



AGENDA

DATE	Wednesday, July 29 th , 2020; 1:30 PM – 4:30 PM (PDT)
LOCATION	https://global.gotomeeting.com/join/923348325 ; Call-In: 1(866) 899-4679; Access Code: 923-348-325
STAKEHOLDER ADVISORY GROUP LIST	Ken Payne, P.E., (El Dorado County Water Agency); Robert Lauritzen, P.G., Karen Bender, REHS, RD (El Dorado County -EMD); Jason Burke (City of South Lake Tahoe); Scott Carroll (CA Tahoe Conservancy); Andrea Buxton (Tahoe Resource Conservation District); Brian Grey, P.G. (Lahontan Regional Water Quality Control Board); Paul Nielsen (TRPA); Joey Keely, Nicole Bringolf (USFS – LTBMU); Nakia Foskett (Lakeside Park Water Co.); Jennifer Lukins (Lukins Brothers Water Co); Daniel Larson (Tahoe Keys Water Co.); Harold Singer (Community Rate Payer); and John Thiel, PE (South Tahoe PUD)
PLAN MANAGER	Ivo Bergsohn, PG, HG (South Tahoe PUD)

BASIN MANAGEMENT OBJECTIVES (BMO)

1. Maintain a sustainable long-term groundwater supply.
2. Maintain and protect groundwater quality.
3. Strengthen collaborative relationships with local water purveyors, governmental agencies, businesses, private property owners and the public.
4. Integrate groundwater quality protection into local land use planning activities.
5. Assess the interaction of water supply activities with environmental conditions.
6. Convene an on-going Stakeholders Advisory Group (SAG) as a forum for future groundwater issues.
7. Conduct technical studies to assess future groundwater needs and issues.
8. Identify and obtain funding for groundwater projects.

WORKSHOP OBJECTIVES

OBJECTIVES

1. Learn about the current Private Well Owner Survey – Phase II being performed by the District for the TVS Basin.
2. Learn about the South Y PCE Regional Plume Characterization being conducted by the LRWQCB during the 2020 Field Season.
3. Consider DRI plans for groundwater model evaluation in support of the first 5-Year Update of the 2014 Groundwater Management Plan.
4. Review the current status of the 2014 GMP Implementation Plan (Table 10-1).

SEE REVERSE FOR AGENDA



AGENDA

Time	Description	
1:30	Roll call	SAG
1:40	TVS Basin (6-005.01) - Open Forum Opportunity for members to briefly raise topics within the subject matter of the SAG and not listed on the Agenda.	Round Robin
1:50	Private Well Owner Survey – Phase II <ul style="list-style-type: none"> • Purpose • Scope • Questions 	I. Bergsohn STPUD
2:10	LRWQCB Regional Plume Characterization <ul style="list-style-type: none"> • 2020 Planned Field Activities • Discussion 	A. Cazier LRWQCB
2:50	DRI Model Evaluation – 50-Year Water Budget <ul style="list-style-type: none"> • Recommended Actions • Approach • Discussion 	S. Rybarski, M. Hausner DRI
3:30	5-minute BREAK	
3:35	Update to 2014 Groundwater Management Plan (2014 GMP) <ul style="list-style-type: none"> • Public Notification/Participation • DWR Facilitation Support Services (FSS) • Status Review - 2014 Implementation Plan (Table 10-1) • Discussion 	SAG
4:30	Adjourn	

Tahoe Valley South Subbasin (6-005.01) Groundwater Management Plan

MEETING NOTES

Wednesday, July 29th, 2020; 1:30 pm - 4:30 pm

Location: On-Line Meeting

SAG ATTENDEES:

John Thiel, PE; Ivo Bergsohn, PG, HG (STPUD); Ken Payne, PE (El Dorado Water Agency); Brian Grey, PG (Lahontan Regional Water Quality Control Board); Michael Conger (Tahoe Regional Planning Agency); Robert Lauritzen, PG; Karen Bender, REHS, RD (El Dorado County Environmental Management Department); Jason Burke (City of South Lake Tahoe); Joe Keely; Nicole Bringolf (USFS- Lake Tahoe Basin Management Unit); Andrea Buxton (Tahoe Resource Conservation District); Jennifer Lukins (Lukins Brothers Water Co); Danial Larson (Tahoe Keys Water Co.); Nakia Foskett (Lakeside Mutual Water Company); Harold Singer (Ratepayer)

Participants: 26

BASIN MANAGEMENT OBJECTIVES:

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2. Learn about the South Y PCE Regional Plume Characterization and activities planned by the LRWQCB during the 2020 Field Season.
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Roll Call

Roll-Call Sheet

TVS Basin (6-5.01) - Open Forum (Group)

Current groundwater-related topics outside of the Agenda

I. Bergsohn, STPUD

- Welcome Bridget Gibbons, SGMA Liaison for CDFW North Central Region and thank you for CDFW Groundwater Planning Considerations document (emailed to SAG);
- Draft EIR/EIS for Tahoe Keys Lagoon Aquatic Weeds Control Methods Test is out for Public Comment; TRPA is hosting an On-line Meeting; Wednesday, August 12, 9:30 am; Comments due September 3, 2020; For more information contact: <https://tahoekeysweeds.org/>
- Welcome Katy Janes, SGMA Point of Contact for DWR; seeking project descriptions for groundwater-related projects within the North Lahontan Region; Projects may be highlighted in the update to Bulletin 118 being prepared by DWR.

Tahoe Valley South Subbasin (6-005.01) Groundwater Management Plan

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- 2020 WY through July 1: Total ppt. at TVS Basin Reference Station = 20"; average = 30.31"; should trend continue, expect a Below Normal WY; Comparison of May 2019 to May 2020 groundwater levels shows an average decline of 1.8 feet.

J. Lukins, LBWC – LBWC Well #5 GAC Treatment System

- Started construction May 2020; currently on-schedule
- Majority of UG piping work completed; Storage Tank construction starting this week
- Carson Pump completed well modifications on LBWC 5; updated well construction diagrams for LBWC 5 to be forwarded to LRWQCB and STPUD

Private Well Owner Survey – Phase II

Private Well Owner Survey- Phase II (I. Bergsohn, PG HG, STPUD)

Ivo provided a brief update on the progress of the second phase of the Private Well Owner Survey (PWOS-II) being conducted by the South Tahoe Public Utility District (District). PWOS-II is being performed to contact the remaining (~246) private well owners not contacted during the initial well owner survey completed in 2017. There are believed to be more than 600 private wells used for drinking water supply within the TVS Basin. The Private Well Survey is part of an outreach effort to inform private well owners of the establishment of GSAs and their responsibility to develop and implement a groundwater management plan for the TVS Basin. A second objective is to encourage private well owners to participate in the groundwater management process. A third objective is to gather information using a questionnaire to better inform the GSAs about: well ownership, water usage, well condition, water quality and well owner concerns. PWOS-II started at the end of June; through July 27, 46 well owners have been contacted with 43 surveys completed.

Handouts: June 29, 2020 STPUD News Release; Private Well Owner Survey- Phase II (2 slides/page)

LRWQCB Regional Plume Characterization

Site Cleanup Subaccount Program (SCAP) Regional PCE Investigation Update (A. Cazier, PE, LRWQCB)

Abby gave an update on the progress of the Site Cleanup Subaccount Program (SCAP) Regional PCE Investigation currently being conducted by the Lahontan Regional Water Quality Control Board (LRWQCB). This is a multi-year groundwater investigation being funded by the SWRCB through SCAP (Total Value = \$4.6 M). PCE groundwater contamination in the South Y area has impaired public and domestic water supplies for over 30 years. Investigation tasks include; records review and potential source area inventory, regional PCE plume delineation, vertical conduit evaluation, private well sampling, soil gas sampling, sentry/monitoring well installations, and potential source area investigation (s).

The records review identified approximately one hundred parcels in the South Y Area that may be potential source areas of PCE contamination (Tier 1 Inventory). These parcels are commercial properties with past history of PCE use associated with dry-cleaning facilities, carpet cleaning businesses, auto repair shops; and auto paint and body shops. Questionnaires from LRWQCB 13267 Investigative Orders are being reviewed along with results from the Regional Plume Characterization (RPC) to help identify suspected source areas.

Tahoe Valley South Subbasin (6-005.01) Groundwater Management Plan

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Well inventory is being performed to identify water supply wells; and relict monitoring wells (Swiss Mart, Hurzel Property) in the South Y area. The status of many water supply wells (active/inactive/destroyed) cannot be confirmed by current property owners. The well inventory will be updated pending results from the District's current private well owner's survey. The well inventory will then be compared to results from the RPC to identify wells which may act as vertical conduits for the movement of PCE groundwater contamination.

The RPC is the major task executed in 2019. Primary objectives were to estimate the lateral and vertical extent of PCE contamination; understand regional subsurface lithologies; estimate depths where PCE contaminant mass enters water supply wells; identify preferential pathways; and provide a "snapshot" of current distribution of PCE within the contaminant plume to support evaluation of potential remedial and receptor protection options. A total of 13 Sonic Borings (TD to 300 feet) and 51 CPT Borings (TD to 100 feet) were arranged along radial transects for collection of groundwater quality samples (8 samples/location) and analyzed for VOCs. A total of 110 groundwater samples were collected from the Sonic Borings; sonic cores were collected and lithology logged (USCS). A total of 408 groundwater samples were collected from the CPT Borings. Tip resistance and sleeve friction were used to estimate soil types. Data gaps from the 2019 RPC occurred in 5 areas; 1. Define Northern Extent; 2. Define Vertical Extent – north end; 3. Define Eastern Extent; 4. Define Vertical Extent – southwest margin; 5. Investigate clay layer & vertical extent- south central portion of plume. A data gap investigation consisting of 9 Sonic Borings and 6 CPT Borings is planned to address these data gaps (expected July/August 2020).

Vertical conduit evaluation is being used to prioritize wells that may be serving as pathways for PCE groundwater contamination. Wells that have a high potential (location within plume; susceptible well construction) have been identified and are being selected for potential well destruction. LBWC #4 was identified as a high potential well during 2019 RPC; this well was destroyed (Mud-rotary drilled to 195 feet to clear gravel fill from open hole below bottom of well casing; Blast perforate 12" Casing and 10" Liner ; and filled to surface with neat cement) during week of June 22, 2020.

Private well sampling- eight domestic wells were sampled in 2019; TV Elementary School Well (Inactive) had detectable levels (0.5 µg/L) of PCE; remaining 7 wells (Active) PCE was not detected (RL= 0.5 µg/L).

Soil Gas Sampling involving the installation of 15 shallow (<5 ft) soil vapor probes in areas of known groundwater contamination and near sensitive receptors; and 5 deep (10 ft) soil vapor probes is planned for September/October 2020.

Sentry Wells (2) are being sited and designed for installation up-gradient of LBWC #1 and TKWC #1. Monitoring Wells (2) are being sited and designed for installation up-gradient of LBWC #5 and TKWC #2. Construction for these four wells is being planned for September/October 2020. Under SCAP, both the Sentry and Monitoring Wells will be sampled following construction during four semi-annual monitoring events.

Source Area Investigations are anticipated to occur in 2021 (Contract Value \$380 K)

Handouts: Site Cleanup Subaccount Program (SCAP) Regional PCE Investigation Update (2 slides/page)

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Q & A (Group)

- What is difference between Sentry Wells and Monitoring Wells? : Difference is in location with respect to plume: Sentry Wells are sited outside the plume; Monitoring Wells are sited within the plume.
- What have we learned from this work that may help improve how future site investigations are performed? : Need to do a better job holding RPs responsible for defining the vertical extent and depth of contamination.
- How can this work be used to make policy changes that would insure a more thorough investigative process and saving the costs needed in identifying responsible parties? : Lesson Learned - Contamination assessments should be completed with full delineation of the groundwater contamination; before remedial action(s) are approved.
- Has LRWQCB been successful in negotiating access agreements to conduct the Source Area Investigations; and if not, how is this going to impact the approach for these investigations?: LRWQCB is requesting that the PRPs conduct the investigation on their own properties; if not possible, SCAP could possibly be used; if access denied, most source area investigation work will be conducted in down-gradient areas.

DRI Model Evaluation – 50 Year Water Budget

GWMP 5-Year Update Groundwater Model Evaluation (S. Rybarski, M. Hausner, DRI)

Susie described the Recommended Actions (RAs) identified by DWR and the DRI modeling tasks planned to develop the information needed to address the RAs as part of the update to the 2014 Groundwater Management Plan. This included developing 50-year water budgets to address RA-1, RA-2 and RA-3; summarizing findings from the South Y PCE Fate and Transport model to address RA-5; delineating a Groundwater Management Area (GMA) along with sustainability indicators and minimum thresholds to address RA-6; developing sustainability goals, indicators and minimum thresholds to address RA-7; and through this work identifying any remaining data gaps to address RA-8.

