



Sub-Terra Heritage Resource Investigations
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To: Evan Davis
From: Todd Greene, Ph.D. (Principal Investigator) and Cristina Mendoza (Staff Geologist)
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Subject: Technical Memo for Task 3.9, Corning sub-basin
cc: Eddy Teasdale

PURPOSE

The purpose of this project is to expand the geologic knowledge of the Corning sub-basin as outlined in Task 3.9 from the Corning sub-basin GSA Master Agreement. Our goal was to provide deliverables that can directly be used to improve the Basin Setting component of the Hydrogeologic Conceptual Model (HCM) for the Corning sub-basin as outlined in the Corning sub-basin Groundwater Sustainability Plan (GSP).

EXECUTIVE SUMMARY

This technical memorandum outlines work completed in the Corning sub-basin to expand the knowledge base of the basin setting as outlined in the Corning sub-basin HCM. We divide our findings into the following objectives and deliverables:

- 1) better understand the structure of the sub-basin by defining geologic formation boundaries (both lateral and vertical) of the base and top of the combined Tehama/Tuscan formation using available well data, petrographic data from well cuttings, Airborne Electromagnetic (AEM) data, and published literature.
- 2) highlight differences in the transmissivity values used in the SVSim groundwater model vs. calculated values from well completion reports (WCRs).
- 3) recommend areas for future groundwater pump tests to constrain aquifer properties and vertical and lateral connectivity.

For Objective 1, results indicate that sand grain percentages of well cuttings can be used to delineate both the top of the combined Tehama/Tuscan formations as well as the lateral boundary between the Tehama Formation and Lower Tuscan. Using all available data, we determined that the Tehama Formation abruptly thickens to the east and is offset by two faults (Corning Fault and Dempsey fault). Quaternary deposits have complex geometry (though never thicker than ~200 feet) due to cut-and-fill processes of the Riverbank and Modesto formations. Deliverables include grid files of the top and base of the combined Tehama/Tuscan formation, isopach maps of the combined Tuscan/Tehama formation as well as the Quaternary deposits, seven cross-sections, a generalized lateral boundary between Lower

Tuscan and Tehama Formation, normalized percentages of grain-types from well cuttings for 5 new monitoring wells to define formations boundaries.

For Objective 2, we found the WCR-derived transmissivity (T) values show that SVSim groundwater model generally overestimates T values. In addition, the variability in transmissivity is primarily driven by lateral changes within the same depth interval most likely due to depositional patterns. Deliverables include maps and a correlation graph highlighting key differences in modeled vs. calculated transmissivity values.

For Objective 3, candidate areas for aquifer pump tests were based on ways to test the vertical connectivity of the shallow and deeper aquifers and the radius of influence from heavy pumping from the Lower Tuscan aquifer. Deliverables include maps and cross-sections justifying six possible areas to conduct pump tests.

BACKGROUND

Luhdorff & Scalmanini Consulting Engineers, Inc. (LSCE), was contracted by Corning sub-basin Groundwater Sustainability Agency (GSA) to be responsible for the deliverables which correspond to portions of Task 3.9 from the Corning sub-basin GSA Master Agreement. LSCE then sub-contracted with Sub-Terra Heritage Resource Investigations to provide deliverables that expand the knowledge of the Corning sub-basin's HCM.

The Corning Subbasin is located partially within Tehama County, and partially within Glenn County (**Fig. 1**). It is generally bounded by Thomes Creek to the north, Stony Creek to the south, the Sacramento River to the east, and the western edge of the alluvial aquifer at the base of the Coast Range to the west (Corning Sub-basin GSP, 2022).

According to the Corning sub-basin GSP (2022), the main aquifer unit is in the Pliocene-aged and time-equivalent Tehama and Tuscan formations with lesser contributions from the overlying Quaternary formations of the Riverbank and Modesto formations. See the Corning sub-basin GSP (2022) for a complete description of the pertinent formations and geologic structures. For this report, we focus on surfaces that define the base of the Tehama/Tuscan formations and the base of the Quaternary formations (i.e. top of the combined Tehama/Tuscan formations). We also estimate the lateral boundary between the Lower Tuscan and Tehama deposits in the subsurface.

