domain minus 75 ft. The thickness of the middle layer was 10 ft across the model domain. The bottom of the model domain was fixed at 3,300 ft msl. This corresponds to a total average model thickness of 325 ft in the vicinity of the site. The sequence of alluvium and lacustrine deposits beneath the site is at least 750 feet thick (Geosyntec, 2011). The model domain focuses on the upper portion of the deposits, as it was developed to assess the impacts of pumping in the shallow zone and in the upper deep zone. A cross-section of the model domain is shown on Figure A-2.

2.3 Groundwater Flow Model

2.3.1 Observation data – Head

Groundwater head measurements from the September 2016 quarterly groundwater monitoring event were used for model calibration. The well locations and observed water levels are shown on Figure A-3 and in Table A-1, respectively.

The interpolated water level contour map in the vicinity of the AP, based on September 2016 monitoring event data, was also used qualitatively for calibration.

2.3.2 Observation data – Spring Flows

Flow rates at selected spring flows were measured in 2010 as part of the hydrogeological investigations (Geosyntec, 2011). Spring discharge generally flows eastward into the main collection ditch and the total flow at the ditch was estimated at roughly 350 gallons per minute (gpm) (Geosyntec, 2011). This total spring flow rate was used to calibrate the model.

2.3.3 Model Boundaries and Stresses

Groundwater flow in the model domain is from west to east, consistent with measured northeasterly flow in the AP area. A no-flow boundary was applied at the northern and southern sides of the model. A constant head boundary is applied to the east and west sides of the model. Constant head boundaries were based on the extrapolation of a surface created from water levels measured in various wells and piezometers in September 2016. The constant head boundaries resulted in a horizontal regional gradient of approximately 0.01 ft/ft.

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[1] The upper model layer is simulated as an unconfined aquifer such that the layer is not fully saturated.

The model simulated a maximum evapotranspiration (ET) rate of 0.01 feet per day from the surface which equates to 3.65 feet per year (ft/yr). This ET rate is consistent with an ET rate of 3.2 ft/year estimated by Duell (1988) for meadows in the Owens Valley and is within the range of previously published ET rates for the Owens Valley as presented in JMM (1993) for the site. The ET rates reported by JMM range from 2.6 ft/year (empirical method where groundwater is less than 8 ft bgs) published by Williams (1969) to 4.4 ft/year (open water or mudflats) published by Danskin (1988) (as cited by JMM., 1993). The ET extinction depth was setup to 10 ft bgs.

The springs along the Spring-line fault were simulated with the drain package and the bottom elevation of the drains was defined 2 feet below ground elevation. Springs were defined at locations ES-1A, ES-3, ES-3A, and CBS-1 to CBS-9. The spring locations are shown on Figure A-4.

The Spring-line fault was simulated as a horizontal flow barrier, in both the shallow and deep sand zones. The modeled and observed spring flow was used to calibrate the hydraulic characteristics of the barrier (hydraulic conductivity divided by fault thickness). Further discussion of groundwater flow calibration results is presented in Section 2.4.

There are several private active pumping wells in the model domain, located in the Cartago area. Average pumping rates of 650 gallons per day (gpd) were used in the model, unless reported otherwise by the owner. There is also one municipal water supply well in Cartago (CMW-2), which provides water to 43 residences. The average pumping rate at this well was estimated based on an estimate rate of 650 gpd per residence (27,950 gpd at the well). The production wells from the CGR Olancha facility and proposed production wells at the Cabin Bar Ranch property are also included in the model. The location of all pumping wells in the model are shown on Figure A-4. The model inputs of each pumping well (pumping rates, pumping zone) are summarized in Table A-2.

The EP and Fire Pond (FP) (see Figure A-4) are simulated with discharge rates of 40 and 2 gpm, respectively (CGR, 2014).

2.3.4 Material Properties

The deep zone was modeled with uniform hydraulic parameters (i.e., horizontal and vertical hydraulic conductivity). The Shallow Zone was modeled with three zones for hydraulic conductivities, shown on Figure A-4. Pumping tests performed in 2010 in wells CGR-8, CGR-9 and CGR-10 resulted in estimates of average hydraulic conductivity of the Shallow Zone between 230 to 550 ft/day (Geosyntec, 2011). These values were used to calibrate groundwater flow simulation. Further discussion of groundwater flow calibration results is presented in Section 2.4. Parameters used in the model are summarized in Table A-3.

The aquitard-like properties of the clay/silt layer are represented in the model to extend from the eastern domain boundary westward to the western edge of the valley floor/HWY-395 area. The remainder of the middle layer to the west was assigned the same properties as the deep sand layer, simulating a westward pinching out of the aquitard. The aquitard extent is based on well logs, which shows that the clay/silt layer is present at wells PAL-1 and CMW-2 but not at wells PAT-1 and HAR-1.

2.4 Model Calibration

The flow model was calibrated to fit the observed head at the monitoring wells (Figure A-3), and the total spring flow rate (see Section 2.3.2).

The model parameters are summarized in Table A-3. These parameters are further discussed below.

2.4.1 Groundwater Flow Model Parameters

Significant groundwater flow model parameters are as follows:

- o The calibrated hydraulic conductivity values for the Shallow Zone are 315 ft/day west of the fault, 400 ft/day northeast of the fault and 250 ft/day southeast of the fault (Figure A-4), which are consistent with the range estimated from pumping tests (230 to 550 ft/day, Geosyntec, 2011). Hydraulic conductivity values southeast of the fault are estimated based on coarse-grained units encountered during drilling activities. Hydraulic conductivity values northeast of the fault is based on calibration.

- o A sensitivity analysis was performed to assess the impact of lower hydraulic conductivity values east of the fault on particle tracking and mounding in the vicinity of the AP and EP (see Section 3.1).

- The calibrated evaporation rate is 3.65 feet per year.