The 50-Year Water Budgets need to account for climate change effects and changes in pumping. Climate scenarios will be developed using DWR-accepted climate models (CIMP5) to help address uncertainties inherent in climate models. The climate scenarios will be used to assess the effects of climate change on groundwater recharge (rate and timing). These simulations will be compared to standard climate model simulations to develop a range of potential variability of impacts due to climate change. Pumping rates will be projected using future water demand estimates recently completed for the District's service area by Kennedy Jenks; and 50—year population growth estimates for El Dorado County (2010-2060) developed by the California Department of Finance.

In order to demonstrate how pumping may impact plume migration or cause degrade water quality DRI will summarize results from the South Y PCE Fate and Transport model report completed for the South Y Feasibility Study. Remedial scenarios showing the effects of varying pumping rates and pumping locations will be highlighted for incorporation into the update of the 2014 Groundwater Management Plan (2014 GMP).

A base 1-year transient model with no pumping will be developed for comparison with climate scenarios. A depletion analysis will be performed to evaluate reductions in stream base flow. Results from the depletion analysis will be compared to the base 1-year transient model to identify the seasonal timing and conditions that may cause an undesirable depletion of interconnected surface waters. Using conservative pumping rates and the most conservative climate scenario (e.g., hot and dry scenario) a capture analysis will also be performed to delineate the GMA as defined by model cells with greater than 50% stream capture in any model layer.

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Modeling results from the 50-year water budget simulations, depletion analysis and capture analysis will be used to identify recommended monitoring sites and quantitative criteria for groundwater levels, storage and depletion of interconnected surface waters that can be used to determine compliance. Minimum thresholds will be set within the range of historical variability derived from the South Tahoe Groundwater Model. Proposed indicators, thresholds and monitoring sites identified through this process will be presented to the SAG for review and comment prior to finalizing.

Data gaps identified as this work proceeds will be noted for incorporation into the updated 2014 GMP.

Handouts: GWMP 5-Year Update Groundwater Model Evaluation (2 slides/page)

Q & A (Group)

- DWR has required that the District report its water budget strictly for the area of the TVS Basin, as defined by DWR, would this affect the depletion analysis and capture analysis?: Let me think about this.
- El Dorado Water Agency and Placer County Water Agency are in the process of performing an American River Basin (ARB) Study. The ARB Study also includes use of climate change scenarios, similar as described for DRI's modeling work the 2014 GMP; are you aware of this on-going study; if not consider contacting this group for more information on the climate change assumptions being used in the ARB Study effort: Not aware good point, Rick will follow-up with contact information to District and DRI.
- Would changes in Lake Level during drought affect the capture analyses and delineation of the GMA during Task 3?: DRI is currently discussing how best to model Lake Level changes in the simulations. If Lake Level changes are significant, influence could be important.
- What is the schedule for completion of the proposed work? : Contract completion date is June 30, 2021.
- Are you able to explore antecedent conditions which may follow drought conditions by shifting the starting point for groundwater pumpage during the following year? Reply: Hard to predict; pumping rates are currently envisioned to vary based on population growth rate, seasonal and pumping distribution trends.
- Would Kennedy Jenks have an interest in re-examining water use projections, in light of potential increases in water use resulting from the increased need for washing due to COVID-19? : Interesting question, uncertain how this event can be applied to the groundwater predictive models; uncertain how long COVID-19 will continue.
- Are there any plans to update the South Y PCE Fate and Transport Model incorporating results from the current South Y PCE RPC? : For now, plans are to summarize previous reports; updating the model with the RPC results is not in the scope of work.

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Update to 2014 Groundwater Management Plan (2014 GMP)

5-Year Update to 2014 GMP (I. Bergsohn, STPUD)

Ivo provided a presentation on the progress of the five-year update the 2014 GMP, due to DWR by January 1, 2022. The focus of the presentation was on: 1) identifying ways to improve public outreach during the update process; and 2) walking through a portion of the status review of Table 10-1 Implementation Plan from the 2014 GMP. A brief review of the administrative items completed for the 5-year update since the last Workshop in November 2019 was also discussed and copies of Resolutions and MOU from the District and El Dorado Water Agency were provided in the handouts.

As part of Public Outreach - GSAs are required to provide notice describing the manner in which interested parties may participate in the development and implementation of Groundwater Sustainability Plans. A copy of the draft Public Notice prepared for the 5-year update was considered. Opportunities for participation cited in the draft Notice included;

- Joining the GMP Interested Parties Email List (at last count about 70 members);
- Attending and providing comments at Public meetings/Workshops;
- Mailing comments directly to the District; and
- Visiting the District's Groundwater Management web page.

Are there other tools that should be considered to encourage participation in this process?

DWR's Stakeholder Engagement Chart was presented as a tool to identify the different Categories of Interest associated Stakeholder Groups for the TVS Basin.

- General Public- EDWA Board includes three County Board of Supervisors; should we more actively engage City Counsel, others?
- Private Users – The District is currently using the Public Well Owners Survey (PWOS) as an outreach tool to Private Well Owners; mailing addresses and emails compiled during the well survey could be used to directly notify private well owners through email and direct Mailers.
- Environmental and Ecosystem – SAG includes reps from USFS, CTC and TRCD; are there other groups that we should be engaging, such as Ca State Parks, others?
- Human Right to Water- Small Community Systems included in PWOS
- Integrated Water Management - Tahoe Sierra IRWM- BMO #3, Action 3 – Participate in IRWMP Process; how best to achieve this objective?

A copy of Table 10-1 Implementation Plan Review was provided to the SAG. Ivo walked through the last section of Table 10-1 focused on the "Projects Dependent on Outside Funding" specifically called-out by DWR in RA-8. The purpose of the exercise is to: 1) Consider the status of each item; and 2) Determine whether the item needs to be expanded or revised for the updated 2014 GMP. A .doc file of Table 10-1 will be distributed to the SAG for fielding SAG comments (comments requested by Friday, August 28th).

BMO#4 - Groundwater Vulnerability is a term used to represent the natural characteristics that determine the ease with which groundwater may be contaminated by human activities. Vulnerability assigned to a site or an area is based on the relative ease with which infiltrating water and potential contaminants may reach groundwater in a vertical or sub-vertical direction. It is evident from the history of groundwater contamination in the TVS Basin that groundwater is very susceptible to contamination from petroleum hydrocarbons, MtBE and PCE spills and releases at land surface or in the shallow subsurface above the water table. However, the District has not moved forward with conducting a formal vulnerability assessment of the TVS Basin.

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DRI delineated recharge areas across the TVS Basin as part of the Phase II modeling work completed in 2018. Groundwater Recharge is often used to help rank the degree of vulnerability within an area (i.e., high recharge = high vulnerability). This work could be built upon along with soils mapping and groundwater elevations to conduct a groundwater vulnerability assessment of the Basin.

Would a Vulnerability Assessment be found useful for planning purposes by TRPA, El Dorado County or City of South Lake Tahoe.

Is this worth maintaining as a future project in the updated 2014 GMP?

BMO #5- DRI assessed the effects of groundwater pumping on surface waters and the potential effects of climate change on groundwater conditions as part of the Phase II modeling work completed in 2018. DRI is going to further address this Action as part of their groundwater modeling work for the updated 2014 GMP. This Action is On-Going.

BMO #7 - Groundwater Sustainability Agencies have the power and authority to conduct investigations for the a number of purposes, including but not limited to:

- To determine the need for groundwater management.
- To prepare and adopt a groundwater sustainability plan and implementing rules and regulations.
- To propose and update fees; and
- To monitor compliance and enforcement.

The District currently provides letters of support for projects that improve the understanding of hydrologic processes, groundwater quality and groundwater quantity in the TVS Basin; and makes its groundwater data readily available for public use.

Should this Action be expanded to include the powers and authorities granted to GSAs under SGMA?

BMO #7 - The existing TVS Basin Groundwater Model was initially updated by DRI in 2015 and is updated annually to calculate and track groundwater storage presented in the TVS Basin WY Annual Report. Future updates and recalibration of the groundwater model may be needed as new hydrogeological data becomes available. This Action is On-Going.

BMO #7- DRI provided recommendations to improve the existing Basin Monitoring Network. This included adding an Observation Well or using existing Public Water Supply Wells in the South Y Area to monitor changes in groundwater elevations. DRI also recommended use of a new or existing Observation Well in the southeast portion of the Basin near (> ¼-mile) from Saxon Creek. A new well in this area would likely be located outside the District's service area and within the jurisdiction of the EDWA GSA. LRWQCB is also seeking parties to take responsibility for new sentinel/monitoring wells be planned in the South Y Area.

Should this Action be expanded to pursue the LRWQCB option?

BMO #7 - This Action was included in the 2014 GMP in case of increased pumping or occurrence of an extended drought in the TVS Basin. Further information on the potential impacts from increased pumping and changing climate conditions, including an extended drought will be provided as part of the work being performed by DRI in developing the 50-year water budgets. This Action is On-going

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This information may be helpful in assessing the potential need for considering projects that may enhance groundwater recharge within the Basin. However, current groundwater elevation data and water budgets suggest that groundwater recharge is adequate; and the likelihood that groundwater replenishment facilities would be needed is very low.

Should this Action be continued or removed from the updated GMP?

Handouts: District Resolution 3140-20; EDWA Resolution WA-6-2020; District & EDWA MOU; Public Notice of Opportunities; Stakeholders Engagement Chart; Table 10-1 Implementation Plan Review; 5-Year Update to 2014 GMP (2 slides/page)

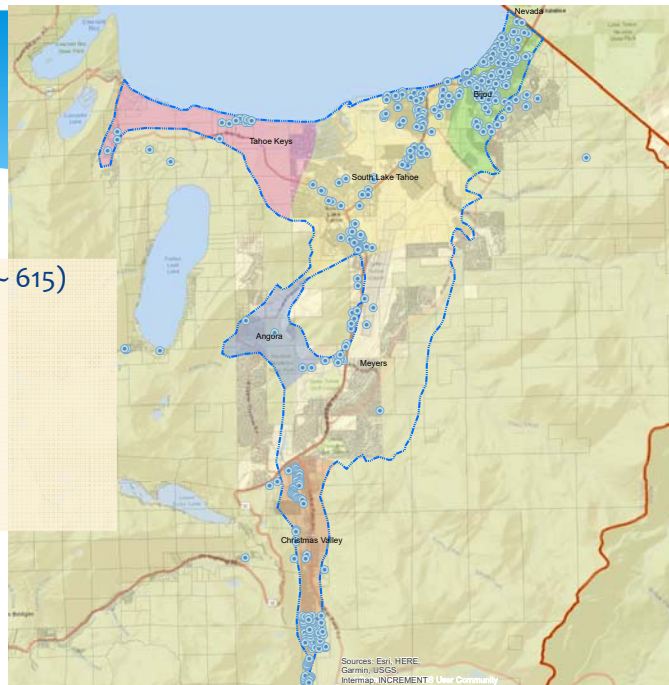
MEETING ADJOURNED (4:00 pm)

TAHOE SOUTH SUBBASIN (6-005.01) SAG WORKSHOP 1 July 29, 2020

Private Well Owner Survey – Phase II
I. Bergsohn, STPUD

Private Wells

- * Wells - inferred (~ 615)
- * Types
 - * Domestic
 - * CWS
 - * NTNC
 - * TNC
 - * SSWS

