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Technical Memorandum

Date: October 26, 2016

To: Ryan Smith and Page Beykpour

From: Mark Grivetti and Kevin Coffman

Subject: **Arsenic Distribution and Background Analysis at the CGR Facility in Olancha, CA**

1. INTRODUCTION

Geosyntec Consultants (Geosyntec) has prepared this Technical Memorandum that presents a study of potential impacts to groundwater supplies from a possible release of arsenic from a lined waste water surface impoundment ("the former Arsenic Pond") located at the Crystal Geyser Roxane ("CGR") southern bottling facility in Olancha, California ("the Site"). This Technical Memorandum concludes that analyses from the various phases of investigation clearly show that groundwater originating at and near the former Arsenic Pond will not impact any water supply wells in the area and, based on current information, no known material harm to the environment or reasonably foreseeable beneficial uses for waters of the State have occurred or will occur.

The waste water in the former Arsenic Pond contained concentrations of arsenic that were derived from filtering of natural groundwater at the Site. No other arsenic was discharged to the former Arsenic Pond.

The location of the Site is shown on **Figure 1**. The Lahontan Regional Water Quality Control Board (Water Board) has indicated that water quality constituents, including arsenic concentrations detected in groundwater at wastewater discharge areas, including the former Arsenic Pond have degraded groundwater quality. Furthermore, the Water Board has specifically indicated that the arsenic concentrations in the near vicinity of the former Arsenic Pond are not representative of naturally occurring arsenic background levels.

To date, there have been three phases of investigation in response to Water Board requirements which have focused on soil, soil vapor, and groundwater across the Site. A total of 17 soil samples, six soil vapor samples, and 21 groundwater grab samples have been collected. Based on these results, historical discharge information, and Site geology and hydrogeology, a total of fifteen groundwater monitoring wells have been installed at the Site. After completion, sampling of these monitoring wells has occurred on a quarterly schedule. Results from the most recent Phase 3 investigation and third quarter 2016 monitoring event were used to evaluate the distribution of arsenic in groundwater (2016b).

The main overall objective of this study was to evaluate the impacts of potential arsenic releases from the former Arsenic Pond relative to natural background arsenic concentrations that occur in and around the Site. To meet this objective, the following tasks were performed:

- Reviewed the current Site Conceptual Model (SCM).
- Reviewed results of the MODFLOW Groundwater Model for the Site with respect to fate and transport of dissolved arsenic near the former Arsenic Pond.
- Reviewed published arsenic data collected on the Owens Dry Lake to assess regional arsenic concentrations in shallow groundwater.
- Reviewed available arsenic groundwater data in off-site locations (Cabin Bar Ranch) to evaluate natural background concentrations at possible analog locations for the former Arsenic Pond.
- Evaluated arsenic data collected from monitoring wells and borings located in the local vicinity of the former Arsenic Pond to assess distribution and natural background levels of arsenic near the pond. This information included a review of groundwater grab samples recently collected and a review of geochemistry information relevant to Site hydrogeological conditions and arsenic solubility.

The remainder of this technical memorandum has been organized as follows:

- Section 2 – *Hydrogeological Site Conceptual Model*. This section describes the current SCM.
- Section 3 – *Groundwater Flow Model*. This section provides information on the recently updated groundwater flow conditions in the vicinity of the former Arsenic Pond.
- Section 4 - *Arsenic Distribution and Natural Background Analysis*. This section presents an analysis of natural arsenic concentrations in the Site vicinity.
- Section 5 – *Conclusions*. This section provides conclusions regarding the impacts of potential arsenic releases from the former Arsenic Pond relative to natural background arsenic concentrations that occur in and around the Site.
- Section 6 – *References*.

2. HYDROGEOLOGICAL SITE CONCEPTUAL MODEL

A hydrogeological SCM, based on the information collected during the past Site hydrogeological investigations, has been developed and previously presented in Geosyntec's *Revised Additional Site Investigation Work Plan* (2016a). The SCM is illustrated on **Figure 2**. The major groundwater bearing unit in the basin 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 in the area of the former Arsenic Pond (i.e., lake deposits from the ancient Owens Lake). The observed sequence of lacustrine and alluvial sediments beneath the Site is the result of deposition associated with ancient fluctuations of water levels in the former 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 fine sands. Based on regional models and Site drilling logs, the percentage of fine-grained material (lacustrine deposits) increases significantly to the east (towards the lake). The interfingering of these deposits with coarser alluvial material is conceptually illustrated on **Figure 2**.

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 also may 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 and towards the central portion of the basin or towards the Owens Dry Lake. The dry lake bed is a groundwater discharge area where up-flowing groundwater is evaporated and, consequently, evaporite salts are produced.

The Great Basin Unified Air Pollution Control District (GBUAPCD, 2009) has indicated that groundwater flow on the dry lake bed is generally directed from the former lake shorelines toward the middle of the lake and that on the lake the vertical hydraulic gradient is upward at most locations, except for the locations adjacent to the spring-related groundwater mounds where it is downward.

The SCM depicts a shallow groundwater table beneath the Site with an eastward flow gradient (**Figure 2**). A small and sometimes subtle escarpment extends across the Site along an approximate north-south trend. A series of springs occurs along this escarpment. This escarpment is interpreted to be associated with the presence of an underlying fault referred to as the Spring-line fault (**Figure 3**).[1] The former Arsenic Pond is located east of 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 ground surface along the fault. This rise of groundwater in the area, together with the high regional evaporation rate, has created soils with high salt content, particularly in the shallowest portions of the groundwater table.

Groundwater quality is an important component for the current groundwater investigation. As part of the SCM, concentrations of total dissolved solids (TDS) and metals including arsenic significantly increase to the east, as groundwater flows toward the Owens Dry Lake. In the Owens Dry Lake area, up-flow of groundwater and evaporation processes have created salt pans (**Figure 2**). Generally, elevated arsenic concentrations are characteristic of groundwater derived from the Eastern Sierra Nevada watershed, and as noted in previous reports (Geosyntec, 2015a and 2015b), arsenic levels above the California Maximum Contaminant Level (MCL) of 10 µg/L occur in groundwater at and in the near vicinity of the Site. The concentrations of arsenic substantially increase naturally in groundwater to the east toward Owens Dry Lake. GBUAPCD (2009) has shown that in the shallow groundwater beneath and around the Owens Dry Lake, high concentrations of sodium and sulfate (tens of thousands of milligrams per liter, mg/L), high electrical conductivity (reaching up to 180,000 milliSiemens per centimeter, mS/cm), and alkaline conditions (pH values from 9 to above 10) are found in association with very high arsenic concentrations (average of 32,000 µg/L in an area adjacent to the Site). Similarly, directly east of the Site, Levy et. al. (1999) has reported very high salinity (up to 300,000 mg/L) in the shallow Owens Dry Lake groundwater. Through the numerous studies conducted at the Owens Dry Lake, it is understood that the concentrations of TDS, arsenic, and other solutes in

[1] An alternative interpretation is that the rise of groundwater is associated with the increase is fine-grained lacustrine deposits towards the east causing a permeability barrier.

groundwater at and around Owens Dry Lake increase due to evaporative enrichment along flowpaths, the enrichment itself resulting from the upward gradient associated with evaporation-dominated discharge and the formation of salt deposits at the playa surface. As a result, the elevated concentrations of solutes in groundwater will also tend to be associated with the fine-grained lacustrine deposits. Thus, as the presence of these fine-grained layers also increases towards the Owens Dry Lake, it is expected that naturally occurring arsenic concentrations, as well as TDS, will likewise increase. This expected increase is a general trend and will be dependent locally on the volume of fine-grained lacustrine sediment which are prevalently encountered on the Site and increase moving eastward toward Owens Dry Lake.