- Figure A-5 presents a plot of observed versus simulated heads, illustrating a good model fit to the observed heads. The root mean squared residual is 3.4 feet, approximately 9.9% of the observed head difference at the site (34.1 feet).

- The simulated total spring flow (which is assumed to include water flowing to the main collector ditch) is 310 gpm. This value is consistent with observed discharge (roughly 350 gpm) from the main collection ditch (see section 2.3.2).

- The calibrated head contours are illustrated on Figure A-6.

3. GROUNDWATER FLOW AND PARTICLE TRACKING SIMULATIONS

The calibrated model was used to assess groundwater flow at the discharge ponds at the site under historical and future proposed pumping conditions. The historical scenario simulation includes the pumping of wells CGR-2, CGR-3, CGR-4, and CGR-7 only. The future scenario simulation includes additional pumping at the Cabin Bar Ranch facility (CGR-8, CGR-9, and CGR-10).

3.1 Historical Groundwater Flow Simulation at Discharge Ponds

The calibrated model was used to assess groundwater flow and potential groundwater mounding from the AP and the EP under historical wastewater discharge conditions[2]. This assessment assumes that the discharge ponds are un-lined and discharged waste water infiltrated directly to groundwater.

Two scenarios were simulated for infiltration at the AP and EP based on historical information:

1. Typical wastewater discharge flow rates of 1,700 and 56,000 gpd to the AP and EP, respectively; and
2. Maximum flow rates of 4,000 and 60,000 gpd at AP and EP, respectively[3].

Figure A-7 shows the simulated water level in the vicinity of the EP and AP and forward particle tracking illustrating the groundwater flow from the ponds for the two scenarios (typical and maximum flow rates).

The model results illustrate that in both scenarios simulated, the groundwater infiltrating at the AP and EP flow towards the northeast and that the impacts on the water levels in the vicinity of the ponds is minimal (i.e. no mounding is evident).

In order to assess the impact of lower hydraulic conductivity values east of the fault, a sensitivity analysis run was performed, using 100 ft/day as the horizontal hydraulic conductivity east (both northeast and southeast) of the fault. The vertical hydraulic conductivity value east of the fault was also reduced to 1 ft/day. Figure A-8 shows the simulated water level in the vicinity of the EP and AP and forward particle tracking illustrating the groundwater flow from the ponds for this

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[2] Hydraulic conductivity values used in this scenario assumed no vertical migration below the upper-most encountered fine-grained layer in the soil beneath the AP and the EP.
[3] Historical typical and maximum flow rates were obtained via Crystal Geyser communication based on internal documentation.

sensitivity scenario, using the maximum flow rates. Similar to the results shown on Figure A-7, the groundwater infiltrating at the AP and EP flow towards the northeast and the impacts on the water levels in the vicinity of the ponds is minimal (i.e. no mounding is evident). This sensitivity analysis run represents a worst-case scenario in that it assumes that there was no liner in the AP such that all waste water discharged to the AP was infiltrated directly to groundwater. Additionally, the lower hydraulic conductivity values do not appear to be representative of the aquifer, as the calibration (comparison of simulated and observed water levels and comparison of simulated and observed spring flow) decreases with decreasing hydraulic conductivity.

3.2 Future Groundwater Flow Simulation at Discharge Ponds

Four additional pumping wells, CGR-8, CGR-9, CGR-10, and CBR-1 (see Figure A-4), were added to the model to simulate groundwater flow under future conditions. CGR-8, CGR-9, and CGR-10 were set at a constant rate of 67 gpm and CBR-1, used as a domestic well, was set to 0.3 gpm. The scenario includes pumping in site production wells CGR-2, CGR-3, CGR-4, and CGR-7, and active domestic wells in the town of Cartago including the Cartago Mutual Water Well (Table A-2). Pumping rates in these off-site wells were based on either reported rates by the owner or estimated rates based on typical average residential use (650 gallons per day).

In addition to the AP and EP, the future scenario simulation includes particle tracking from the Fire Pond (FP) and a proposed wastewater infiltration pond at the Cabin Bar Ranch property north of the site (Figure A-4). The wastewater infiltration pond was modeled with an anticipated flow rate of 23,000 gpd. Under future conditions the EP and FP are simulated as infiltration ponds, however, no discharge and therefore no infiltration is assumed at the AP.

Figure A-8 shows the simulated capture zones at the pumping wells and forward particle tracking illustrating the groundwater flow path from the discharge ponds.

The model results illustrate that the groundwater at the ponds flow towards the northeast ultimately discharging in Owens Dry Lake and that this groundwater is not captured by any of the pumping wells.

4. CONCLUSIONS

In conclusion, results of the groundwater modeling indicate the following:

1. Under historical typical and maximum discharge flow rates, impacts to water levels in the vicinity of the AP and EP is minimal with no groundwater mounding evident;
2. Using maximum historical discharge flow rates and lower range hydraulic conductivity values, groundwater mounding at the AP and EP is not evident;

3. Groundwater at the site ponds is shown to flow towards the northeast toward Owens Dry Lake under both historical and future conditions; and
4. Under future pumping conditions, water discharged from the site ponds will not be captured by any of the site pumping wells.

5. REFERENCES

CG Roxane, LLC., 2014. Facility Waste Generation and Discharge Systems Report, 1210 South Highway 395, Olancha, California. October 16.

Duell, L. W., 1988. Estimates of Evapotranspiration in Alkaline Scrub and Meadow Communities of Owens Valley, California, Using the Bown-Ratio, Eddy Correlation and Penman-Combination Methods, U.S.G.S Open-File Report No. 88-92.

Geosyntec, 2011. Test Well Installation and Hydrogeology Report. Cabin Bar Ranch, U.S. Highway 395, Olancha, California. February 7.

Geosyntec, 2014. Groundwater Monitoring, Mitigation, and Reporting Plan. Cabin Bar Ranch, U.S. Highway 395, Olancha, California. June 18.