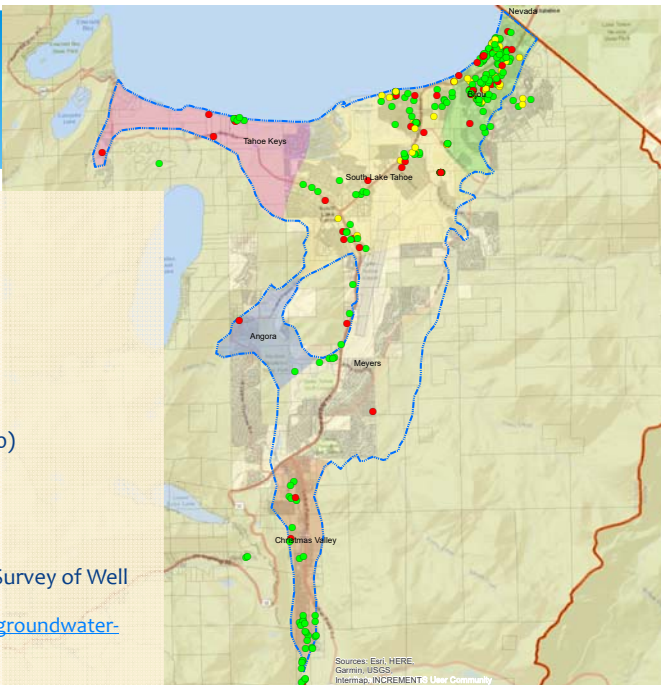


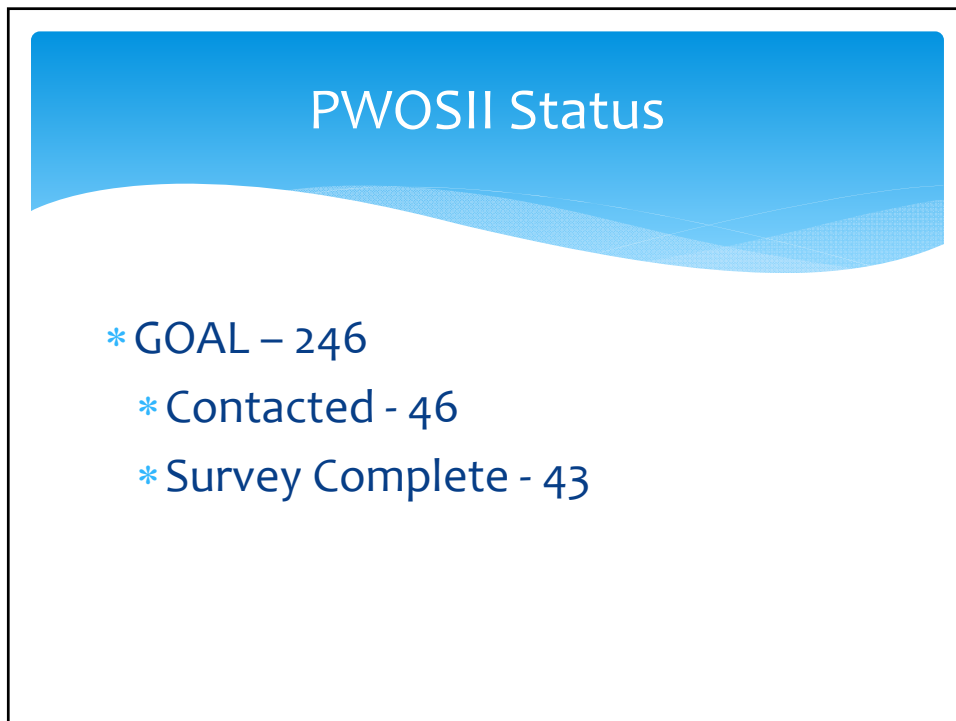
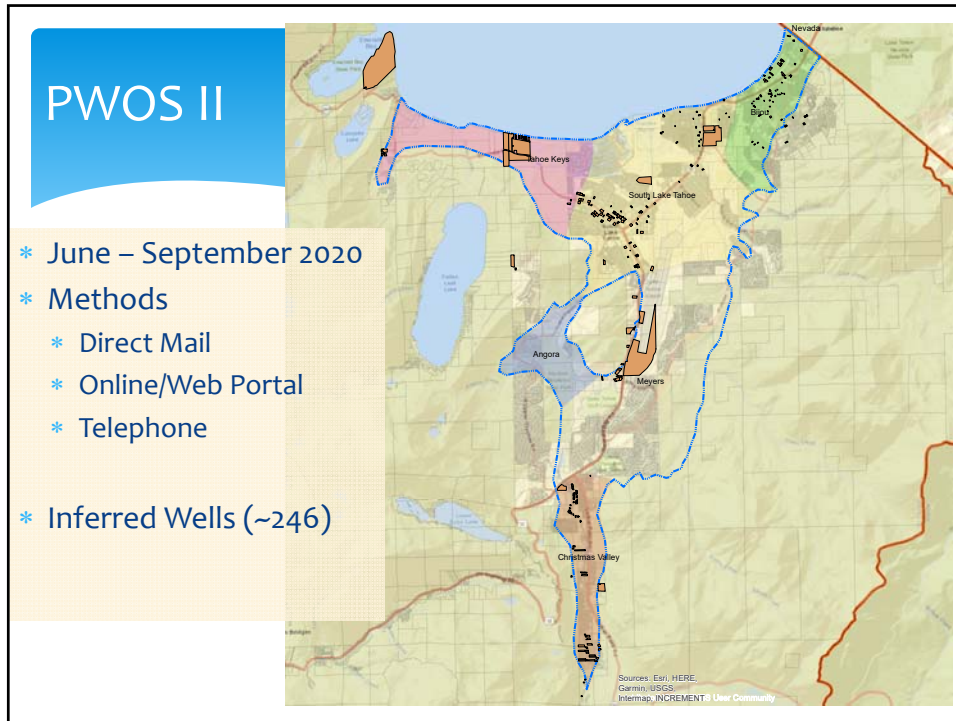
OBJECTIVES

- * Inform Private Well Owners of GSAs & Groundwater Management
- * Encourage Private Well Owners to participate in the SAG
- * Reach-out to Private Well Owners to better understand:
 - * Well Ownership
 - * Water Usage
 - * Well Condition
 - * Water Quality
 - * Well Owner Concerns

PWOS I

- * August – October 2017
- * Methods
 - * Direct Mail
 - * Door to Door
 - * Online/Web Portal
 - * Telephone
- * Confirmed Well Sites (370)
 - * Yes (247)
 - * No (77)
 - * Uncertain (46)
- * TVS Groundwater Basin Survey of Well Owners (Allegro, 2018)
 - * <https://stpud.us/news/groundwater-management-process/>





**Tahoe Valley South Subbasin
Groundwater Management Plan
Stakeholder Advisory Group Workshop
July 29, 2020**

**Site Cleanup Subaccount Program (SCAP)
Regional PCE Investigation Update**

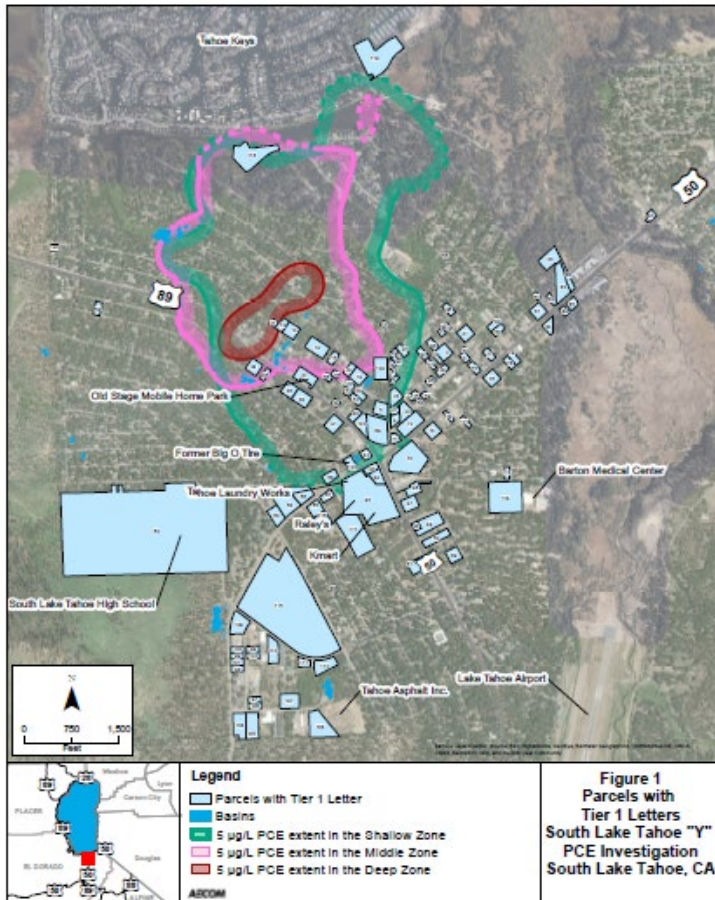


Abby Cazier, PE
Water Resource Control Engineer

Introduction

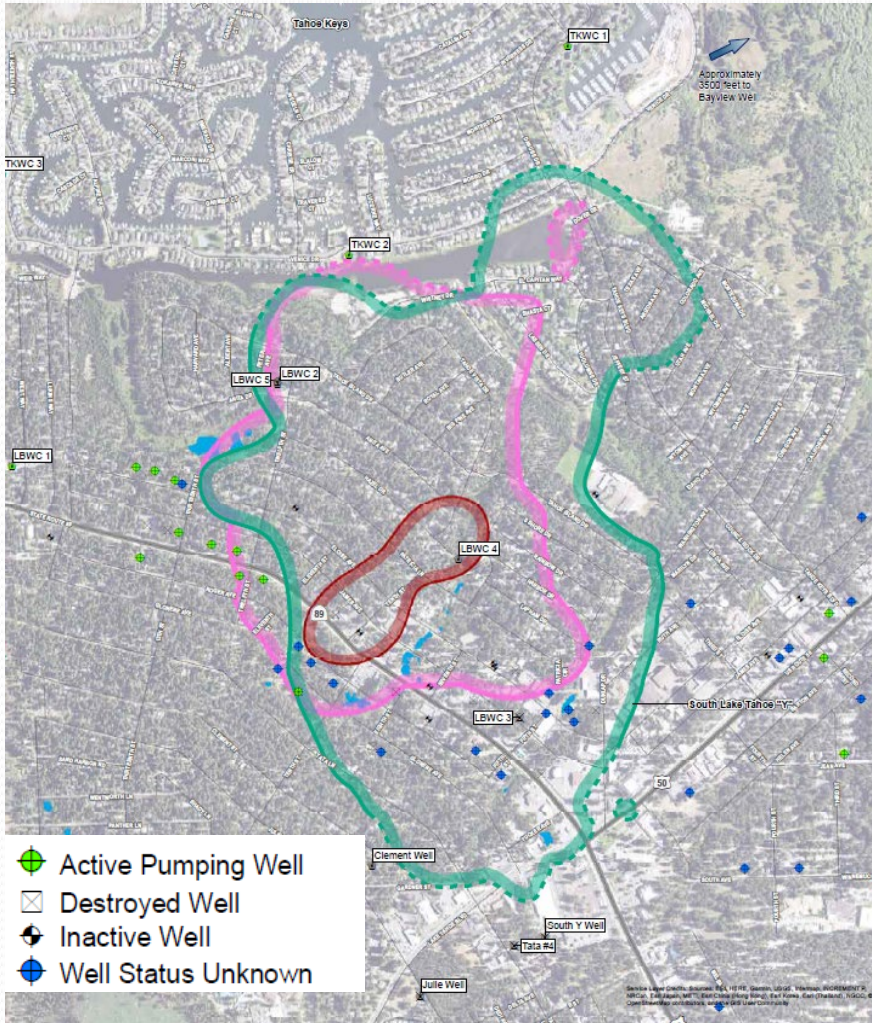
- Site Cleanup Subaccount Program (SCAP) Regional Investigation Tasks
 - Records Review and Inventory Development
 - Regional PCE Contamination Investigation
 - Vertical Conduit Evaluation and Destruction
 - Non-Municipal Water Supply Well Sampling
 - Soil Gas Sampling
 - Sentry and Monitoring Well Network Installation
 - Source Area Investigation

Source Area Inventory



- Review records to develop Tier 1 Inventory
- Over 200 13267 Investigative Orders (Order) issued requiring the submittal of Chemical Use and Site History Questionnaire
- Tier 1 Inventory, questionnaire responses, and Regional Contamination Investigation results being evaluated to identify potential responsible parties

Well Inventory



- Identify supply wells (active/inactive)
- Identify monitoring wells
- Locate supply well DWR Well Completion Reports
- Locate boring logs for monitoring wells
- Review El Dorado Co. Environmental Management's records
- Tabulate well construction detail
- Verify well status
- Evaluate inventory relative to Regional Contamination area lithology and PCE contamination

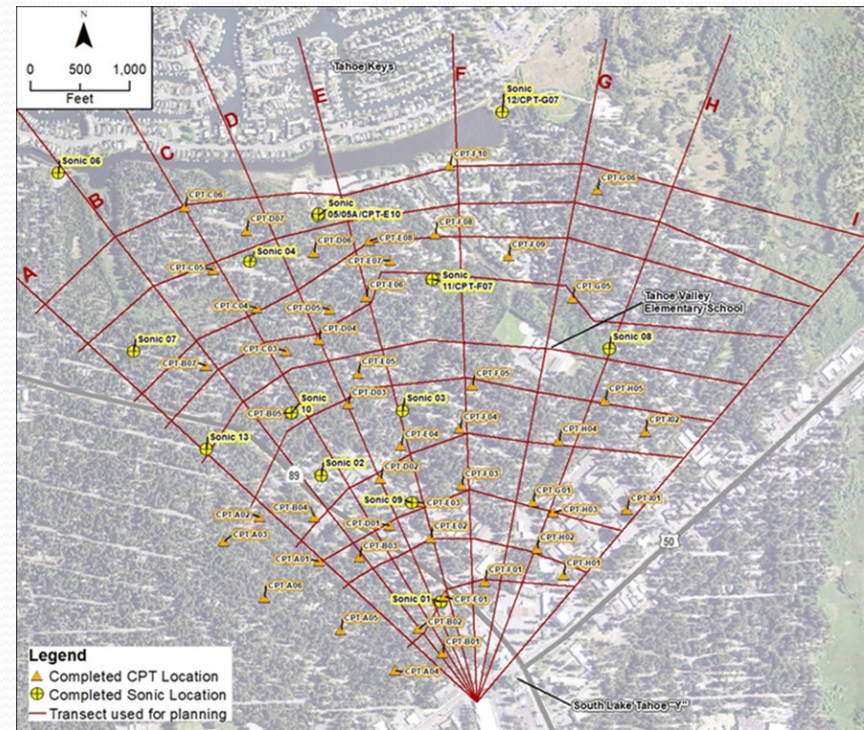
Regional PCE Contamination Investigation