3. GROUNDWATER FLOW MODEL

A hydrogeological groundwater model for the Site area was recently updated and applied to evaluate groundwater flow conditions in the vicinity of the former Arsenic Pond (Geosyntec, 2016). The model was developed with MODFLOW™ software and was used to:

1. Simulate groundwater flow in the area of the Site;

2. Estimate capture zones of all significant production wells in the vicinity of the Site, based on current and projected pumping rates; and

3. Estimate the groundwater particle tracks in the area of the former Arsenic Pond.

Modeling results show that east of the Spring-line fault and the former Arsenic Pond groundwater flows to the northeast and to the Owens Dry Lake. Capture zone analysis indicate that the current pumping from the Site production wells (CGR wells) and from the Cartago Mutual Water District production well (CMW-1) located north of the former Arsenic Pond, will not draw water from east of the Spring-line fault towards the west (**Figure 3**). The particle track analysis also indicates that groundwater in the area of the former Arsenic Pond will migrate to the northeast and discharge at Owens Dry Lake (**Figure 3**). Furthermore, an upward vertical gradient has been documented on the Site and in the Site vicinity. Thus, significant downward migration of any impacted groundwater into portions of the aquifer used for potable water supply will not occur. The model results along with supporting hydraulic gradient information clearly indicate that groundwater originating at and near the former Arsenic Pond will not impact any water supply wells in the area.

4. ARSENIC DISTRIBUTION AND NATURAL BACKGROUND ANALYSIS

This section presents an analysis of natural arsenic concentrations (i.e., background arsenic concentrations) in the Site vicinity including a review of regional arsenic information. First, regional arsenic data collected by the GBUAPCD for the Owens Dry Lake area is discussed. Second, recent arsenic data collected at the Cabin Bar Ranch located north of the Site is presented. Lastly, the distribution and variation of arsenic concentrations in the near vicinity of the former Arsenic Pond is discussed.

4.1 Arsenic in the Owens Dry Lake Area

Based on regional groundwater flow direction and MODFLOW modeling, groundwater in the area of the former Arsenic Pond will migrate to the northeast and discharge at Owens Dry Lake. Very high levels of naturally occurring arsenic have been documented in shallow groundwater beneath the dry lake, including a recent report prepared by the GBUAPCD (2009). GBUAPCD collected total arsenic data from a series of shallow piezometers installed within seven designated hydrology areas on the dry lake bed and shoreline areas (**Figure 4**). The piezometers were generally completed at depths of four (4) and ten (10) feet below ground surface (ft bgs) which are depths similar to first encountered groundwater at the Site. Utilizing GBUAPCD data, Geosyntec calculated average and median arsenic concentrations for each of the seven hydrologic study areas (**Figure 4**). Average arsenic concentrations between the hydrologic areas range from 4,500 to above 28,000 micrograms per liter (µg/L) at the 10-ft depth, and increase up to 79,000 µg/L within the shallower 4 ft bgs zone. Median arsenic concentrations between the hydrologic areas range from approximately 600 to 14,900 µg/L at the 10-ft depth, and increase up to 86,500 µg/L within the shallower zone at 4 ft bgs. Results indicate that arsenic is more concentrated at the shallower depths in every area except at the Owens River delta where significant inputs of surface water flow dilute the shallowest groundwater (**Figure 4**).

The nearest designated hydrology study area by GBUAPCD is the Dirty Socks-Cartago Creek Hydrology Area, located in the south/southwestern portion of the Owens Dry Lake. The western boundary of the study area is approximately ½ to 1 mile from the former Arsenic Pond. Based on Geosyntec's previous investigative and modeling data, this area is downgradient of the former Arsenic Pond (**Figures 3** and **4**) and, therefore, we present the specific data of the study area on **Figure 5**.

The GBUAPCD assessed arsenic concentrations in this area by installing an array of thirteen single and/or paired piezometers (**Figure 5**). The piezometers were located in both historical lake shoreline locations and within the actual dry lake bed. Arsenic concentrations are very high in this hydrologic area, ranging from 2,600 to 75,200 µg/L, with the exception of a single 10-ft deep piezometer located near the historic lake shoreline, location S3(1) which was non-detect for arsenic. Similar to the regional trend discussed above, arsenic concentrations are higher at the shallower 4-foot depth relative to the 10-foot depth. The average and median arsenic concentrations in the Dirty Socks-Cartago Creek Hydrology Area were calculated to be 5,596 µg/L and 6,460 µg/L, respectively at the 10 ft depth and increasing to 32,055 µg/L and 15,220 µg/L at the 4 ft depth (**Figure 4**).

The observed range of very high arsenic concentrations in the Dirty Socks-Cartago Creek Hydrology Area is representative of downgradient arsenic concentrations for the Site. The very high arsenic concentrations in the study area are the result of naturally elevated arsenic in groundwater and the evaporative processes that occur in and around the dry lake bed.

Based on the high arsenic concentrations detected in shallow groundwater in the Owens Dry Lake, the Los Angeles Department of Water and Power (LADWP) currently implements dust control measures on the Owens Dry Lake under a revised waste discharge requirements (WDR) permit issued by the Water Board. The permit allows discharge of water with a maximum arsenic concentration of 165,000 µg/L for purposes of shallow flooding, habitat shallow flooding, managed vegetation, operational ponds, and a settling basin at their Facility. The closest area of discharge by the LADWP is approximately 1 mile to the east of the Site in the southwestern Owens Dry Lake.

4.2 Arsenic at Cabin Bar Ranch

Figures 5 and **6** also show data collected from three shallow wells located directly north of the Site at Cabin Bar Ranch. These wells were recently installed by CGR and are designated WW-01, WW-02 and WW-03 (**Figure 5**). The piezometers are located approximately 1,400 ft east of the Spring-line Fault and are generally screened at a depth of 9-15 ft bgs, similar to the majority of monitoring wells completed at the Site. Total/dissolved arsenic concentrations in these wells were measured after well installation to be between 305 and 521 µg/L (**Figure 6**)[2]. No wastewater discharge has occurred at the Cabin Bar Ranch and, consequently, these concentrations represent natural concentrations of arsenic in shallow groundwater beneath the eastern portion of Cabin Bar Ranch.

Based on the location of the Cabin Bar Ranch wells east of the Spring-line fault and near the historic lake shorelines and wetland areas, environmental conditions at these locations represent a reasonable analog of conditions in the near vicinity of the former Arsenic Pond. As such, naturally occurring background arsenic concentrations in the range of 300 to 500 µg/L can reasonably be expected to occur locally in the Site area.