Geosyntec, 2016. Revised Additional Site Investigation Workplan. Olancha Spring Water Bottling Facility, 1210 South U.S. Highway 395, Olancha, California. July 13.

James M. Montgomery (JMM), 1993. Environmental Impact Report/Environmental Assessment for the Anheuser-Busch Companies Los Angeles Brewery Water Supply Study.

USGS, 2012. The National Map Viewer and Download Platform. http://nationalmap.gov/viewer.html. Accessed December 1, 2012.

Williams, D.E., 1969, Preliminary Geohydrogeologic Study of a Portion the Owens Valley Ground Water Reservoir, Ph.D Thesis, New Mexico Institute of Mining and Technology.

LIST OF TABLES

LIST OF FIGURES

* * * * *

Table A-1 - Measured Water Levels Used for Calibration
Cabin Bar Ranch, Olancha, California

Well Name	Water Level (ft msl)
OW-7U	3610.54
P-5	3616.43
P-10	3617.03
RP-1	3613.08
MW-01	3620.32
MW-02	3618.88
MW-10	3619.39
MW-03	3602.78
MW-04	3602.98
MW-05	3599.12
MW-06	3601.53
MW-07	3601.28
MW-08	3602.96
MW-09	3602.28
MW-11	3593.94
MW-12	3589.82
MW-13	3601.16
MW-15	3613.48
OW-10U	3616.86
SSW-1	3616.70
MW-3	3623.90
OW-7Ma	3618.92
OW-10M	3617.66

Notes:

Water levels measured in September 2016.

ft msl = feet mean sea level

Table A-2 - Input Parameters for Pumping Wells

Cabin Bar Ranch, Olancha, California

Well	Type	Top of Screen (ft bgs)	Bottom of Screen (ft bgs)	Percent Pumping Shallow Zone	Percent Pumping Deep Zone	Pumping Rate (gpm)
Cartago Active Supply Wells						
CMW-2	Active Well	115	150	0	100	19.4
BIL-1	Active Well		98	50	50	0.45
HAN-1	Active Well		86	50	50	0.45
HAR-1	Active Well	100	157	0	100	0.28
HUE-1	Active Well		140	50	50	0.45
LAW-1	Active Well		120	50	50	0.45
MER-1	Active Well		85	50	50	0.45
MER-2	Active Well		105	50	50	0.45
PAL-1	Active Well	100	185	0	100	0.45
PAT-1	Active Well	93.5	153.5	0	100	0.45
RIL-1	Active Well			50	50	0.45
RIL-2	Active Well			50	50	0.45
RIL-3	Active Well			50	50	0.45
SIE-1	Active Well			50	50	0.45
Cartago Non-Active Supply Wells						
ADK-1	Non-Active Well		100			0.0
BIY-1	Non-Active Well		65			0
CMW-1	Standby Well					0
DIE-1	Non-Active Well		90			0
HAT-1	Non-Active Well					0
HUG-1	Non-Active Well		100			0
LUN-1	Non-Active Well		100			0
WAL-1	Non-Active Well		94			0
WAL-2	Non-Active Well		90			0
WIC-1	Non-Active Well		320			0
Crystal Geyser-Roxanne Active Pumping Wells						
CBR-1	Active Well	60	120	50	50	0.3
CBR-4	Active Well		60	100	0	0.45
CGR-2	Active Well	51	65	100	0	130
CGR-3	Active Well	56	72	100	0	9
CGR-4	Active Well	52	67	100	0	9
CGR-7	Active Well	55	70	100	0	37
Crystal Geyser-Roxanne Non-Active Pumping Wells						
CGR-1	Non-Active Well					0
CBR-2	Non-Active Well	62	166			0
CBR-3	Non-Active Well					0
CGR-5	Non-Active Well					0
CGR-6	Non-Active Well					0
PW-1	Non-Active Well	200	650			0
Crystal Geyser-Roxanne Additional Pumping Wells						
CGR-8	Future Well	53	66	100	0	67
CGR-9	Future Well	53	73	100	0	67
CGR-10	Future Well	53	73	100	0	67