- Task Objectives

- Estimate lateral and vertical extent of PCE contamination
- Understand regional subsurface lithology
- Estimate depth where contaminant mass enters water supply wells
- Identify preferential pathways contributing to contaminant transport
- Provide “Snapshot” of the Regional PCE Contamination to support and evaluate feasibility of potential remedial and receptor protection options

Regional PCE Contamination Investigation

- Groundwater Investigation 2019
 - Radial transect approach selected for boring placement
 - 13 sonic borings advanced to 300 feet bgs
 - 51 Cone Penetration Test (CPT) borings advanced to 100 feet
 - Approximately 8 groundwater samples collected per location



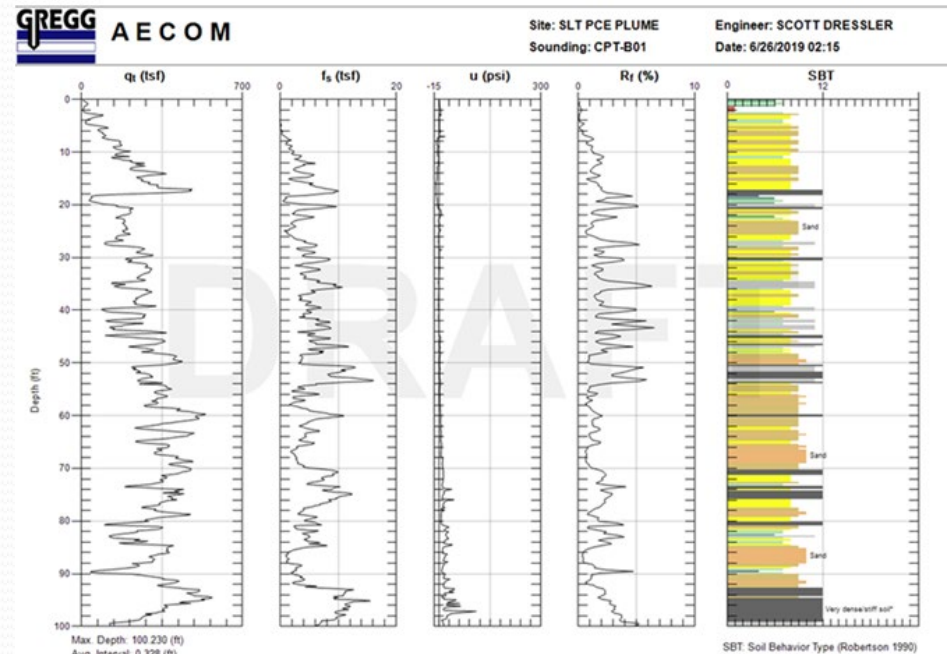
Sonic Drilling Activities

- 7 borings advanced near inactive/active supply wells
- 6 borings advanced within the contamination and near contamination area boundaries
- 110 groundwater samples were collected
- Core logged using Unified Soil Classification System
- Soil samples analyzed physical parameters (i.e. grain size) and TOC analysis

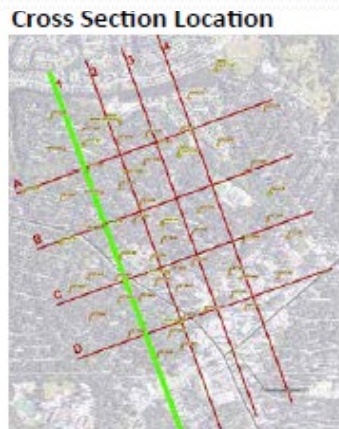
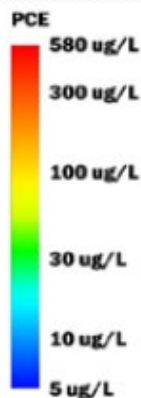
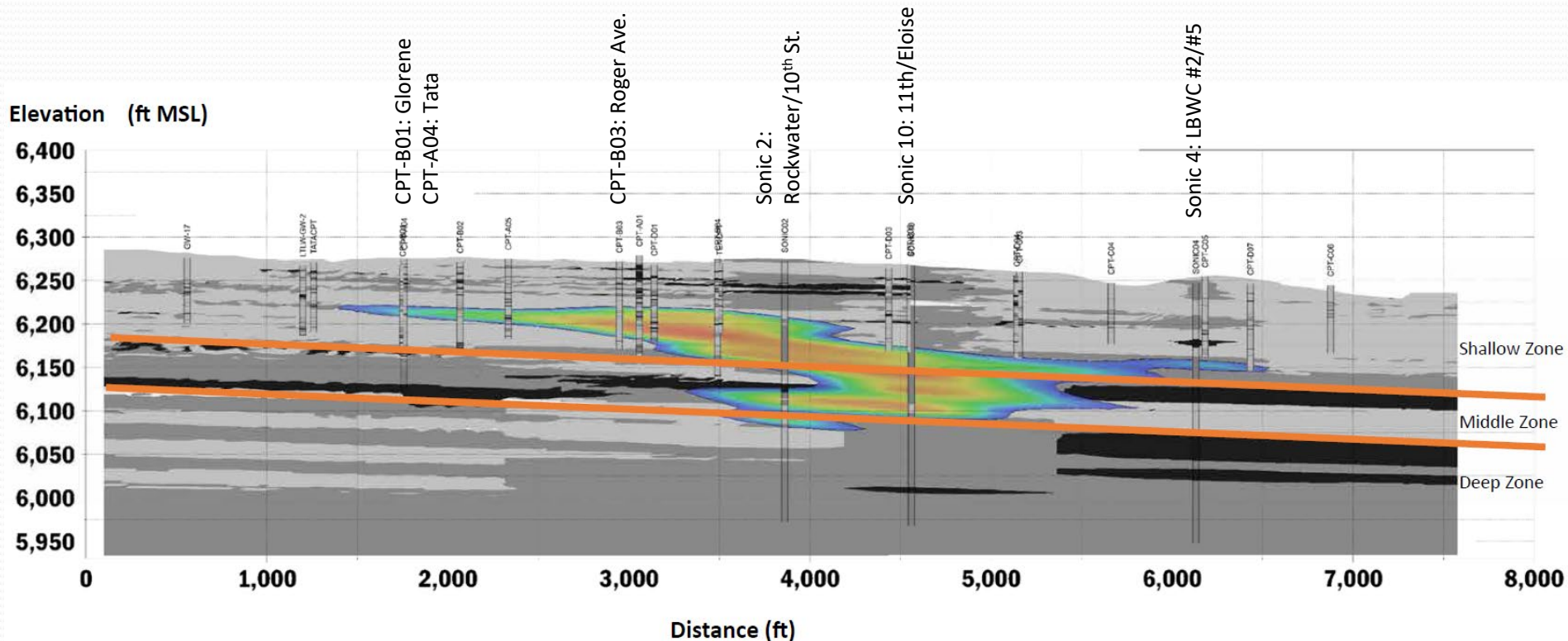


Cone Penetration Test Drilling Activities

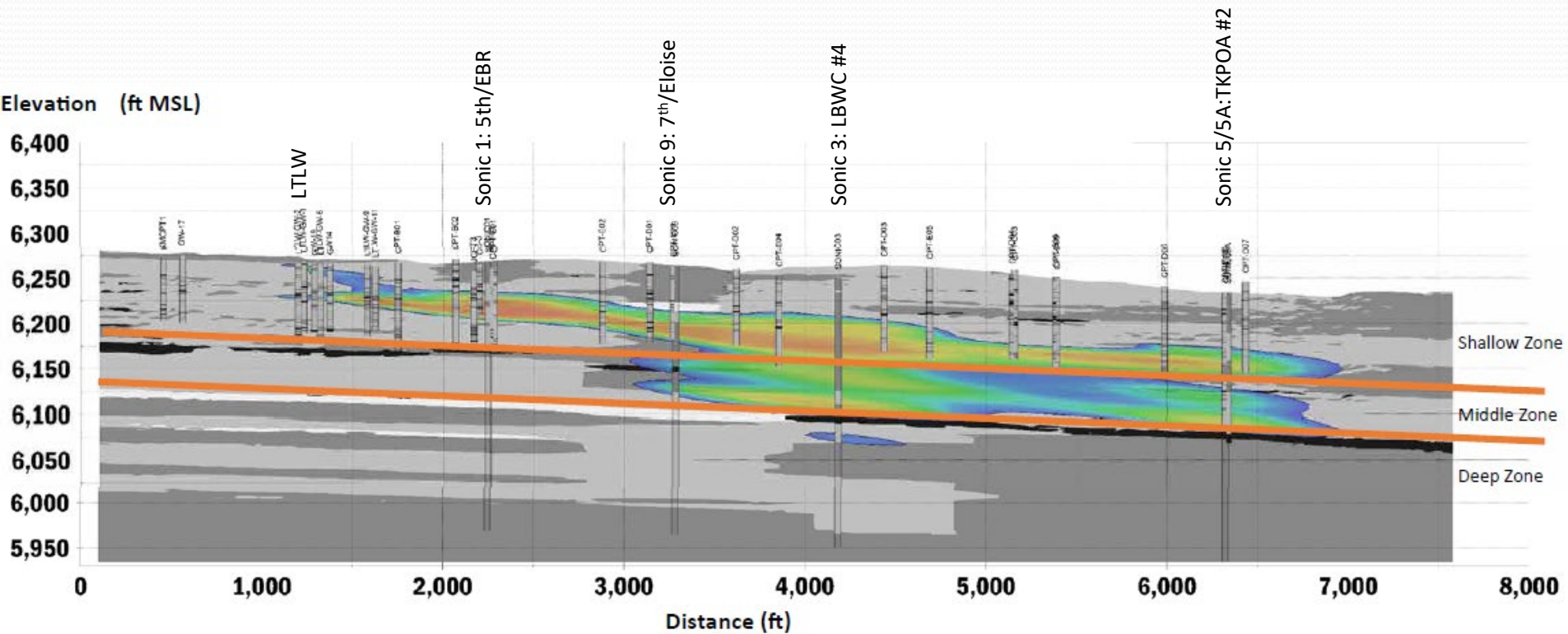
- Cone pushed through subsurface to apx. 100 feet bgs
- Tip resistance and sleeve friction used to estimate soil type
- 1st CPT push to evaluate lithology and determine sampling intervals
- Co-located CPT pushes advanced to collect groundwater samples
- 408 groundwater samples were collected



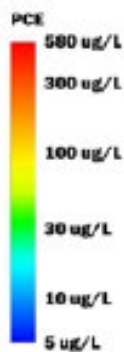
Cross Section 1 – South to North



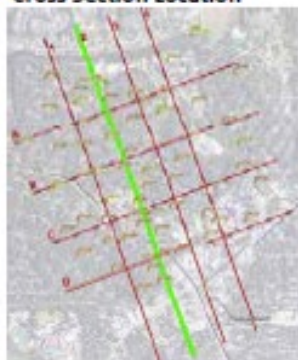
Cross Section 2 – South to North



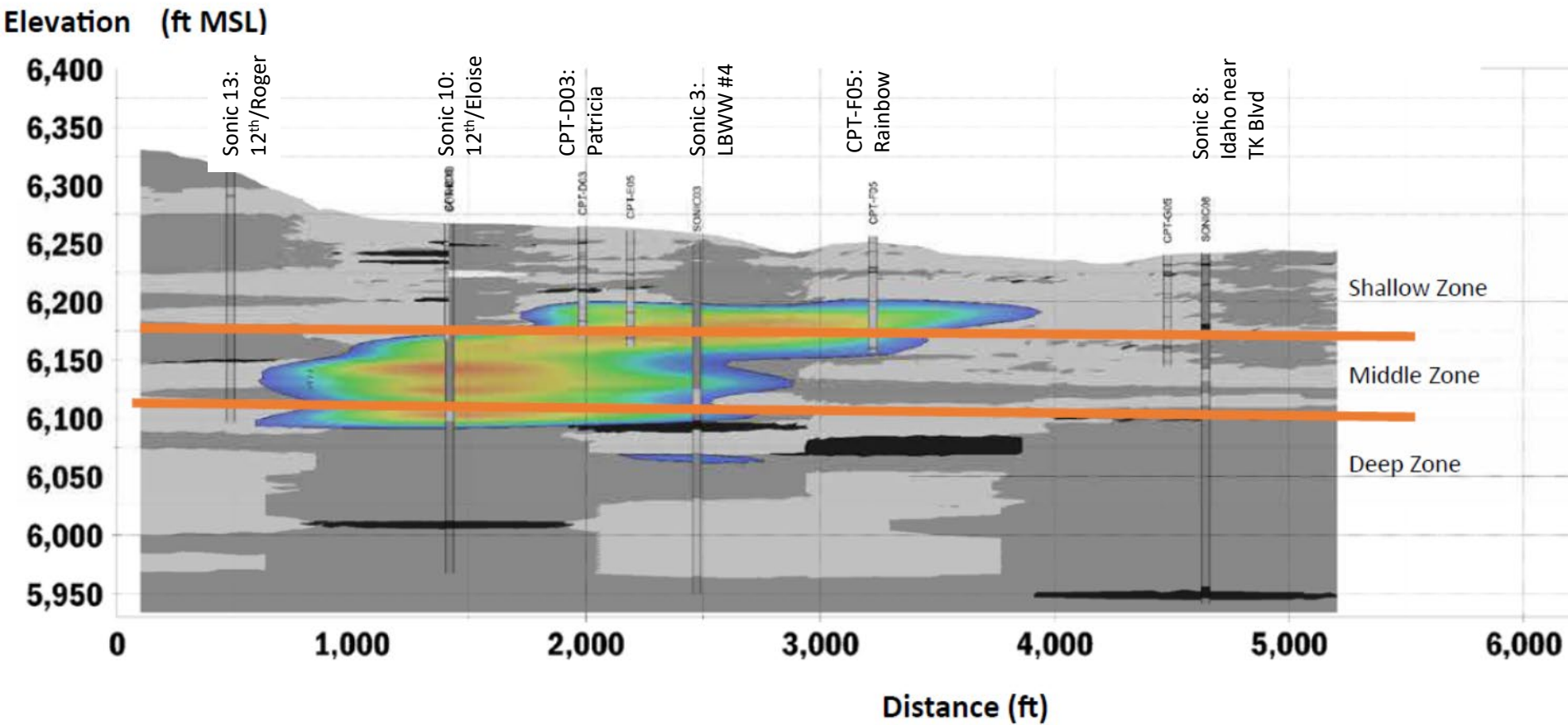
- Lithology**
- Coarse Grained Sand
 - Sand
 - Fine Grain, Silts and Sand
 - Fine Grain, Silts and Clays