4.3 Distribution of Arsenic at the Site

The most recent arsenic concentrations measured at Site monitoring well locations are variable, ranging between 6 and 191 µg/L (**Figure 6**). This range includes both total and dissolved arsenic concentrations. As shown on **Figure 6**, dissolved and total arsenic concentrations in groundwater samples collected from Site monitoring wells are very similar indicating that the majority of the arsenic is in the dissolved phase.

Generally, wells completed west of the Spring-line fault have lower arsenic concentrations than wells screened east of the fault. Based on the SCM and the regional arsenic data discussed in preceding sections, this would be expected as there is a decrease of fine-grained stratum west of the fault. Wells located west of the Spring-line fault include monitoring wells MW-01 and MW-02, screened at 10 to 33 ft bgs, and the slightly deeper production wells screened at depths between 55-88 ft bgs (CGR-1, CGR-3, CGR-5, and CGR-7). Arsenic concentrations in these western wells have moderately elevated naturally-occurring arsenic concentrations of approximately 6 to 28 µg/L (**Figure 6**).

In comparison, dissolved and total arsenic concentrations in shallow monitoring wells located east of the Spring-line fault at the Site ranged between 6 to 191 µg/L. Eastern wells screened near the top of the groundwater table (5-24 ft bgs) have arsenic concentrations ranging between 8-191 µg/L whereas two slightly deeper wells, MW-15

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[2] At the Water Board's request, Geosyntec performed another round of sampling from these wells on October 20, 2016, approximately two months after the initial samples were collected. Dissolved and total arsenic results were similar to the initial sample results.

and OW-8US, screened between 43-48 feet and 55-75 feet respectively, have arsenic concentrations between 6-29 µg/L. Groundwater samples collected from two deep monitoring wells OW-8U and OW-8D, screened in deep zones of the alluvial aquifer (190-230 ft bgs and 582-642 ft bgs), contained <1 µg/L and 22 µg/L of arsenic, respectively.

As shown on **Figure 6**, arsenic concentrations in the shallow monitoring wells located east of the fault and in the near vicinity of the former Arsenic Pond are highly variable. The apparent variability of arsenic in the vicinity of the former pond was further assessed by collecting groundwater grab samples at discrete depths from boring location B-02 and from the boreholes advanced during the installation of monitoring wells MW-12 and MW-15 (**Figure 7a** and **Figure 7b**) during the Phase 3 Site Investigation. Both total and dissolved arsenic were measured in the grab samples (**Figure 7b**) and comparison of the data indicates that total arsenic concentrations in samples are generally higher than the dissolved concentrations. The relatively high total arsenic concentrations in the grab samples would be expected since grab samples intrinsically have very high turbidity and contained sediment, contributing to elevated total metals concentrations. However, dissolved arsenic concentrations in filtered grab samples collected from these borings are not influenced by turbidity issues and can be directly compared to samples collected from properly developed monitoring wells.

Our review of grab groundwater sample results for dissolved arsenic shows that a relatively high amount of variation in arsenic concentrations is observed within short lateral and vertical distances in the shallow zone. For example, a grab sample collected at 14 ft bgs in boring MW-15 located approximately 70 feet up-gradient of the former Arsenic Pond contained 201 µg/L dissolved arsenic and approximately 30 feet west in monitoring well MW-03, dissolved arsenic was detected an order of magnitude lower at 12 µg/L. Although the grab sample collected from MW-15 represents a discrete depth water sample collected at 14 ft bgs and the water sample collected from MW-03 is representative of groundwater across the submerged screen interval of approximately 12.5 to 20 ft bgs, the order of magnitude difference in arsenic concentrations in these two samples suggests very localized elevated concentrations of arsenic concentrations can occur. It should be noted that the total arsenic concentrations in the 14 ft and 24 ft MW-15 samples were reported at 1,230 µg/L and 404 µg/L, respectively. These high total arsenic concentrations likely reflect naturally high concentrations of arsenic in the sediments where the grab samples were collected (i.e., arsenic in the solid phase).

Vertical heterogeneity in grab samples is also noted at borehole B-02 (located approximately 50 feet downgradient of the former Arsenic Pond) where the grab samples collected at 23 and 25.5 ft bgs contained 13 and 119 µg/L dissolved arsenic, respectively. This is an order of magnitude difference in arsenic concentrations in two samples collected within 2½ ft of each other. Another example of the vertical variation is observed at borehole MW-12 where grab samples collected at 8 and 11.5 ft bgs contained 55 and 111 µg/L dissolved arsenic, respectively. These findings suggest that groundwater arsenic concentrations near the former Arsenic Pond can be very heterogeneous, varying between tens and hundreds of µg/L within short distances.

Groundwater grab samples collected at B-02 and MW-15, located near the former Arsenic Pond, were collected from coarse-grained lithologic units adjacent to fine-grained lacustrine deposits. These low-permeability, fine-grained silt and clay units along with the upward vertical groundwater gradient indicate that the distribution of dissolved arsenic concentrations in the deeper samples is not consistent with a leak from the former Arsenic Pond, and may indicate elevated background levels at depth. Although it cannot be precluded that the observed variations of arsenic concentrations in the vicinity of the former Arsenic Pond are the result of past releases of waste, some of the heterogeneity in arsenic concentrations observed (e.g up-gradient well MW-15 and deeper samples from B-02) are likely the result of local variability in sediment conditions (i.e. the impact of lacustrine deposits with higher solid phase arsenic). Because the shallow aquifer in the Site vicinity and beneath Owens Dry Lake consists of a laterally and vertically heterogeneous system of interconnected hydrologic units, and evapotranspiration and surface discharge varies on a spatial and temporal basis, local hydrochemical conditions likely change along lateral flow paths. GBUAPCD (2009) has indicated that hydrochemical conditions in the Owens Dry Lake area are dependent on the chemistry of the geologic material along a specific groundwater flow path. An example of this is the interfingering of sandy and gravelly alluvium with fine-grained lacustrine deposits (clay and silt) along the southwestern edge of the basin in the vicinity of the Site and the increase of the fine-grained lacustrine deposits towards the middle of the lake bed (GSI, 1983). Elevated arsenic concentrations are associated with the fine-grained deposits due to adsorption of arsenic onto iron-bearing clay minerals and organic matter, both of which are also commonly concentrated in clay and silt deposits. Thus, as the presence of the lacustrine layers increases, it is expected that naturally occurring arsenic concentrations will likewise increase, but this general trend will be not be laterally continuous due to the heterogeneous distribution of the fine-grained deposits. Arsenic concentrations would also be expected to increase near and within these fine-grained deposits on a localized basis, thus, possibly explaining the observed variations observed in groundwater grab samples collected from MW-15, B-02, and MW-12.

5. CONCLUSIONS

Based on the current evaluation of local and regional arsenic distribution we find that:

(1) The SCM and MODFLOW modeling results indicate that groundwater beneath and in the area of the former Arsenic Pond is flowing to the northeast and discharges at Owens Dry Lake. In addition, modeling results clearly indicate that groundwater originating at and near the former Arsenic Pond will not impact any water supply wells in the area.