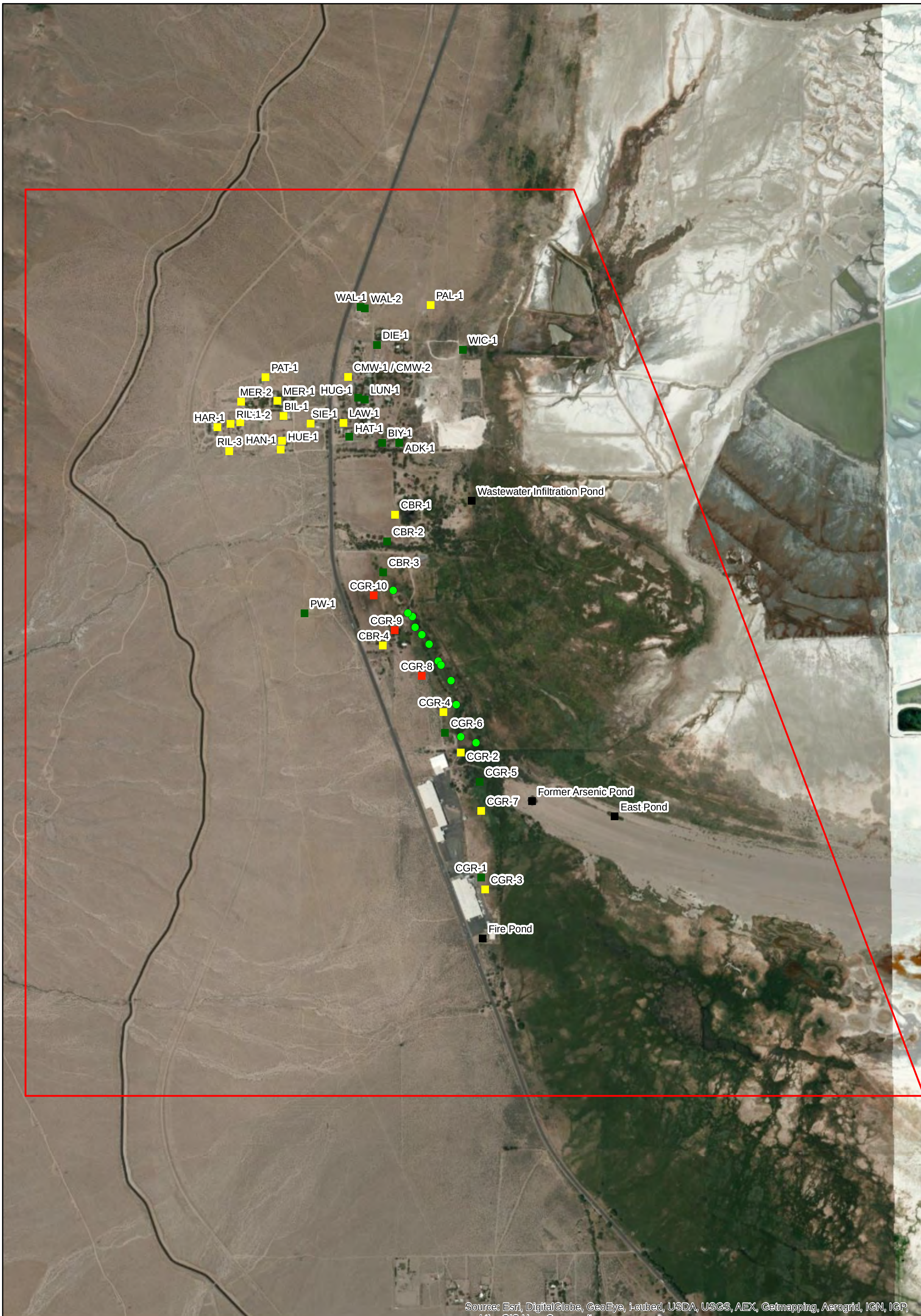
Table A-3 - Model Parameters

Cabin Bar Ranch, Olancha, California

Parameter		Unit	Value
Evaporation	Evaporation Rate	ft/year	3.65
	Extinction Depth	ft	10
Horizontal Hydraulic Conductivity	Shallow Zone (West)	ft/day	315
	Shallow Zone (Northeast)		400
	Shallow Zone (Southeast)		250
	Deep Zone		10
	Clay/Silt Layer		0.2
Vertical Hydraulic Conductivity	Shallow Zone (West)	ft/day	3.15
	Shallow Zone (Northeast)		4
	Shallow Zone (Southeast)		2.5
	Deep Zone		0.1
	Clay/Silt Layer		0.002
Horizontal Flow Barrier Characteristics	Shallow Zone	1/day	0.225
	Middle/Deep Zone		0.001

Notes:

Hydraulic conductivity zones for Shallow Zone are shown in Figure A-4



Legend

- Springs
- Pond
- Active Well
- Non-Active Well
- Additional Pumping Well
- Model Domain

N

0 600 1,200 Feet

Model Domain - Plan View

Cabin Bar Ranch, Olancha, California

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SB0794	February 2017	Figure A-1

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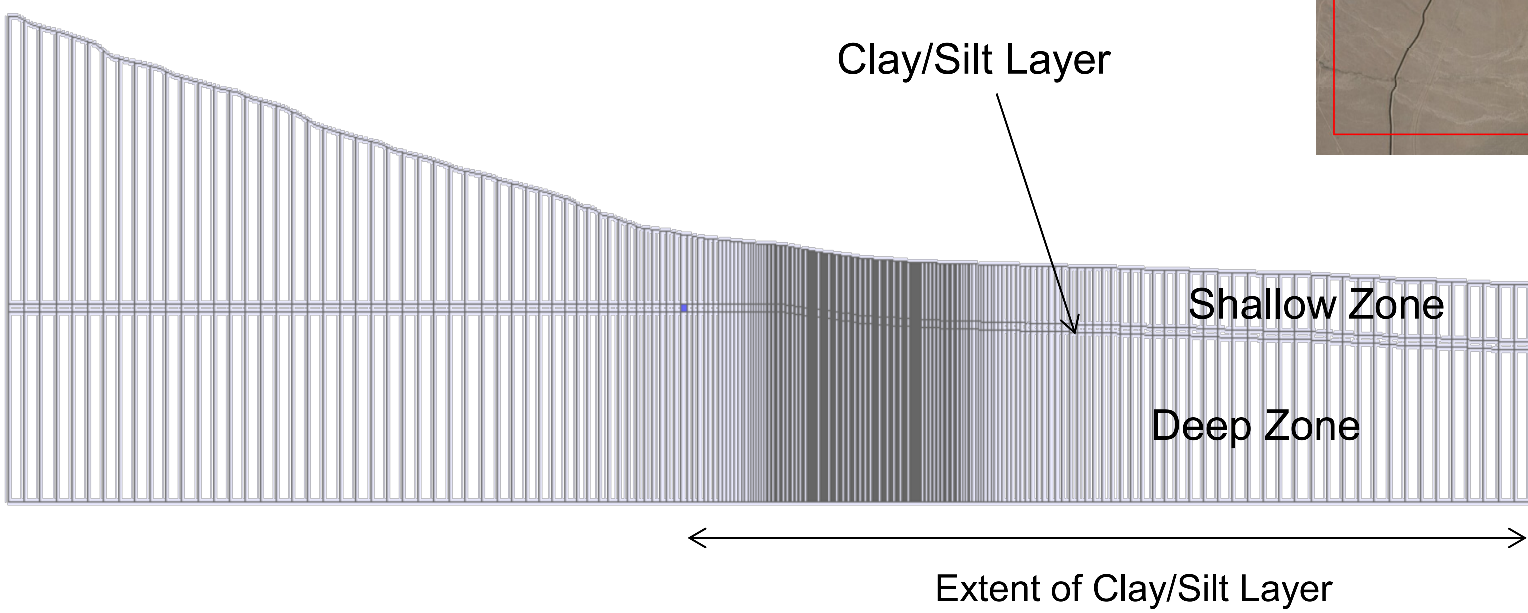