DATA

Objective 1: Structure of the Corning sub-basin

Well data

This study uses approximately 1000 wells to help map stratigraphic boundaries in the Corning sub-basin:

- digital lithology logs of 390 wells from the [WO7 DWR AEM profile data](#) and 83 additional wells from SGMA Data Viewer.
- [geophysical logs](#) (resistivity) from 523 gas wells (most of which have data no shallower than 500 ft below ground surface (bgs)).
- geophysical (resistivity) and lithology logs from five new monitoring wells drilled in 2024-2025 (Corning-1, Corning-2, Corning-3, Corning-4, and Corning-5).

AEM data

We also used Airborne Electromagnetic (AEM) data from two sources:

- 1) the [Stanford GAP pilot study](#) conducted in the Corning, Colusa, and Vina sub-basins using data acquired in 2018 (see Kang et al., 2021 for detailed methods).
- 2) [Statewide AEM surveys](#) from Survey Area 7. Published AEM data were reprocessed to increase resolution using methodology developed by Geophysical Imaging Partners (Max Halkjaer, personal communication).

Petrographic data

In addition, this study also utilizes point-count information from five new Corning monitoring wells in order to place well intervals into their appropriate stratigraphic formation based on sediment composition (e.g. Ingersoll et al., 2016; Greene and Hoover, 2014; Davis, 2023). We selected 118 sand-rich samples from 437 total well-cutting samples for thin section production and compositional analysis.

Other data sources

- DWR (2014) geologic map and cross-sections (A-A', B-B', F-F').
- cross-sections and base of Princeton Valley fill structure map (Redwine, 1972) and the structure map for post-Eocene fill from Page (1974).
- [Corning sub-basin GSP](#) cross-sections (2022).

Objective 2: Transmissivity value comparisons

In order to compare modeled transmissivity values vs. calculated values from WCR data, we used the following data:

- layering and horizontal hydraulic conductivity values from SVSim groundwater model.
- well completion reports from 83 wells (from [SGMA Data Viewer](#)) to calculate transmissivity values (Mendoza and Greene, 2025).

Objective 3: Candidate areas for pump tests

Recommended areas for aquifer pump tests used the following data:

- all data mentioned in Objectives 1 and 2.
- land use and monitoring well data from [SGMA Data Viewer](#).
- California Groundwater Live [Well Infrastructure](#) maps.

For all objectives, we used the software GeoScene3D (I-GIS) and QGIS to place the monitoring wells, borehole data, geologic map, and AEM profile data, along with other geographic data in a software mapping platform.

METHODS

Objective 1: Structure of the Corning sub-basin

Petrographic data

Well cutting samples were collected every 10 ft. during drilling of the Corning-1, Corning-2, Corning-3, Corning-4, and Corning-5 wells. Selected well cutting samples were washed and sieved to a sand grain

fraction between 1 mm and 0.15 mm. A portion of the sand sample was epoxied into a fake rock stub then mounted to a slide and ground to 30 microns thick. Thin sections were point-counted (150 grains per thin-section) under a petrographic microscope to quantify sand-grain composition as percentages, then evaluated across depths to support formation boundary identification. We recorded each point into the following grain type categories (**Fig. 2, Table 1**): Qt (total quartz), volcanic rock fragments (V), metamorphic rock fragments not including quartz-mica schist grains (M), quartz-mica schist grains (Mqms), and sedimentary rock fragments (S). Felspars were intentionally left out due to their low abundance. The normalized percent composition versus depth was plotted against each well to identify vertical compositional changes used for formation boundary interpretation.

Mapping surfaces

Using well-log signatures, AEM data, WCR-lithology data, published interpretations (Redwine, 1972; Page, 1974; DWR, 2014), and petrographic signatures from the five Corning wells and the GCID-2 well (Greene and Hoover, 2014), we created grid surfaces of the base and top of the combined Tehama/Tuscan formations: the base represents the top of the Upper Princeton Valley fill, and the top represents the base of the Quaternary (Q) deposits.

For the base of the combined Tehama/Tuscan formations, there is considerable vertical uncertainty (up to 200 feet) since the Tehama well-log signatures can look very similar to those of the Upper Princeton Valley log signatures (Redwine, 1972; Page, 1974). We started our interpretations by following the interpreted boundary from the DWR (2014) published cross-sections (A-A', B-B', and F-F') and then used the additional data (e.g. Page, 1974) to map the rest of the sub-basin.