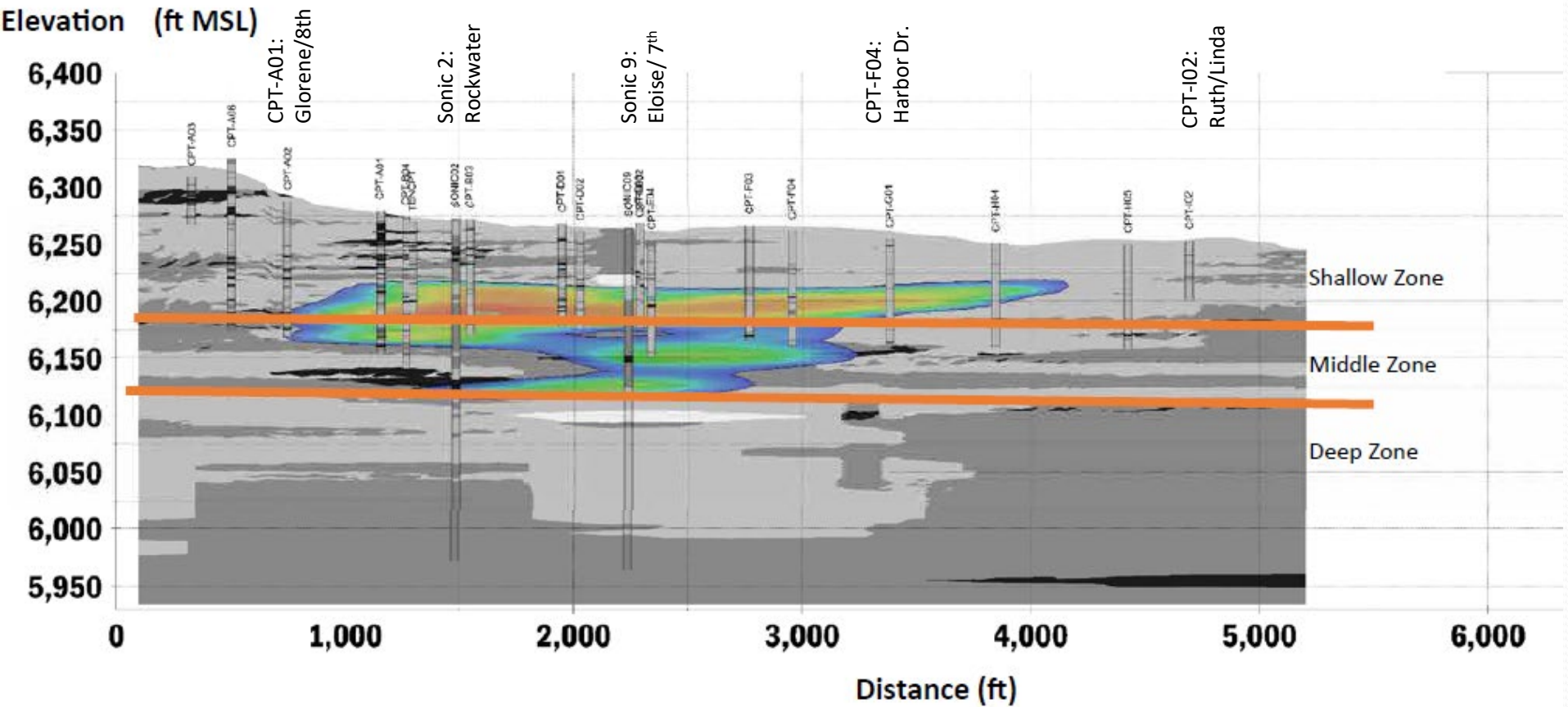
Cross Section Location



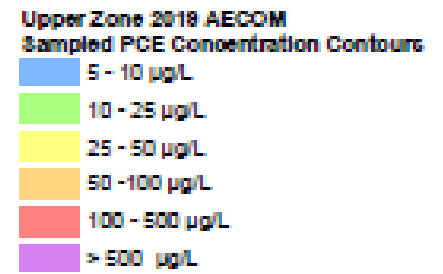
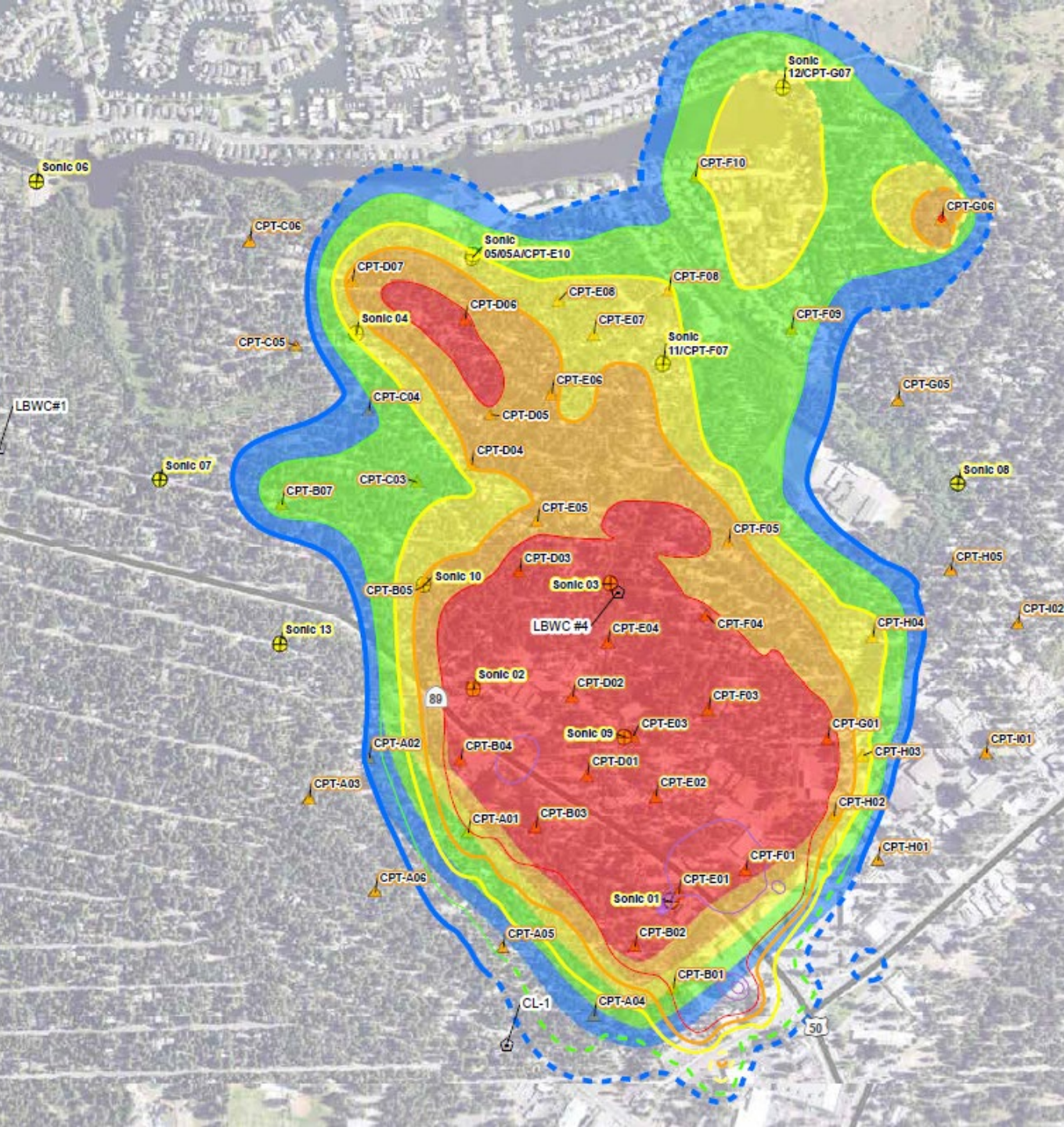
Cross Section B – West to East