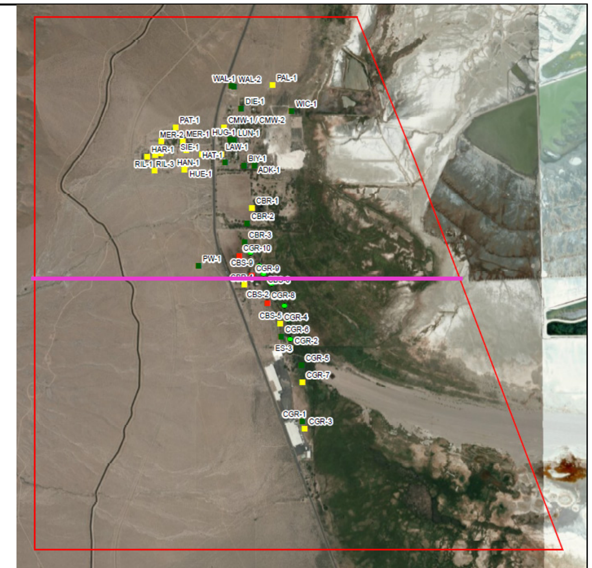

Notes:
Vertical Magnification = 5

200 ft
2,000 ft

Cross-Section
Model Domain

Model Domain – Cross-Section

Cabin Bar Ranch
Olancha, California

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Figure

A-2

Legend

- ■ Pond
- ⊗ Monitoring Well
- Approximate Location of Spring-Line Fault

0 300 600 Feet

N

Monitoring Wells Used for Calibration

Cabin Bar Ranch, Olancha, California

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SB0794	February 2017	Figure A-3

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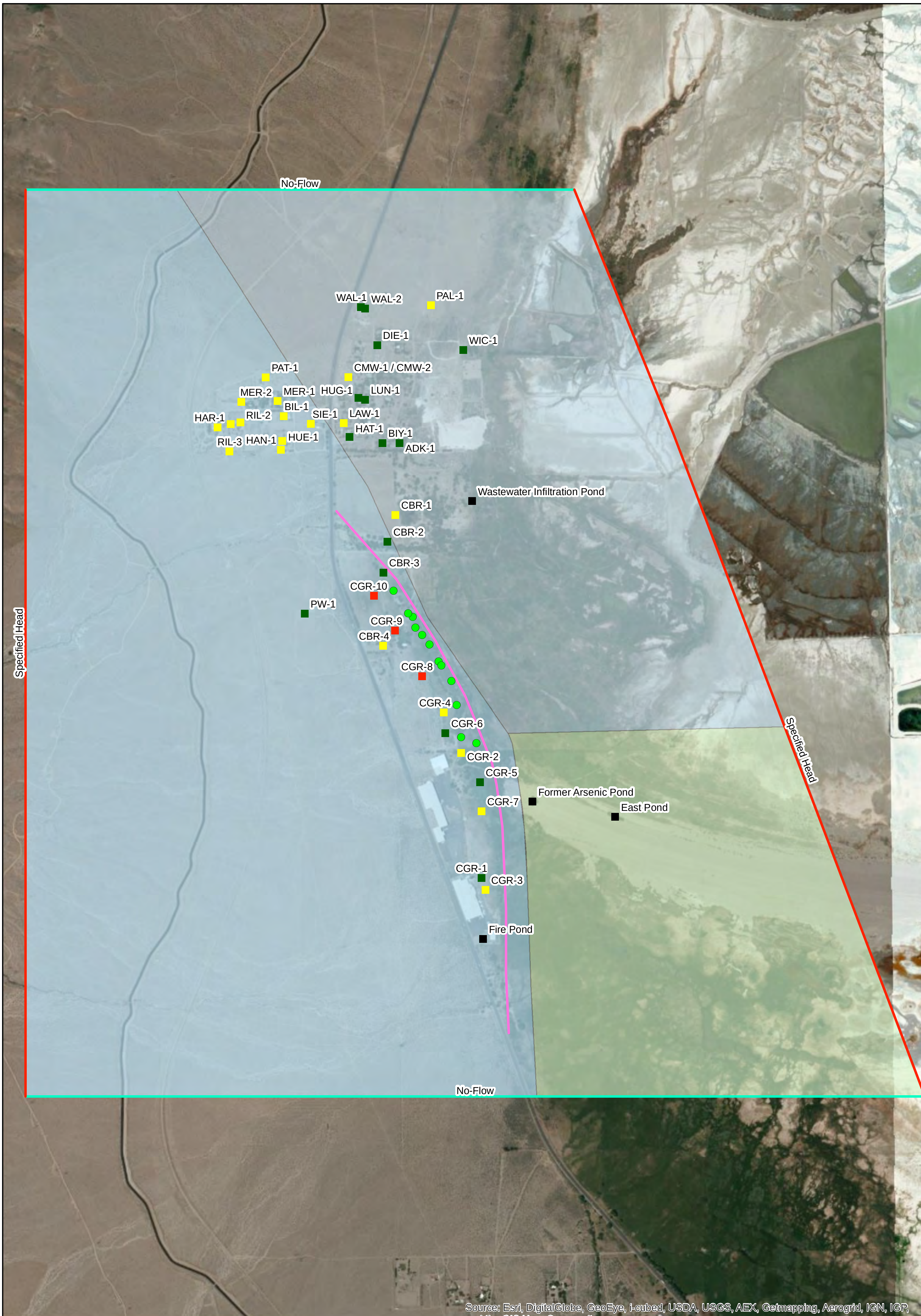