(2) Arsenic concentrations in shallow groundwater east and hydraulically downgradient of the former Arsenic Pond are highly elevated. Average arsenic concentrations in shallow groundwater samples collected beneath the Owens Dry Lake to the east of the former Arsenic Pond were calculated to be 32,055 µg/L at a depth of 4 ft and 5,596 µg/L at depth of 10 ft. This indicates that arsenic concentrations in shallow groundwater hydraulically downgradient of the former Arsenic Pond are one to two orders of magnitude higher than the highest arsenic concentrations detected beneath and around the former pond area. Thus, any arsenic bearing groundwater at the Site will ultimately discharge into an area of groundwater with arsenic concentrations 1-2 orders of magnitude higher than those at the Site. Accordingly, the Site groundwater is discharging into the same area where current Water Board WDRs are allowing discharge of surface water with arsenic concentrations of 165,000 ug/L and TDS concentrations of 120,000 to 450,000 mg/L. The very high discharge limits are reflective of the very poor natural water quality in the area downgradient of the former Arsenic Pond.

(3) Recent shallow groundwater samples collected at a location north of the former Arsenic Pond and east of the Spring-line fault on Cabin Bar Ranch provide a reasonable environmental analog to the former Arsenic Pond 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.

(4) Results from grab groundwater samples collected directly adjacent to the former Arsenic Pond suggest that dissolved arsenic as high as 100 to 200 µg/L may occur in specific zones such as localized strata within and adjacent to lacustrine deposits. Consequently, based on a review of the data recovered in the Phase 3 Investigation, it appears very likely that some of the elevated arsenic concentrations observed in the former Arsenic Pond area may be the result of local and natural hydrochemical conditions.

In conclusion, impacts from any potential releases of arsenic from the former Arsenic Pond are not significant given the naturally high background arsenic concentrations in the general Site area, including extremely elevated natural arsenic concentrations known to occur hydraulically downgradient of the former Arsenic Pond area. Any potential impacts of dissolved arsenic releases and TDS from the former pond are well within these regional natural background levels. In addition, current analyses clearly show that groundwater originating at and near the former Arsenic Pond will not impact any water supply wells in the area and, based on current information, no known material harm to the environment or reasonably foreseeable beneficial uses for waters of the State have occurred or will occur.

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6. REFERENCES

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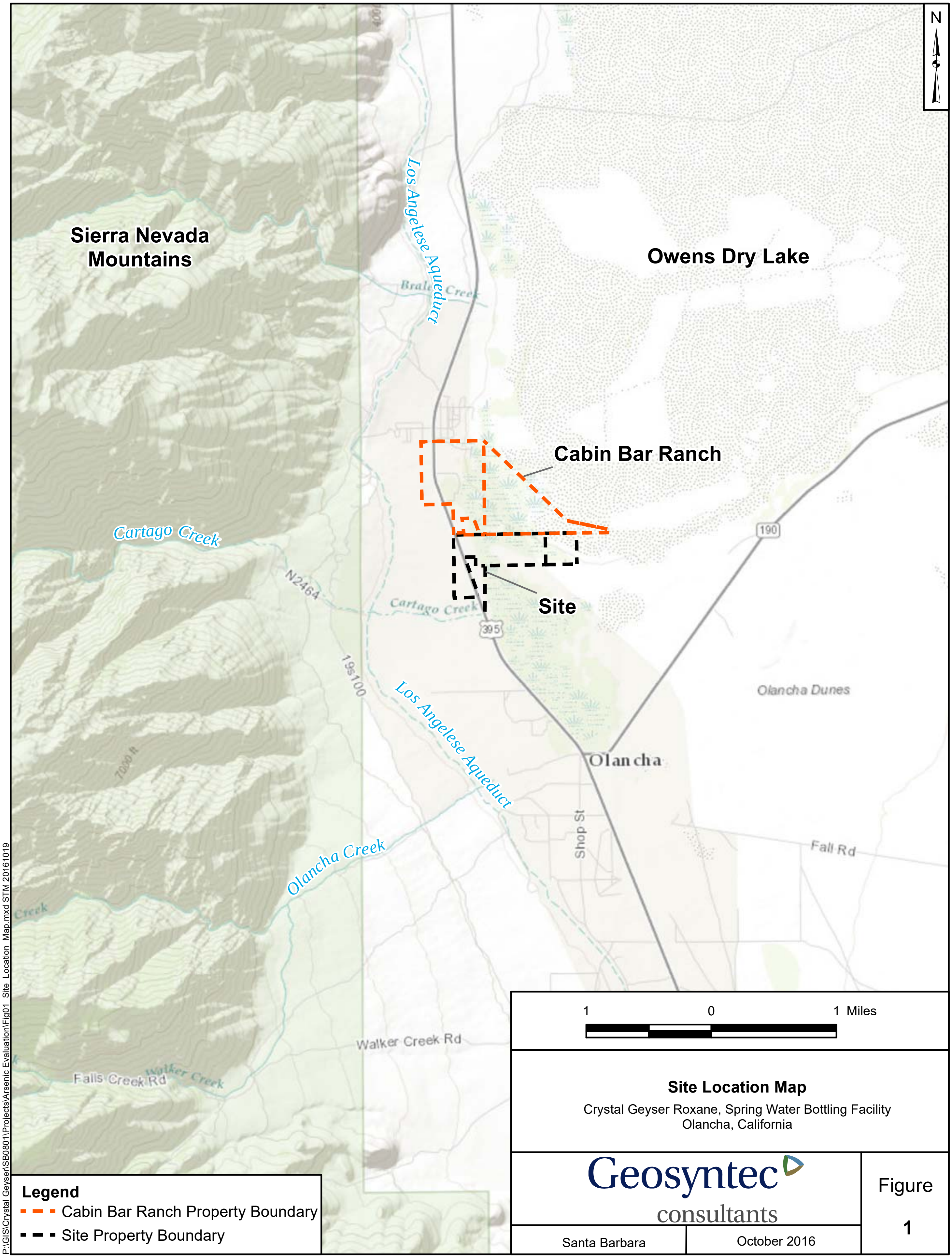