For the top of the combined Tehama/Tuscan formations (i.e. base of Quaternary deposits), we used a maximum thickness of Quaternary deposits of 200 feet, while also conforming to the DWR (2014) cross-sections and their geologic map. For example, we did not infer any Quaternary deposits where Tehama Formation was mapped at the surface. We also used outcrops of the Red Bluff Formation as a guide to bring the base of Quaternary surface to within approximately 30 feet (maximum thickness of the Red Bluff Formation) of the ground surface. We increased the thickness of the Quaternary deposits within paleovalleys of the Riverbank and Modesto formations as determined on the DWR (2014) geologic map. In addition, we also used petrographic data from the five Corning monitoring wells, as well as lithology data from WCRs and AEM signatures. We estimate a 50-100 feet uncertainty of the base of Quaternary surface.

Cross-sections from this report follow various types of data: AEM, well-logs, WCR lithology data, and petrographic data. Where possible, we include well data on the cross-sections, however, it was not possible to include most of the resistivity logs from gas wells since they are not in digital format. We did include a subset of gas wells on the cross-sections identified by their Unique Well Identifier (UWI) which can be found on the California Dept. of Conservation [website](#). (When searching for a well identified on a cross-section, type 04 before the UWI.)

Objective 2: Transmissivity value comparisons

To highlight differences in transmissivity values between the SVSim-modeled data and WCR-based calculated data, 86 well completion reports (WCRs) were filtered out from a total of 3,819 across the Corning sub-basin based on key criteria such as lithology, screen interval depths, reliable well locations, and pump test data (**Fig. 3**). Transmissivity values were calculated using the specific capacity-transmissivity relationship from Razack and Huntley (1991):

$$T = 33.6 * [Q/(h_o-h)]^{0.67}$$

T = transmissivity in ft²/day

Q = pumping rate in ft³/day

(h_o-h) = maximum drawdown in ft

These calculated values were then compared with model-derived transmissivity, which was obtained by multiplying modeled horizontal hydraulic conductivity (Kh) by modeled aquifer thickness (b). Spatial analysis was conducted using QGIS to assess transmissivity patterns and their relationship to aquifer heterogeneity.

The SVSim groundwater model divides the aquifer into nine layers, though the basis for these divisions is unknown. To determine which layer each screened interval corresponds to, we imported the extracted WCR data into GeoScene 3D software. We then used this data to generate cross-sectional profiles across the Corning sub-basin to assign each screened interval to a specific SVSim layer (**Fig. 3**).

Objective 3: Candidate areas for pump tests

Areas recommended for pump test data were based on the following criteria:

- proximity to heavy use areas: irrigation and domestic well density
- within or nearby heavy agricultural land use areas such as nut orchards
- heavy use zones based on screened intervals for nearby wells
- SVSim modeled horizontal hydraulic conductivity values that differ with calculated values from WCR data
- high resistivity value zones based on well-logs and AEM data
- nearby existing multi-completion monitoring wells
- nearby volunteered domestic wells
- reported dry wells

RESULTS AND INTERPRETATIONS

Objective 1: Structure of the Corning sub-basin

The structure of the Corning sub-basin follows the general pattern of the top of Cretaceous surface of Harwood and Helly (1982). This early basin structure set up the geometry of the “base of post-Eocene” surface of Page (1974) and the “base of Princeton Valley fill” of (Redwine, 1972). The base of post-Eocene surface generally strikes N-S and is relatively shallow in the western portion of the sub-basin. It deepens considerably to the east just east of the Orland Buttes longitude and then deepens even further in the northcentral portion of basin just west of the Corning Fault. Key geologic structures include the Corning Domes (northern and southern), the Corning Fault, and the Dempsey fault in the southern portion of the sub-basin (**Fig. 1**). This structural setting heavily influenced the deposition of the Tehama Formation.