Legend

- Drains (Springs)
- Pond
- Active Well
- Non-Active Well
- Additional Pumping Well
- Spring-line Fault

Hydraulic Conductivity Zone in Shallow Zone

- West of the Fault
- Northeast of the Fault
- Southeast of the Fault

N

0 600 1,200 Feet

Model Boundaries and Stresses

Cabin Bar Ranch, Olancha, California

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Figure **A-4**

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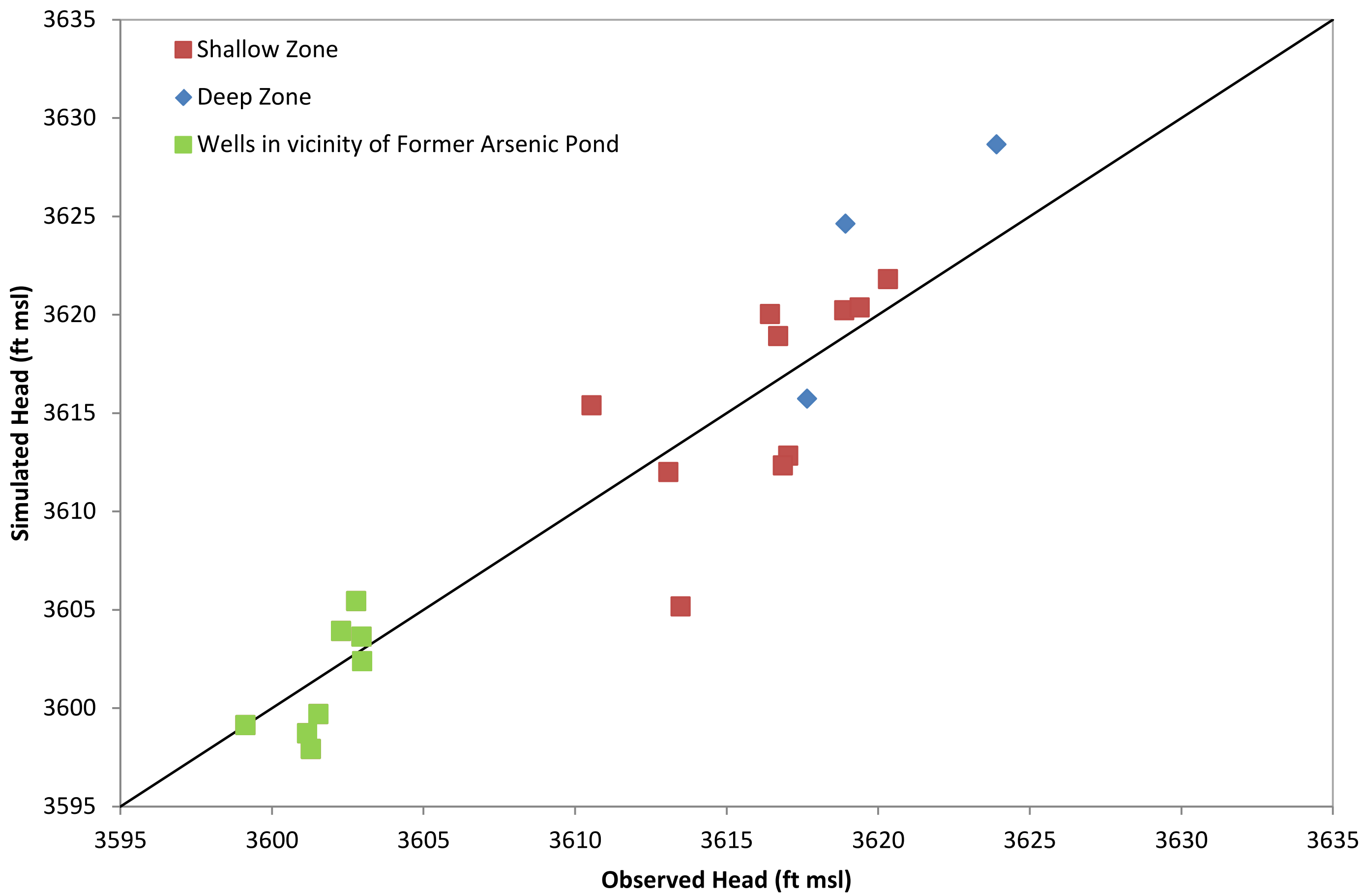