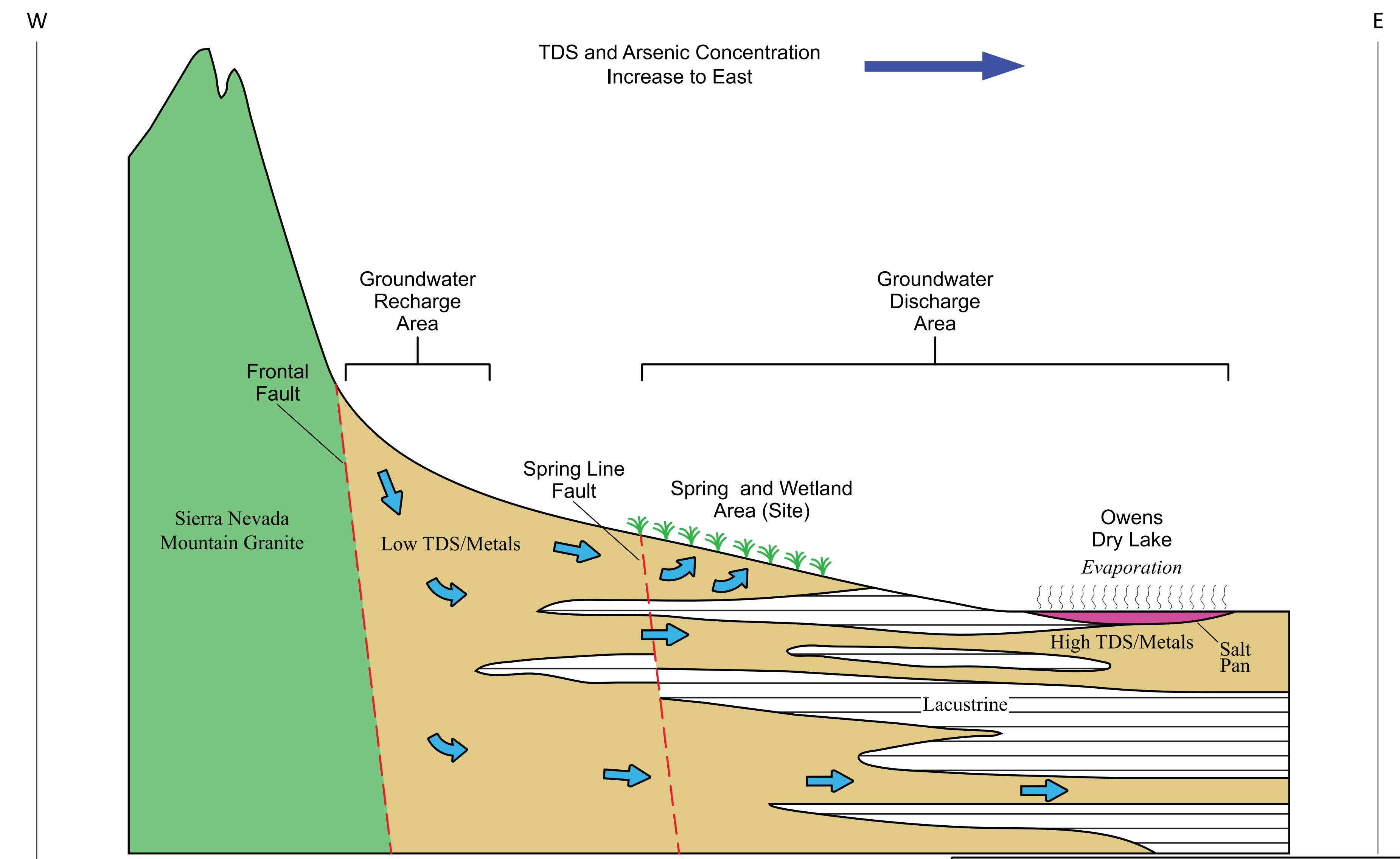
Legend
- Cabin Bar Ranch Property Boundary
- Site Property Boundary

Site Location Map
Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Figure 1

Santa Barbara | October 2016



NOT TO SCALE

Hydrogeological Conceptual Model Illustration

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

Geosyntec consultants

Figure 2

Santa Barbara | December 2015

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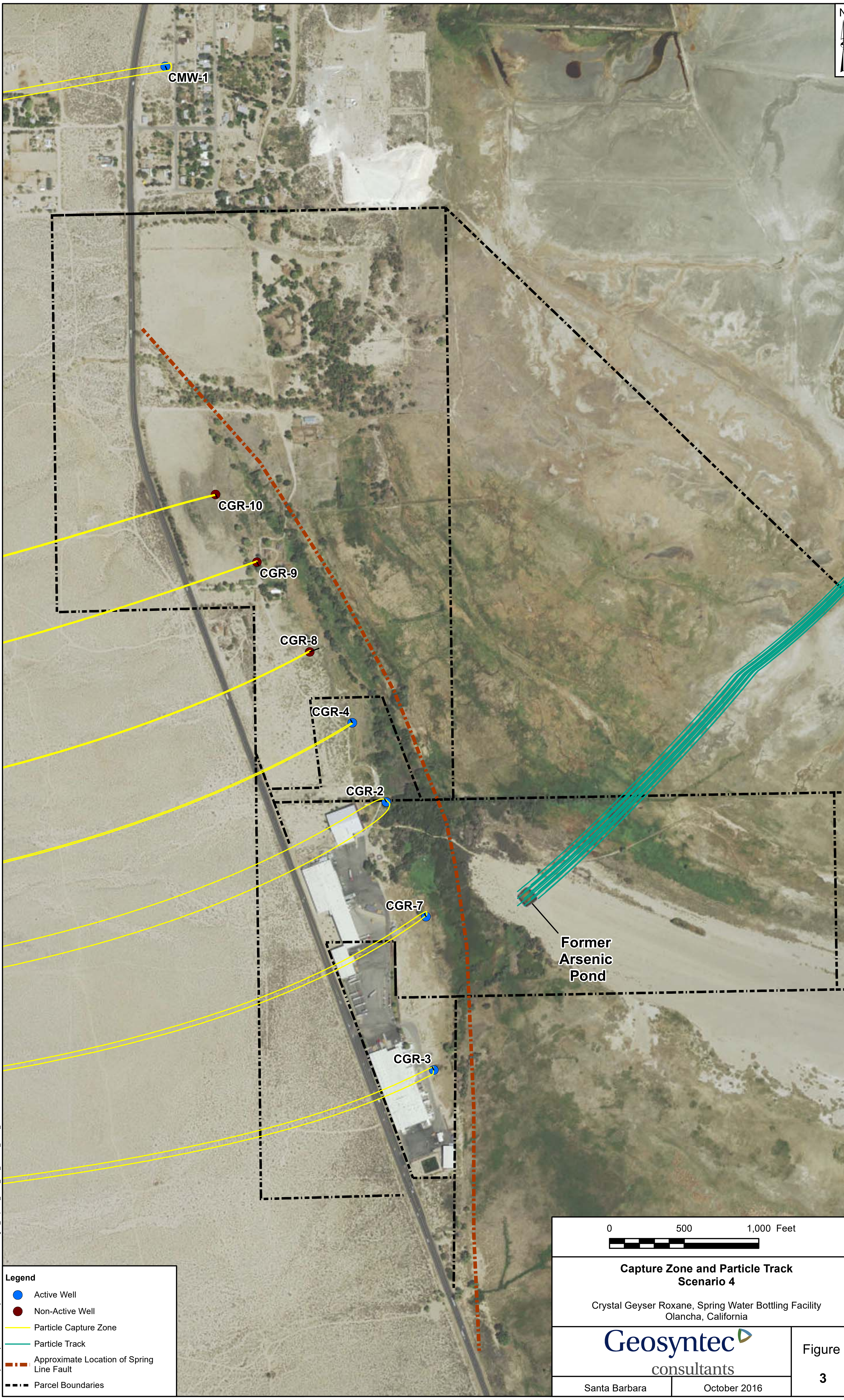