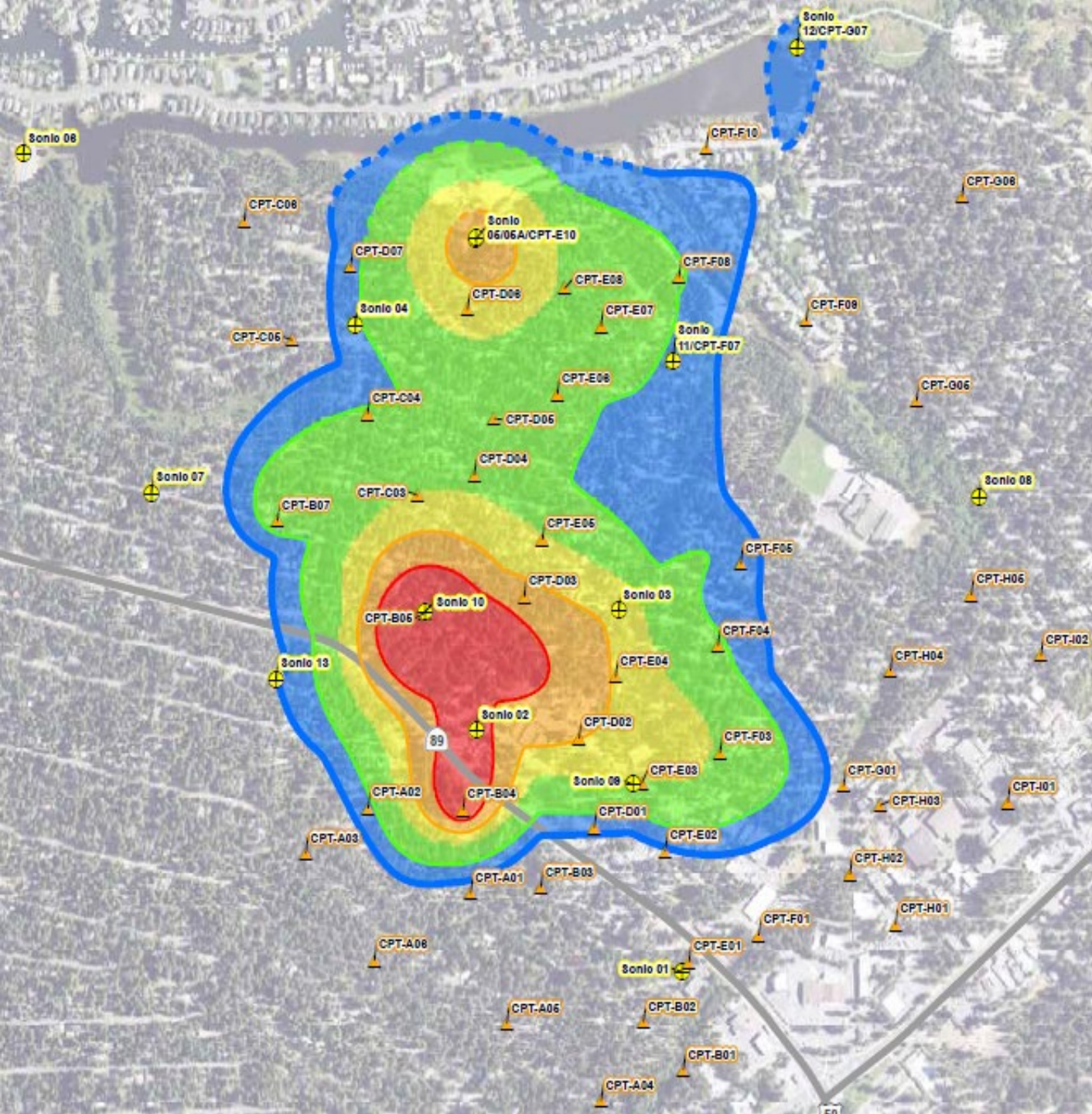


Cross Section C – West to East



Shallow Zone PCE Map

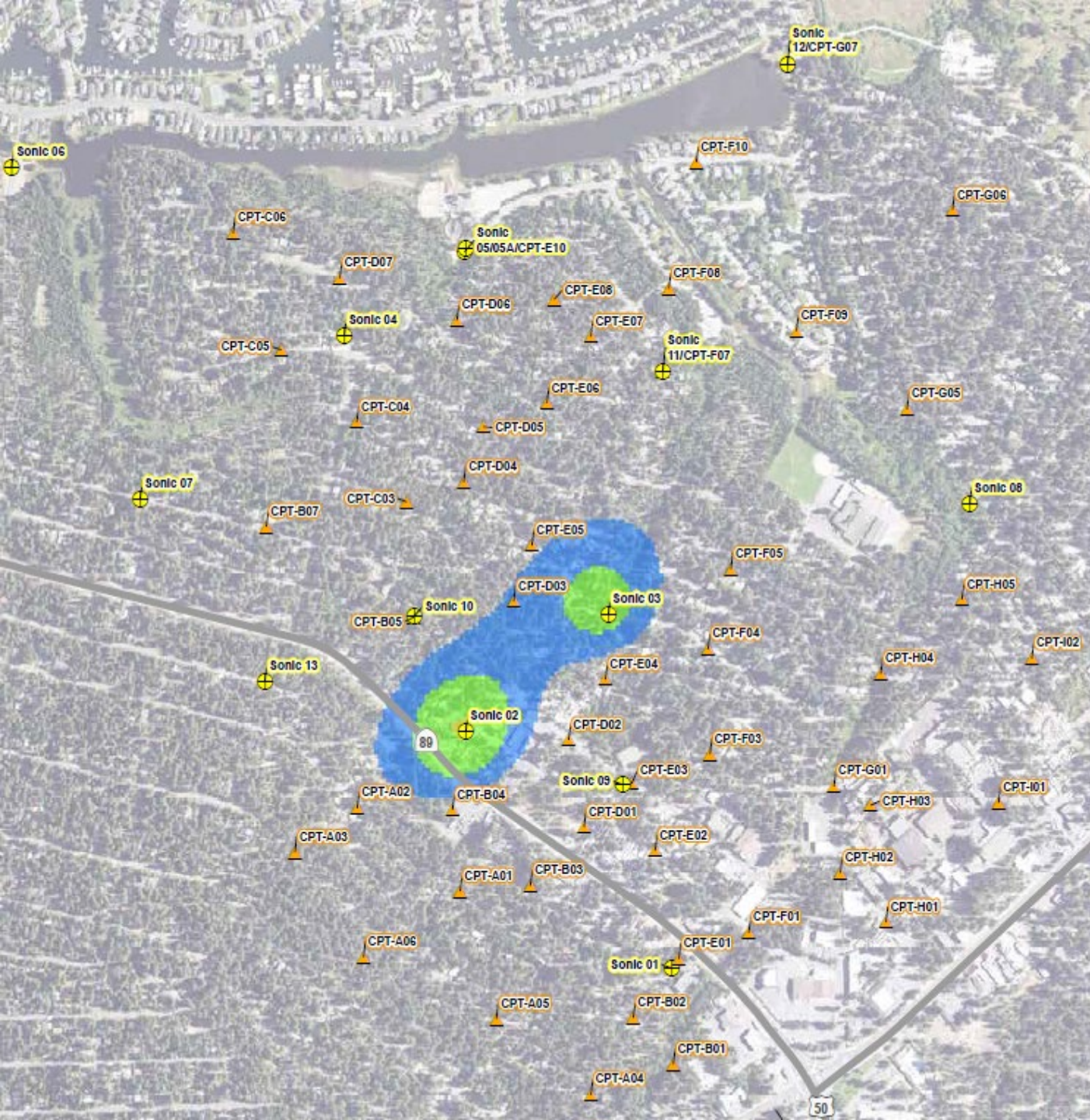




Middle Zone PCE Map

**Middle Zone 2019 AECOM
Sampled PCE Concentration Contours**

- 5 - 10 µg/L
- 10 - 25 µg/L
- 25 - 50 µg/L
- 50 - 100 µg/L
- 100 - 500 µg/L
- > 500 µg/L

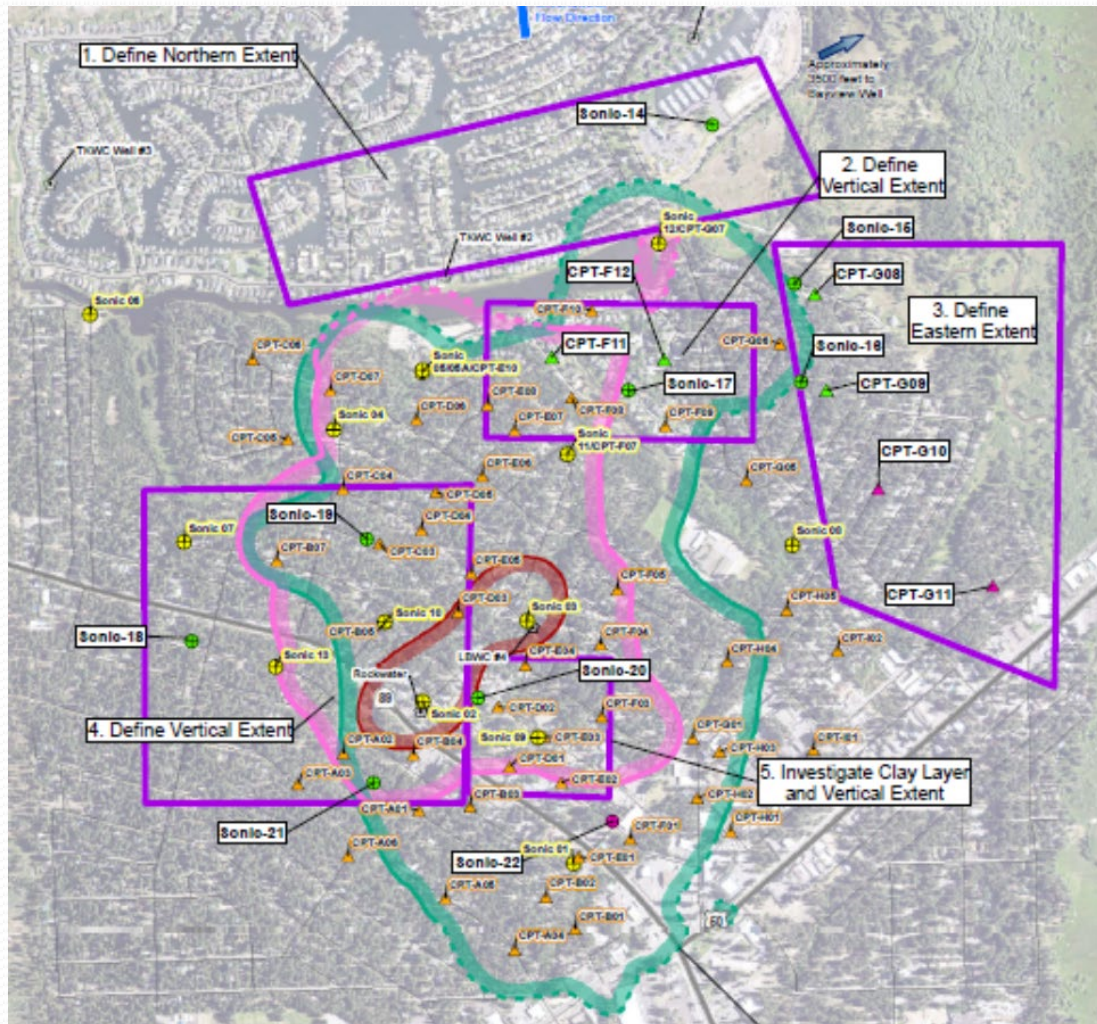


Deep Zone PCE Map

**Deep Zone 2018 AECOM
Sampled PCE Concentration Contours**

- 5 - 10 µg/L
- 10 - 25 µg/L

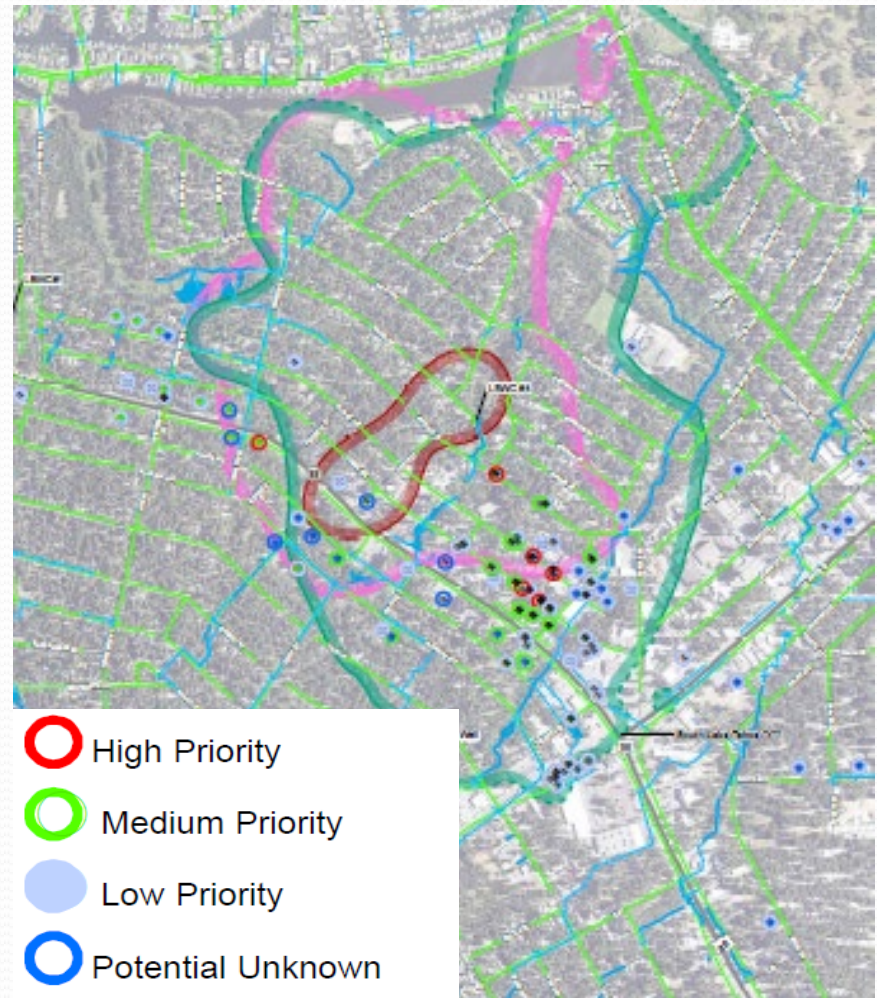
Data Gaps Identified in 2019



- Data gaps identified in 5 areas
- Address priority data gaps by advancing:
 - 9 Sonic borings
 - 6 CPT borings
- Data gap investigation began in July and expected to be completed in August 2020

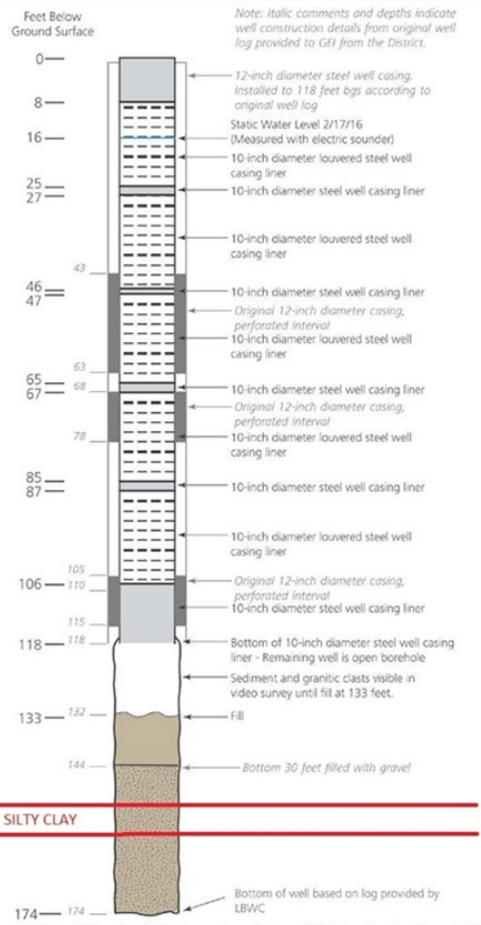
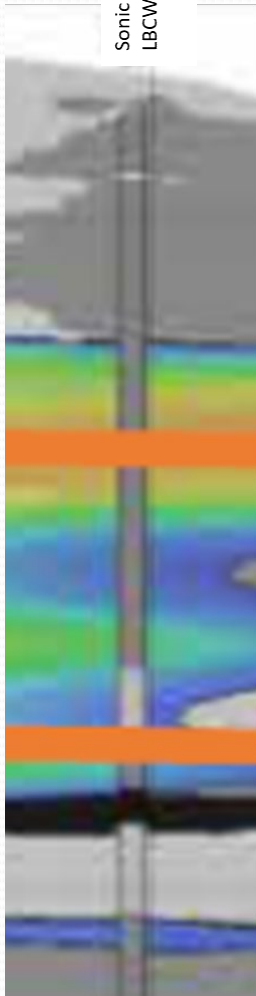
Vertical Conduit Evaluation