Notes:
ft msl = feet mean sea level

Observed vs. Simulated Heads

Cabin Bar Ranch
Olancha, California

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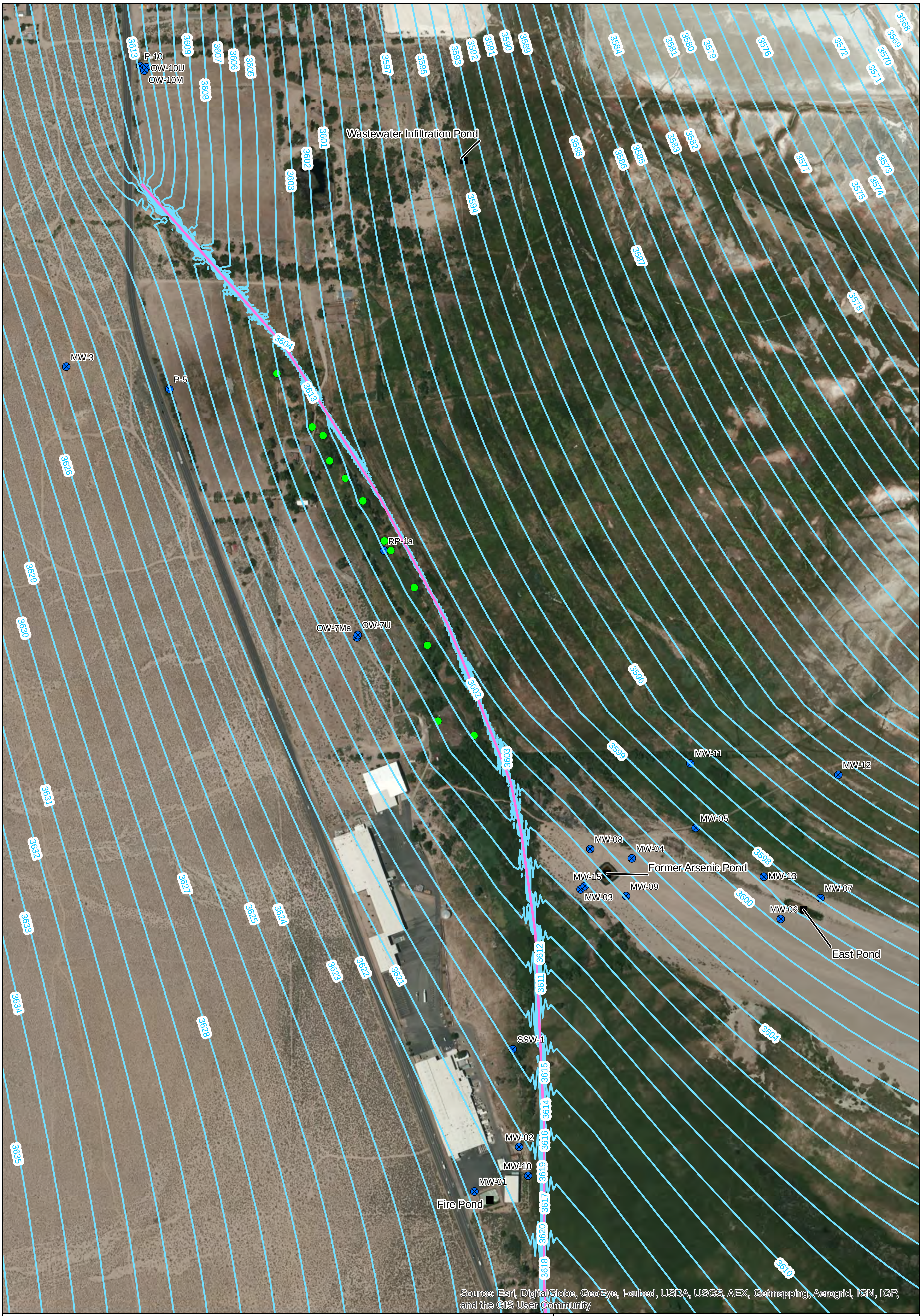
Figure

A-5



Legend

- Approximate Location of Spring-Line Fault
- Calibrated Head Contours (ft msl)
- Drains (Springs)
- Monitoring Well
- Pond

0 300 600 Feet

N

Calibrated Head Contours in Shallow Zone

Cabin Bar Ranch, Olancha, California

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Figure **A-6**

SB0794 | February 2017

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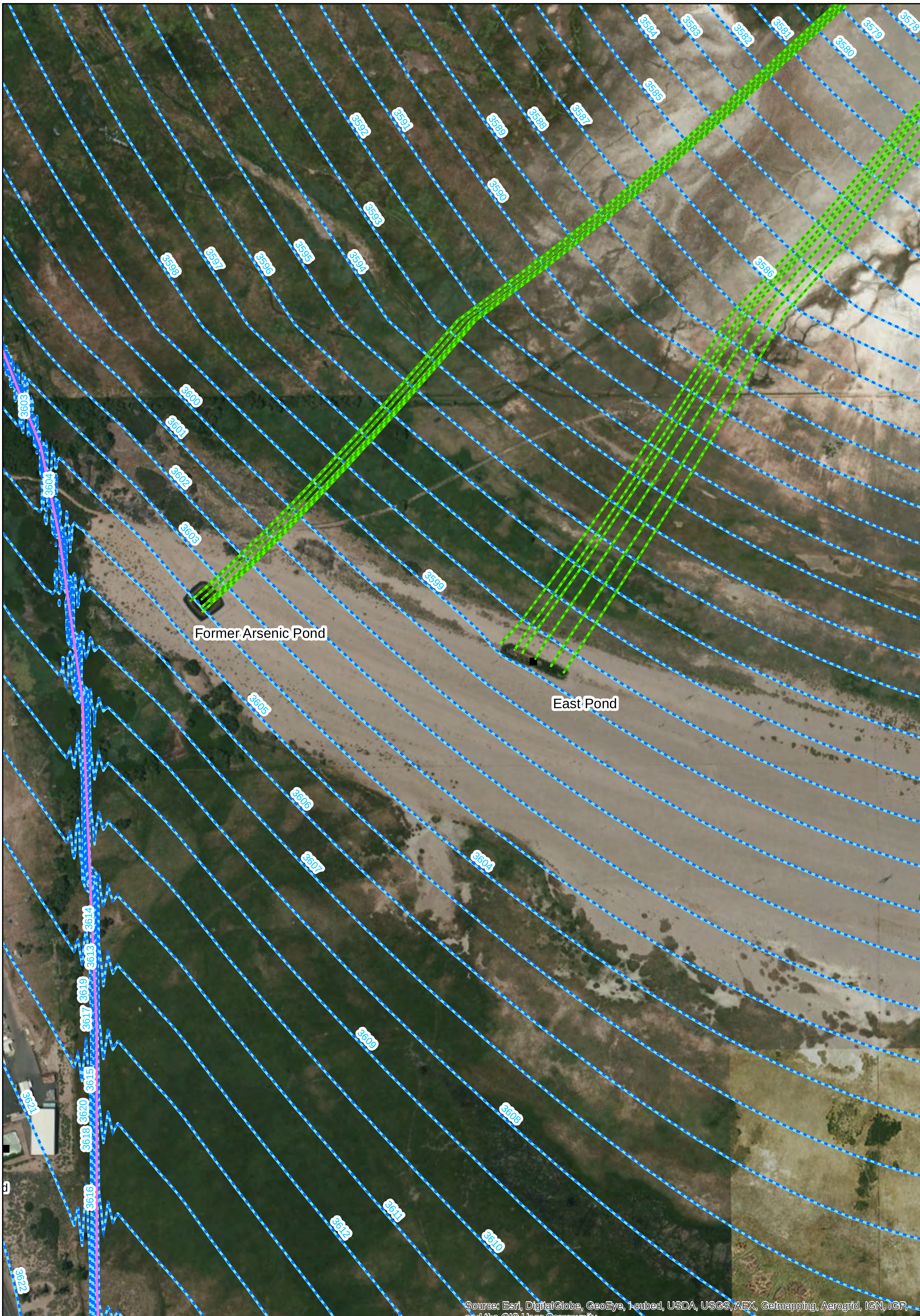