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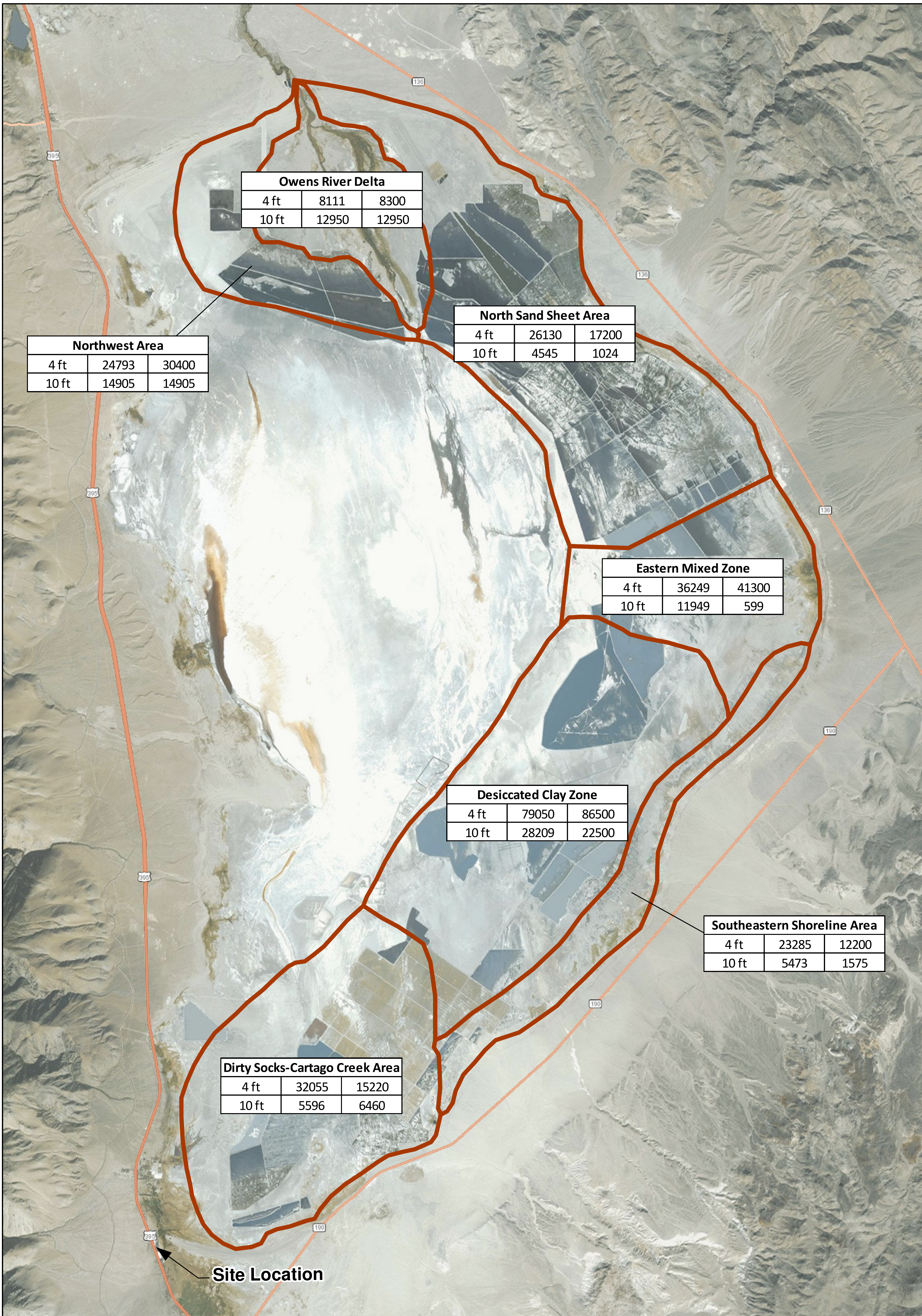

Legend

Hydrologic Areas

Location		
Piezometer Depth (ft)	Average Arsenic Concentration (µg/L)	Median Arsenic Concentration (µg/L)

Notes:
Data from April 2004.
Reference: Owens Lake Shallow Hydrology Monitoring Data and Chemistry 1992-2004, Great Basin Unified Air Pollution Control District, Bishop, California, February 2009.

N

0 7,000 Feet

Arsenic Concentrations in Shallow Groundwater of the Owens Lake Area

Cabin Bar Ranch
Olancha, California

Geosyntec consultants

Santa Barbara | October 2016

Figure 4

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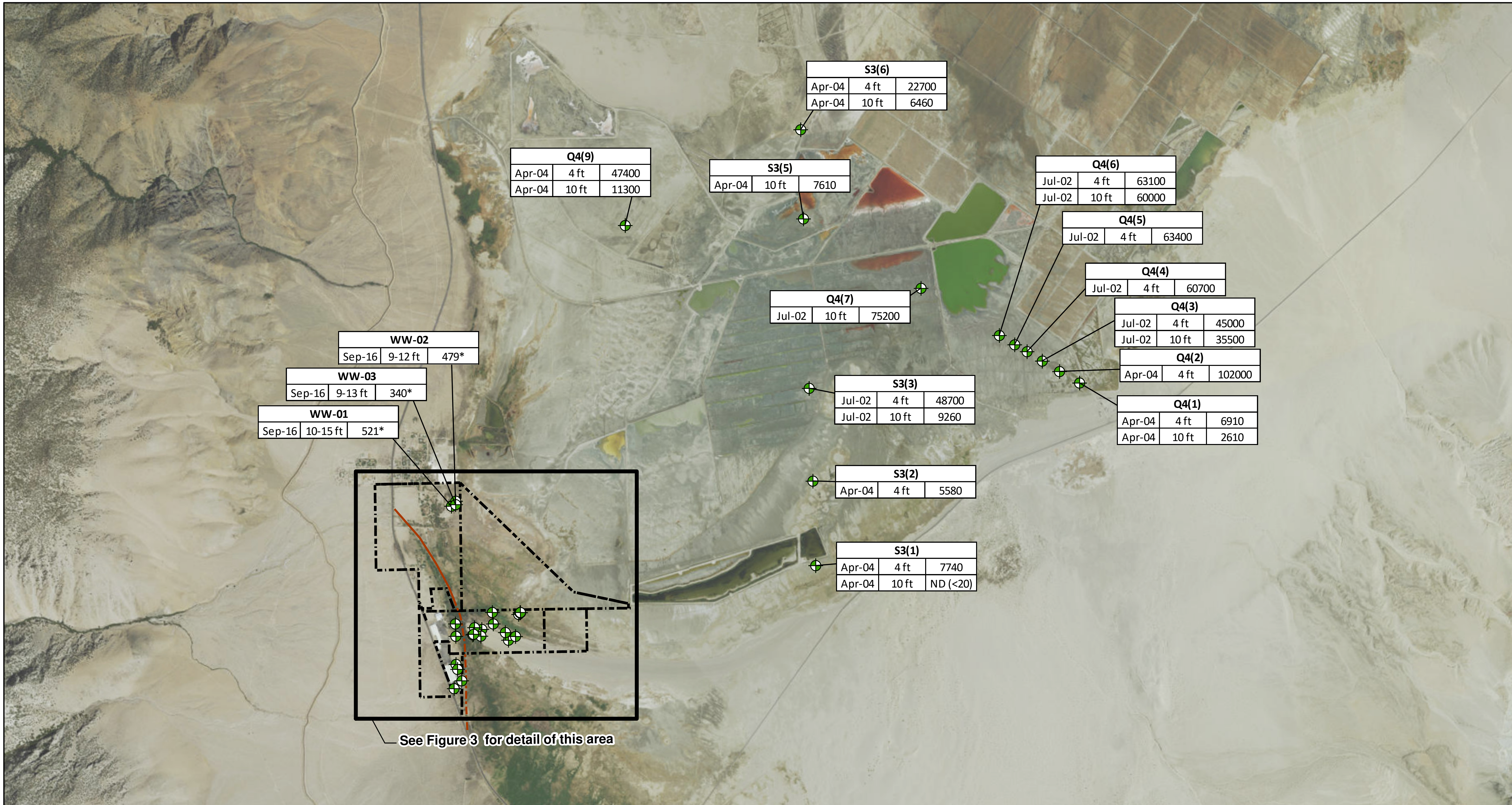