- Task Objective: Identify potential vertical conduits responsible for PCE migration
- Vertical conduit evaluation criteria
 - Well located within Regional Contamination
 - Well screened across clay or silt aquitard
 - Well filter pack intercepts clay or silt aquitard
- Preliminary evaluation
 - **Red** indicates well is high potential vertical conduit priority
 - LBWC #4, 5 Swiss Mart MWs, and two active domestic wells
- Continued evaluation is required to prioritize wells selected for destruction



LBWC #4 Vertical Conduit Evaluation

Sonic 3:
LBCW #4



- Well destroyed during the week of June 22, 2020
- Well penetrated silty clay aquitard
- PCE was detected below the silty clay at 18 ug/L
- Over drilled borehole using a mud rotary drill rig to remove fine gravel
- Installed down-hole explosives, borehole/casing filled with neat cement, and detonated charges to blast perforate casings
- Blast perforations displaced grout into the formation, sealing annular space

Non-Municipal Water Supply Well Sampling



- Task Objective: Identify and sample domestic wells
 - 8 domestic wells sampled in October 2019
 - PCE was not detected above the RL of 0.5 ug/L in the 7 active wells and detected at 0.5 ug/L in well at Tahoe Valley Elementary
 - Two active wells were identified and property owners did not allow access
- Second round of sampling anticipated to occur in September 2020

Soil Gas Sampling

- Task Objective: Evaluate potential threat to human health from vapor intrusion
 - Install 15 shallow soil vapor probes (5 feet bgs) in areas of known shallow groundwater contamination and near sensitive receptors (preschool, high school, elementary school, private residences)
 - Install 5 deep soil vapor probes (10 feet bgs) at select locations to determine vertical extent
 - Soil vapor samples will be collected in accordance with the Active Soil Gas Investigation Advisory
 - Conduct a Tier 1 Human Health Risk Assessment using soil gas investigation data
- Soil gas sampling anticipated to occur in September/October 2020

Sentry Well Network Installation

- Task Objective: Install sentry well network upgradient from threatened receptors

LBWC #1

- Siting
 - Within capture zone of LBWC #1
 - Selected location: 560 James Avenue
- Design
 - 3 wells targeting the screened interval of LBWC #1 (132 -182 feet bgs)
 - Considered data from Sonic 7
 - Well 1: Screen from 110 - 115 feet bgs
 - Well 2: Screen from 135 - 150 feet bgs
 - Well 3: Screen interval TBD

TKPOA #1

- Siting
 - Within capture zone of TKPOA #1
 - Proposed location: 2411 Venice Drive
 - Location contingent on Data Gap Investigation results
- Design
 - 3 wells targeting the screened interval of TKPOA #1 (125 -312 feet bgs)
 - Consider data from Sonic 12/Sonic 14
 - Well 1: TBD
 - Well 2: TBD
 - Well 3: TBD

- Sentry well network installation anticipated to occur in September/October 2020
- Contract task includes four semi-annual monitoring events

Monitoring Well Network Installation

- Task Objective: Install up to 3 monitoring wells upgradient from LBWC #5 and TKPOA #2 to monitor contamination migration
 - Siting
 - Location/s TBD
 - Design Considerations
 - LBWC #5 screened interval: 141 – 180 feet bgs
 - TKPOA #2 screened interval: 138 – 188 feet bgs, 348 - 414 feet bgs, and 426 – 491 feet bgs
 - Monitoring well screened interval to consider lithology and PCE concentrations detected in the Regional Investigation
- Monitoring well network installation anticipated to occur September/October 2020
- Contract task includes four semi-annual monitoring events

Source Area Investigation

- Task Objective: Identify and investigate potential sources that may be contributing to the Regional PCE Contamination
 - Scope of Work is currently being developed by AECOM
 - Identify potential source areas from Tier 1 Inventory
 - Implement passive and/or active soil gas, groundwater, and soil investigations
 - Evaluate contaminant transport along preferential pathways
- Source Area Investigation anticipated to occur in 2021

SCAP Schedule Summary for 2020

- **July – August:** Conduct Data Gap Groundwater Investigation
- **September – October:** Install Sentry/Monitoring Wells
- **October:** Conduct first semi-annual monitoring event
- **September:** Complete 2nd Non-Municipal Supply Well Sampling Event
- **September – October:** Conduct Soil Gas Investigation
- **TBD:** Destroy Priority Vertical Conduits



Questions?

GWMP 5-Year Update Groundwater Model Evaluation

Susie Rybarski
Mark Hausner
(7/29/2020)



DWR RECOMMENDED ACTIONS TO BE ADDRESSED

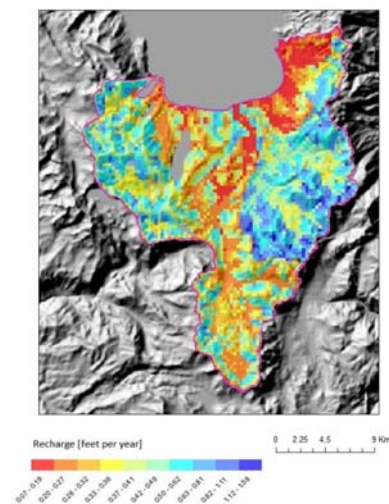
- **RA-1:** Provide water budget information in tabular form for the historical, current, and projected water budgets.
- **RA-2:** Provide a projected water budget incorporating climate change over the planning and implementation horizon of 50 years. Address the apparent discrepancy between the Groundwater Management Plan indicating a shift from snow to rain and the Urban Water Management Plan indicating no detrimental effects on the Subbasin.
- **RA-3:** Reconcile the differing future water demand trend projections between the Groundwater Management Plan, Urban Water Management Plan, and incorporate the reconciliation into the projected water budget.
- **RA-5:** Provide additional explanation for how pumping may impact plume migration or cause degraded water quality.
- **RA-6:** Provide estimates of the quantity and timing of depletions of interconnected surface water and further define what would cause depletions to become significant and unreasonable for the Subbasin.
- **RA-7:** Define quantitative criteria for groundwater levels, storage, and depletion of interconnected surface water that can be used to objectively determine compliance of the Plan with the objectives of SGMA on an ongoing basis.
- **RA-8:** Provide a description of data gaps and how they will be addressed

DRI TASKS TO ADDRESS RECOMMENDED ACTIONS

- **Task 1:** Develop updated water budgets for the 50-year planning horizon, including climate change and population growth (Addresses RA-1, RA-2, RA-3).
- **Task 2:** Summarize findings from the South Y PCE Model for inclusion in the plan (Addresses RA-5).
- **Task 3:** Delineate a Groundwater Management Area (GMA) based on the capture of water from streams and develop area-specific sustainability indicators and minimum thresholds for the undesirable results “depletion of interconnected surface water” (Addresses RA-6).
- **Task 4:** Develop recommended quantitative sustainability goals, indicators and minimum thresholds for undesirable results (chronic lowering of groundwater levels, reduction of groundwater storage, degraded water quality, and depletion of interconnected surface water) and reconcile those recommended goals to the guidance provided by DWR in draft Sustainable Management Criteria BMP guidelines (Addresses RA-7).
- **Task 5:** Identify data gaps that arise in addressing these issues and make recommendations on how to address those gaps (Addresses RA-8).

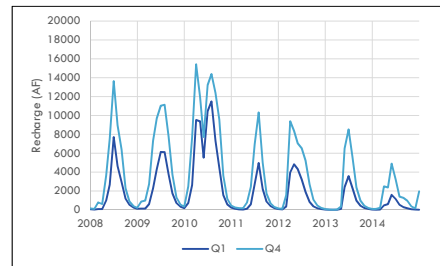
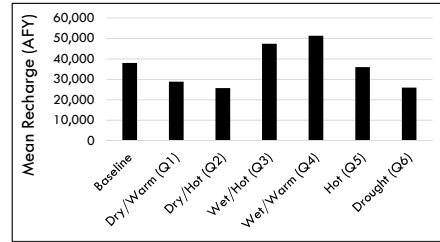
TASK 1: DEVELOP 50-YEAR WATER BUDGETS

- Addresses RA-1, RA-2, and RA-3
- Predictive water budgets must incorporate climate effects and changes in pumping
- Extend climate projections previously developed to address 2014 GWMP BMOs to 2099 (existing models simulate 33 years, we need at least 50)
- Project annual pumping rates according to projections of population growth and water demand (KJ, 2019; California Dept of Finance, 2020) following historical seasonal distribution
- Update existing South Tahoe groundwater model with revised recharge rates and projected pumping; generate simulated water budgets for 6 climate scenarios through 2099



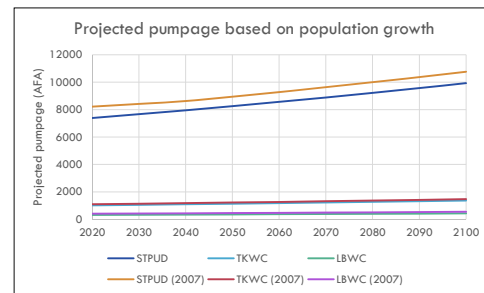
TASK 1: DEVELOP 50-YEAR WATER BUDGETS

- Five climate scenarios previously developed using global climate models (CMIP5) for 2075-2099 and a historically-based drought scenario
 - Q1 – warm and dry
 - Q2 – hot and dry
 - Q3 – hot and wet
 - Q4 – warm and wet
 - Q5 – hot with no change in precipitation
 - Q6 – historically-based drought scenario (1987-1994 and 2012-2015)
- GW recharge calculated in GSFLOW for each climate scenario allows for spatial and temporal variability in recharge rates based on precipitation and temperature
- Climate scenarios assume warming/precipitation changes begin immediately; compare to historical baseline to create an envelope for predicted changes to flow budgets



TASK 1: DEVELOP 50-YEAR WATER BUDGETS

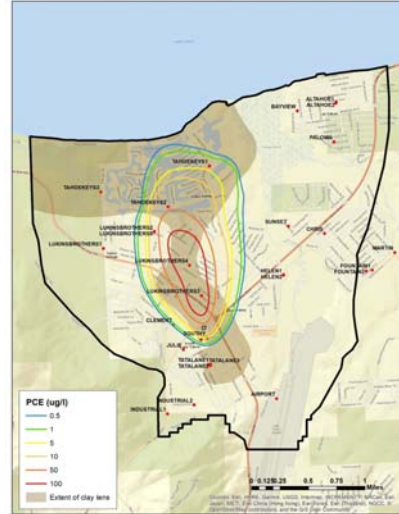
- Projecting pumping to future demand
 - Water demand analysis (KJ, 2020)
 - Uses parcel development, land use, occupancy rates, climatic and economic conditions, to predict 'future' demand spatially
 - Population projections (El Dorado County, 2020)
 - Estimated El Dorado County population growth rate for 2010-2060 = 0.37%
- Baseline (initial) pumping defined by KJ baseline estimate or by 2007 pumpage (most conservative).
- Total estimated pumpage will be distributed across wells in each system according to the ratio of use in 2019, and according to historical seasonal distribution to allow for monthly stress periods (LBWC 5 assumed to be online starting 2022).
- Pumpage to be estimated at private well locations
- Pumping projections to be coordinated with KJ to ensure consistency between GWMP and UWMP



System	KJ Future Rate (AF/A)
STPUD	8410
LBWC	353
TKWC	1046

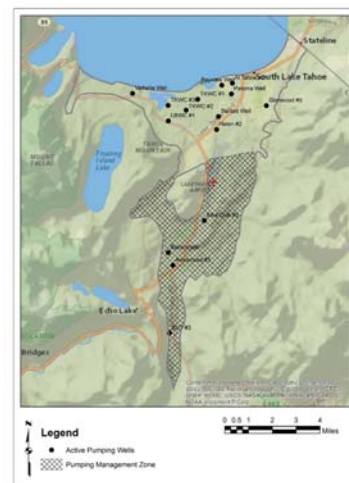
TASK 2: SUMMARIZE SOUTH Y PCE MODEL FINDINGS

- Addresses RA-5
- Summarize results from South Y PCE model report (Rybarski et al, 2019)
 - South Y PCE model is a subsection of the larger TVS groundwater
 - Demonstrate how groundwater pumping may impact PCE plume migration or cause degraded water quality within the subbasin.
 - Discuss alternatives for pumping rates/locations and various remediation options.