Legend

- ■ Pond
- Approximate Location of Spring-Line Fault
- Water Level (typical flow rates)
- Water Level (maxl flow rates)
- Particle Tracks (typical flow rates)
- Particle Tracks (max flow rates)

0 150 300 Feet

N

Notes: Water level contour labels in feet mean sea level

Simulated Water Level and Particle Tracking under Historical Conditions

Cabin Bar Ranch, Olancha, California

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Legend

- ■ Pond
- Approximate Location of Spring-Line Fault
- Particle Tracks (max flow rates)
- Water Level (max flow rates)

0 150 300 Feet

N

Notes: Water level contour labels in feet mean sea level

Simulated Water Level and Particle Tracking under Historical Conditions using Lower Conductivity Values

Cabin Bar Ranch, Olancha, California

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SB0794	February 2017	Figure **A-8**

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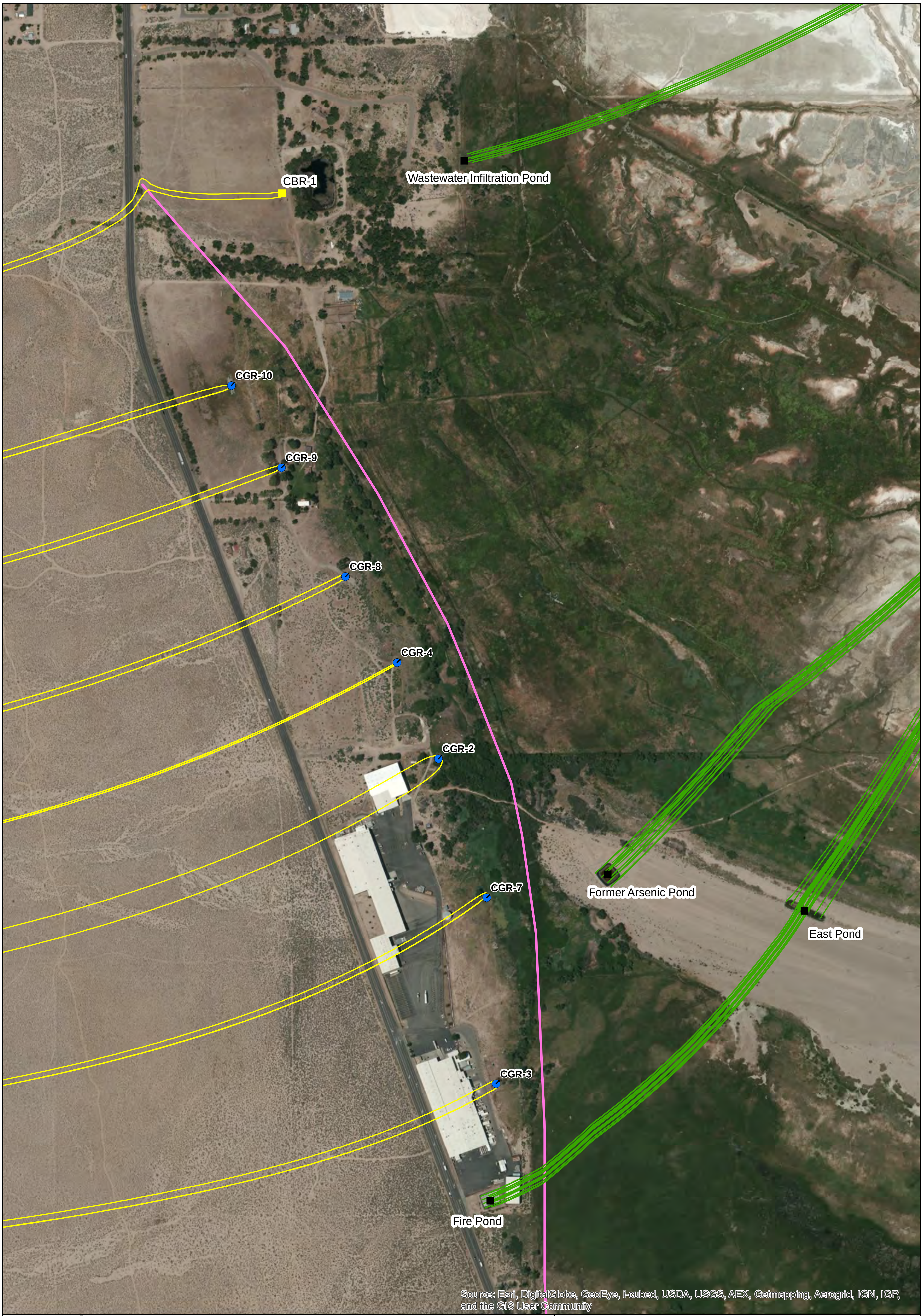

Legend

- ■ Pond
- ■ Active Well
- Particle Track
- Particle Capture Zone
- Approximate Location of Spring-Line Fault

0 300 600 Feet

N

Simulated Capture Zone and Particle Tracking under Future Conditions

Cabin Bar Ranch, Olancha, California

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Figure **A-9**

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