Legend

- Sample Location
- Parcel Boundaries
- Approximate Location of Spring Line Fault

Location		
Date Sampled	Screened Depth (ft)	Total Arsenic Concentration (µg/L)

Notes:
* - Total Arsenic
Reference for Q4 and S3 wells: Owens Lake Shallow Hydrology Monitoring Data and Chemistry 1992-2004, Great Basin Unified Air Pollution Control District, Bishop, California, February 2009.

N

0 2,800 Feet

Groundwater Total Arsenic Concentrations in the Site Vicinity

Cabin Bar Ranch
Olancha, California

Geosyntec consultants

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Figure 5

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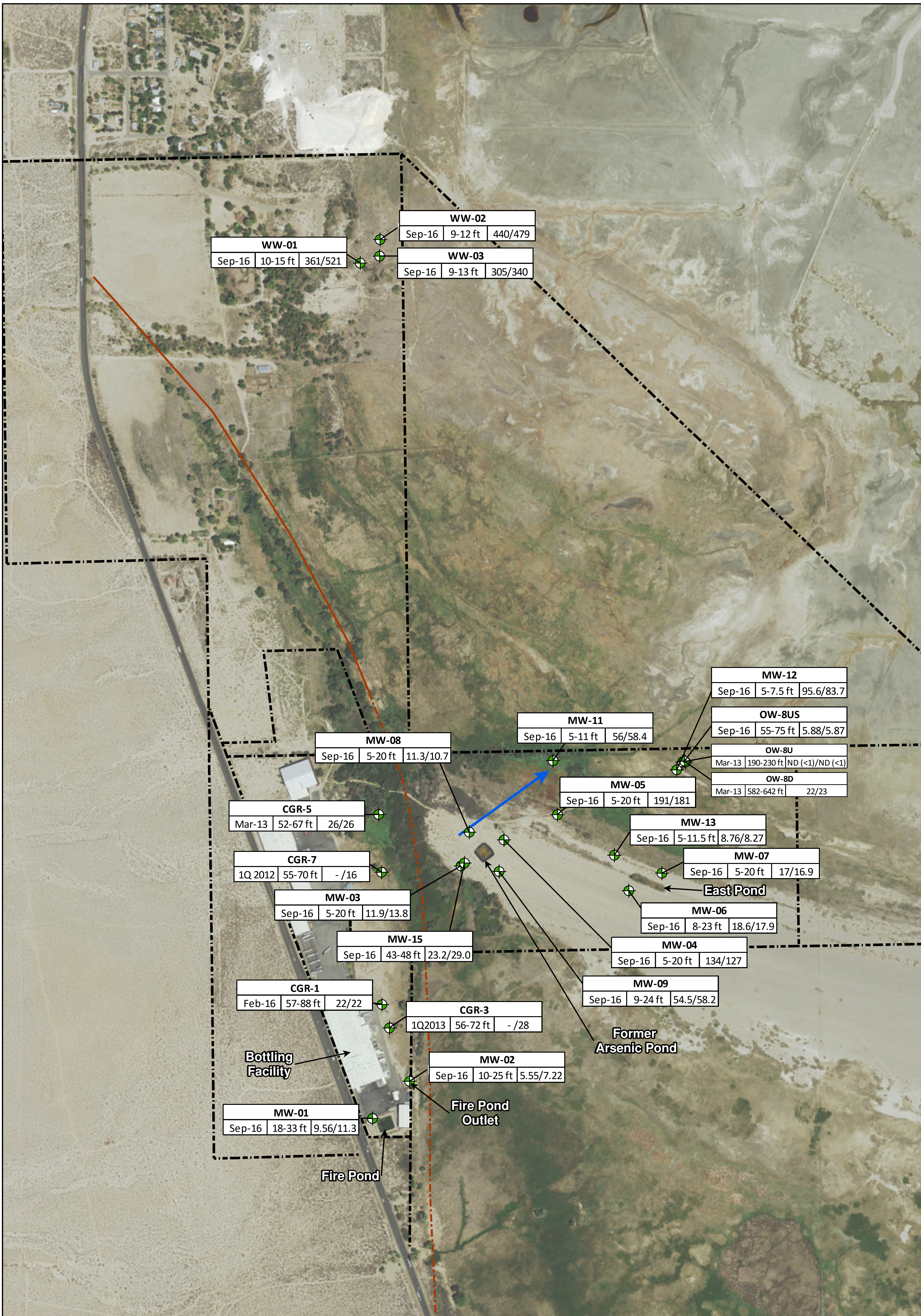

Legend

- Sample Location
- Groundwater Gradient
- Parcel Boundaries
- Approximate Location of Spring Line Fault

Location		
Date Sampled	Screened Depth (ft)	Dissolved / Total Arsenic Concentration (µg/L)