TASK 3: DELINEATE A GROUNDWATER MANAGEMENT AREA/DEVELOP SUSTAINABILITY INDICATORS AND MINIMUM THRESHOLDS FOR THIS AREA

- Addresses RA-6
- Develop a 1-yr transient groundwater model with no pumping (i.e. dynamic steady-state) for comparison with climate scenarios to produce monthly/annual depletion analyses.
- GMA will be delineated using a capture map analysis, defined by cells expressing greater than 50% stream capture in any model layer.
- Recommend for the GMA a set of quantitative sustainability indicators, representative monitoring sites, and minimum thresholds designed to prevent the undesirable result "significant and unreasonable depletion of interconnected surface water that has significant or unreasonable adverse impacts on beneficial uses of the surface water."



Proposed Pumping Management area which is based on simulated stream depletions in excess of 50 percent (from Pohl et al, 2018)

TASK 3: DELINEATE A GROUNDWATER MANAGEMENT AREA/DEVELOP SUSTAINABILITY INDICATORS AND MINIMUM THRESHOLDS FOR THIS AREA

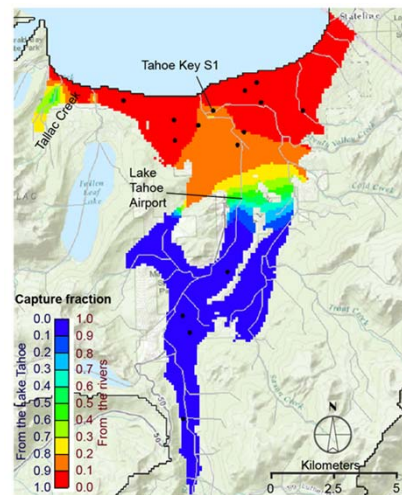
- Addresses RA-6
- Develop a 1-year transient model with no pumping to represent 'dynamic steady-state', with monthly stress periods using mean monthly recharge rates from 1983-2011.
- Difference in flow budgets between this model and each month/year of the climate scenarios developed in Task 1 is defined as depletion
- Depletion to be calculated separately for baseflow (groundwater flow to rivers/streams) and flow to Lake Tahoe
- This method allows for analysis of total annual depletions for a variety of basin conditions, as well as the timing of depletions on a monthly basis



Baseflow depletion for the TVS Basin caused by groundwater pumping. The capture percentage is calculated as the ratio of baseflow depletion and average annual runoff (124,000 acre-ft/yr) (from Pohll et al, 2018)

TASK 3: DELINEATE A GROUNDWATER MANAGEMENT AREA/DEVELOP SUSTAINABILITY INDICATORS AND MINIMUM THRESHOLDS FOR THIS AREA

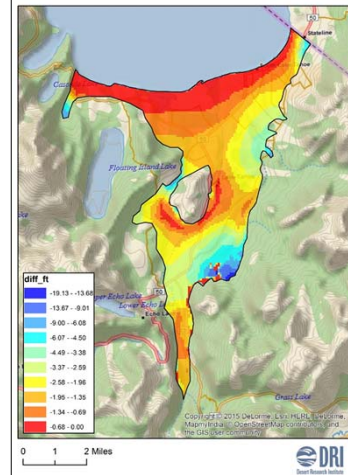
- Addresses RA-6
- Used to show spatially where a hypothetical well would be expected to cause an increase in aquifer recharge due to losses from interconnected surface-water features (capture).
- Capture analysis will be run on the steady-state model, with all municipal wells pumping at their most conservative (i.e. highest) rate from future projected rates.
- The same analysis will also be run on a steady-state model with the recharge rates defined by the most conservative climate scenario (hot/dry) to provide a worst-case end member.
- GMA will be defined by any cells expressing greater than 50% stream capture in any model layer



Simulated capture fractions from Lake Tahoe and from all rivers in the model domain as a function of well locations in the TVS groundwater basin (from Pohll et al, 2018)

TASK 4: RECOMMEND QUANTITATIVE SUSTAINABILITY GOALS, INDICATORS, AND MINIMUM THRESHOLDS FOR UNDESIRABLE RESULTS

- Addresses RA-7
- Recommend for the entire basin a set of quantitative sustainability indicators, representative monitoring sites, and minimum thresholds designed to prevent the undesirable results:
 - Chronic lowering of groundwater levels indicating a significant and unreasonable depletion of supply if continued over the planning and implementation horizon
 - Significant and unreasonable reduction of groundwater storage
 - Significant and unreasonable degraded water quality, including the migration of contaminant plumes that impair water supplies
 - Depletions of interconnected surface water that have significant and unreasonable adverse impacts on beneficial uses of the surface water
- Goal is to set thresholds within the range of historic variability; dependent on model results.
- Proposed thresholds/indicators will be presented to stakeholders to solicit feedback prior to finalization of recommendations to the District.



Simulated changes in groundwater levels between the baseline and Scenario Q4 (warmer/wetter) at the end of the 33 year simulation (from Pohll et al, 2018)

TASK 5: IDENTIFY DATA GAPS AND RECOMMEND METHODS TO ADDRESS THEM

- Addresses RA-8
- Data gaps will be identified as work proceeds!

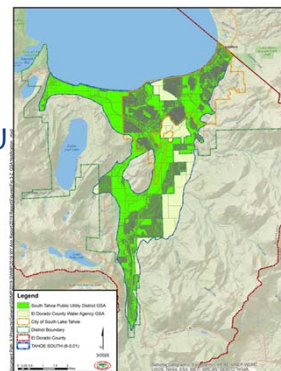


TAHOE SOUTH SUBBASIN (6-005.01) SAG WORKSHOP 1 July 29, 2020

5-Year Update to 2014 GMP
I. Bergsohn, STPUD

2014 GMP Process

- * 7/17/2019 – DWR approves Alternative for TVS Basin
- * 11/22/2019 – 2019 SAG Workshop II
- * 4/9/2020 – Follow-Up Meeting with DWR
- * 5/21/2020 – District Resolution 3140-20
- * 6/4/2020 – 2nd Amended and Restated MOU
- * 6/25/2020 – Resolution 3140-20 to DWR
- * 7/8/2020 - WA Resolution WA-6-2020
- * 7/23/2020 – Resolution WA-6-2020 to DWR
- * 7/29/2020 – 2020 SAG Workshop I



Public Notification and Participation



PUBLIC NOTICE OF
OPPORTUNITIES TO PARTICIPATE IN THE
DEVELOPMENT OF THE
5-YEAR UPDATE TO THE 2014 GROUNDWATER MANAGEMENT PLAN
FOR THE TAHOE SOUTH SUBBASIN



On December 4, 2014, the South Tahoe Public Utility District ("District") adopted the 2014 Groundwater Management Plan ("2014 GMP") for the Tahoe South Subbasin of the Tahoe Valley Groundwater Basin (5-005.01) ("TVS Basin"). The 2014 GMP was prepared in accordance with the Groundwater Management Act

- * Add email to the GMP Interested Parties list.
- * Attend and provide comments at public meetings/workshops.
- * Send inquiries and/or comments to the South Tahoe Public Utility District GSA.
- * Visit the District's Groundwater Management Webpage.
- * OTHER ?

Facilitation Support Services (FSS)

- 6) Please explain the scope of any active professional facilitation;
- 10) Which beneficial uses and users of groundwater has the applicant established a venue for engagement, or plans to establish avenue for engagement? (List all applicable uses and users of groundwater)
- 11) Please explain the key challenges the applicant has encountered that has led to the need for professional facilitation.
- 12) DWR's FSS program requires applicants to have a well-defined goal for the requested services. What is the applicant's goal for professional facilitation?
- 17) Please summarize anticipated tasks, deliverables, and completion dates to be completed with support of DWR FSS.

Stakeholder Engagement

- * General Public
- * Private Users
- * Environmental and Ecosystem
- * Human Right to Water
- * Integrated Water Management

Stakeholder Engagement Chart for GSP Development

Category of Interest	Examples of Stakeholder Groups
General Public	<ul style="list-style-type: none"> • Citizens groups • Community leader
Land Use	<ul style="list-style-type: none"> • Municipalities (City, County planning departments) • Regional land use agencies
Private users	<ul style="list-style-type: none"> • Private pumpers • Domestic users • Schools and colleges • Hospitals
Urban/ Agriculture users	<ul style="list-style-type: none"> • Water agencies • Irrigation districts • Municipal water companies • Resource conservation districts • Farmers/Farm Bureaus
Industrial users	<ul style="list-style-type: none"> • Commercial and industrial self-supplier • Local trade association or group
Environmental and Ecosystem	<ul style="list-style-type: none"> • Federal and State agencies (Fish and Wildlife) • Wetland managers • Environmental groups
Economic Development	<ul style="list-style-type: none"> • Chambers of commerce • Business groups/associations • Elected officials (Board of Supervisors, City Council member) • State Assembly members • State Senators
Human right to water	<ul style="list-style-type: none"> • Disadvantaged Communities • Small community systems • Environmental Justice Groups
Tribes	<ul style="list-style-type: none"> • Tribal Government
Federal and State lands	<ul style="list-style-type: none"> • Military bases/Department of Defense • Forrest service • National Park Service • Bureau of Land Management • California Department of Fish and Wildlife
Integrated Water Management	<ul style="list-style-type: none"> • Regional water management groups (RWMM regions) • Flood agencies • Recycled water coalition

California Department of Water Resources
 SGMA Stakeholder Communication and Engagement Digital Toolkit

Status Review 2014 GMP Implementation Plan

- * Table 10-1 Implementation Plan Review
 - * RA-8: Provide a description of how the data gaps identified will be addressed; specifically the projects identified in Table 10-1 for BMO 5 - dependent upon District funding.

BMO #4 – Integrate Groundwater Quality Protection into Local Land Use Planning Activities

ACTION	STATUS	DESCRIPTION
Conduct a regional groundwater vulnerability assessment of the Basin	On-Going	<p>District and Water Agency Cost Share funding was used to support a study performed by DRI using hydrologic models to identify recharge areas, amounts, and capture zones for municipal wells (BMO #4, Action 2).</p> <p>Results from this work needs to be assessed for possible incorporation into the next update of the Drinking Water Source Assessment and Protection Map for the TVS Basin</p>

BMO #5 – Assess the Interaction of Water Supply Activities with Environmental Conditions

ACTION	STATUS	DESCRIPTION
Assess the effects of groundwater pumping on habitats in lakes, streams and wetlands	On-Going	<p>District and Water Agency Cost Share funding was used to support a study performed by DRI using hydrologic models to determine the effects of groundwater pumping on surface water (BMO #5, Action 1).</p> <p>DRI is building on this study to provide estimates on the quantity and timing of depletions of interconnected surface water and define minimum thresholds to prevent undesirable results. This new work will also be used to address RA-3 for the five-year update to the 2014 GMP</p>

BMO #5 – Assess the Interaction of Water Supply Activities with Environmental Conditions

ACTION	STATUS	DESCRIPTION
Assess potential effects of climate change on groundwater conditions	On-Going	<p>District and Water Agency Cost Share funding was used to support a study performed by DRI using hydrologic models to evaluate the impacts of climate change on groundwater conditions (BMO #5, Action 3).</p> <p>DRI is building on this study to incorporate climate change effects as part of the development of 50-year water budgets for the five-year update to the 2014 GMP</p>

BMO #7 – Address Planned or Potential Future Water Supply Needs and Issues

ACTION	STATUS	DESCRIPTION
Support future groundwater studies in the Basin	?	<p>Continue to review proposals for groundwater-related studies in the TVS Basin. Provide letters of support for outside studies that improve overall understanding of the hydrology and sustainable management of groundwater within the TVS Basin and contributing watersheds.</p> <p>Review the list of Projects Dependent Upon Obtaining Outside Funding in the Implementation Plan as part of the status review for the update to the 2014 GMP.</p>

BMO #7 – Address Planned or Potential Future Water Supply Needs and Issues

ACTION	STATUS	DESCRIPTION
Update the existing TVS Basin groundwater model	Completed, On-Going	District and Water Agency Cost Share funding was used to update the existing TVS Basin groundwater model (BM #7, Action 3). In 2015, the groundwater model was updated by DRI to calculate a water budget for the TVS groundwater system in which annual water budget terms are established for water years 1983 to 2014. In 2016, DRI extended boundary stresses through the 2015 WY. Since 2016, the District has been updating this groundwater flow model on an annual basis to calculate and track water budget terms for the TVS Basin.

BMO #7 – Address Planned or Potential Future Water Supply Needs and Issues

ACTION	STATUS	DESCRIPTION
Expand monitoring well network to evaluate recharge and other key areas	On-Going	Add DRI Monitoring Network Recommendations: 1) South Y Area; and 2) Southeast portion of TVS Basin as project as part of update to 2014 GMP.

BMO #7 – Address Planned or Potential Future Water Supply Needs and Issues

ACTION	STATUS	DESCRIPTION
Assess potential future need and feasibility of groundwater replenishment facilities	Remove (?)	<p>Current groundwater level monitoring and hydrologic analysis indicate that groundwater recharge is sufficient to prevent declining groundwater levels in the TVS Basin. The potential need for future groundwater replenishment facilities in the TVS Basin is questionable.</p> <p>Consider removing this item from the Implementation Plan.</p>