Notes:
"-" = Dissolved arsenic concentration not available

N

0 600 Feet

Groundwater Arsenic Concentrations at the Site

Cabin Bar Ranch
Olancha, California

Geosyntec consultants

Santa Barbara | October 2016

Figure 6

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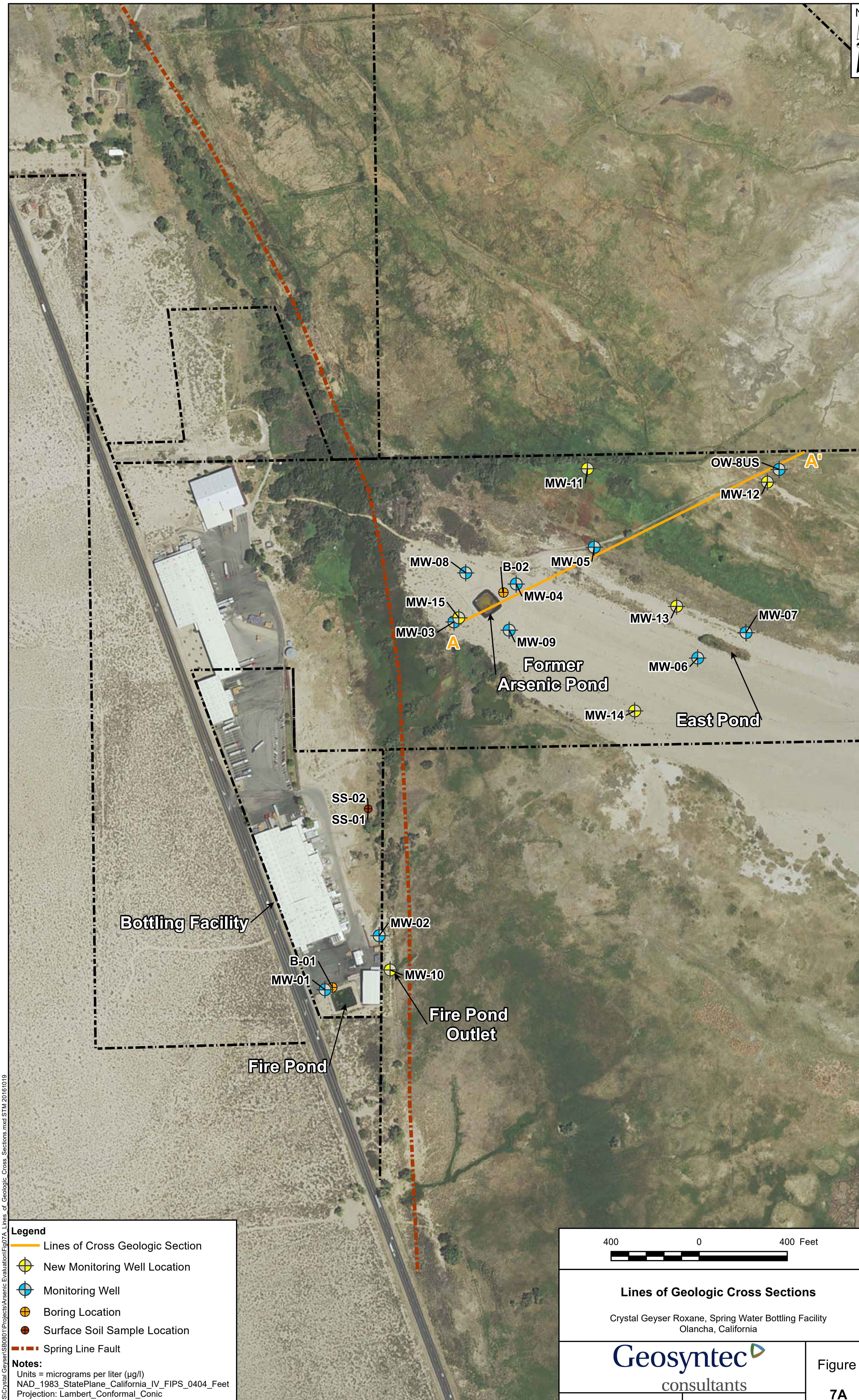

Lines of Geologic Cross Sections

Crystal Geyser Roxane, Spring Water Bottling Facility
Olancha, California

Geosyntec consultants

Santa Barbara | October 2016

Figure 7A

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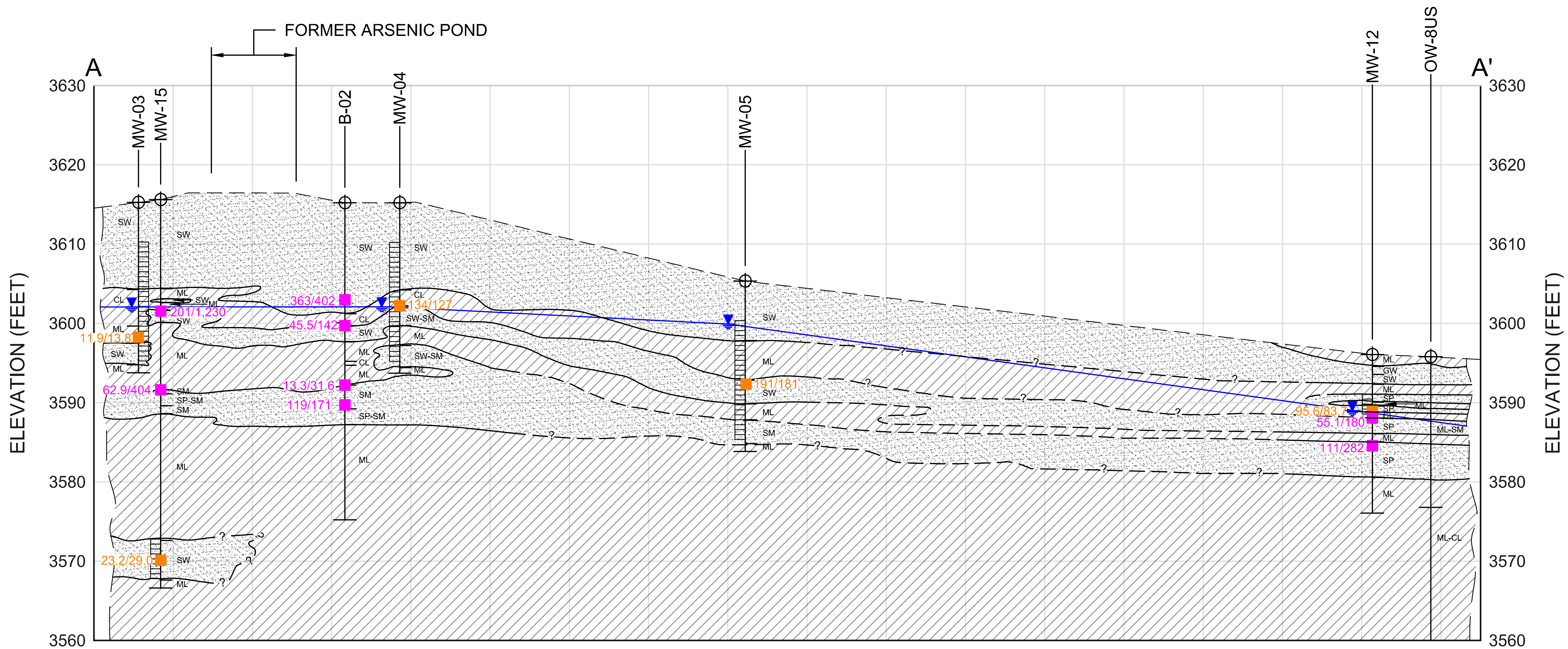

LEGEND

GENERALIZED SAND/GRAVEL LITHOLOGY

GENERALIZED CLAYS/SILTS LITHOLOGY

GROUNDWATER ELEVATION

SCREENED INTERVAL

GROUNDWATER MONITORING SAMPLE (SEPTEMBER 2016) - DISSOLVED ARSENIC / TOTAL ARSENIC CONCENTRATION (μg/L)

GROUNDWATER GRAB SAMPLE (AUGUST 2016) - DISSOLVED ARSENIC / TOTAL ARSENIC CONCENTRATION (μg/L)

USCS SYMBOLS

GW	WELL GRADE GRAVEL	SM	SILTY SAND
SW	WELL GRADED SAND	SM-ML	SILTY SAND TO SILT
SW-SM	WELL GRADED SAND WITH SAND	CL	LEAN CLAY
SP	POORLY GRADED SAND	ML	SILT
SP-SM	POORLY GRADED SAND WITH SILT	ML-CL	SILT TO CLAY

0 150
HORIZONTAL SCALE

0 15
VERTICAL SCALE

SITE GEOLOGIC CROSS SECTION A-A'
CRYSTAL GEYSER ROXANE WATER
OLANCHA, CALIFORNIA

Geosyntec consultants

Figure **7B**

Project No: SB0794 | October, 2016

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