Formation boundaries

Our study focused on mapping the base of the combined Tehama/Tuscan formation and the base of the Quaternary deposits (i.e. top of the combined Tehama/Tuscan formation). Since none of the 2025 Corning wells (Corning 1, 2, 3, 4, or 5) penetrated below the Tehama/Tuscan formation boundary, our

petrographic data can only identify both the top of the Tehama/Tuscan boundary as well as differentiate between the Tehama Formation from the Lower Tuscan (**Figs. 4-10**).

Normalized percents of grain types (**Table 1**) in the Tehama Formation have high concentrations of combined M and Mqms (up to 80%) and up to 44% Qt grains while containing relatively low V grains (<5%). Percentages of S grains are more abundant below 600' bgs in Corning-3 and Corning-4 wells (**Fig. 9**). Corning-3 and Corning-4 wells had notable high percentages of carbonate grains, though these were most likely coming from *in-situ* caliche layers and not considered diagnostic source indicators. Corning-2 grains have an unusually high amount of Mqms grains (**Fig. 5**) possibly due to paleo-Thomes Creek drainages reaching further west into the metamorphosed Coast Range source rocks.

A mixed signal of Tuscan (up to 48% V grains) and Tehama (up to 60% M and Mqms grains) occurs in the middle portions of the Corning-1 and Corning-5 wells (**Figs. 5, 6**). These mixes are indicative of the interbedded nature of the two formations towards the middle of the Sacramento Valley. However, below approximately 700' bgs for both wells, the signature becomes dominantly volcanic where we interpret this as the Lower Tuscan interval of Greene and Hoover (2014).

Quaternary signatures are difficult to separate from Tehama. Generally, higher Qt and Mqms grains (e.g. Corning-2 and Corning-5; **Fig. 5**) can indicate a Quaternary signal. Quaternary in the Corning-1 well (**Fig. 6**), however, contains higher V grains complicating this interpretation.

Moving from west to east, the base of the combined Tehama/Tuscan formation in the western portion of the sub-basin generally strikes NW-SE and is within 100-500 feet of the ground surface (**Fig. 11**). At approximately the Orland Buttes longitude, it begins to deepen dramatically to -1200 ft elevation until it is upthrown approximately 200-250 ft across the N-S trending Corning Fault. On the east side of the Corning Fault, the base of the combined Tehama/Tuscan formation shallows from -800 ft elevation to -500 elevation across the Corning Domes, and then deepens again on the far eastern portion of the sub-basin. In the southeastern portion of the sub-basin, the base of the combined Tehama/Tuscan formation is offset nearly 200 ft along a N-S trending Dempsey fault (westside upthrown) resulting in a deepening of the surface to -1100 to -1200 ft elevation.

The top of the combined Tehama/Tuscan formations (i.e. base of Quaternary deposits) show thickening in paleovalleys (**Fig. 12**). In the westernmost part of the subbasin, Quaternary thicknesses range from 0–50 ft. Moving east towards the Sacramento River and southeastern portion of the sub-basin, Quaternary deposits become progressively thicker reaching up to 200 ft. (**Fig. 13**).

The maximum thickness of the combined Tehama/Tuscan formation in the sub-basin is approximately 1600 feet (**Fig. 14**). However, the lateral boundary between the Tehama and Tuscan formations is difficult to determine based on lack of petrographic data in the sub-basin and inherent mixing of the two sources in the center of the basin during deposition. However, using the Corning wells, well-log signatures, and interpretations from Greene and Hoover (2014), we can track the western boundary of the Lower Tuscan in both cross-section (**Figs. 4, 5, 6, 8**) and map view (**Fig. 1**). This boundary generally runs between the Corning Fault and the Sacramento River.

Objective 2: Transmissivity value comparisons

Among 86 WCRs in the Corning sub-basin, 131 transmissivity (T) values were obtained as some wells have screens across multiple layers. In 95 of the 131 cases, the SVSim groundwater model

overestimated transmissivity compared to the calculated values, while only 36 cases showed an underestimation (**Fig. 15**). Contour maps based on calculated T values were created using data from 51 wells with screens in the SVSim model Layer 4 (**Fig. 16**) and 49 wells with screens in SVSim model Layer 5 (**Fig. 17**).

In general, the SVSim model oversimplifies T patterns within Layers 4 and 5. T values from well data suggest a more complex distribution possibly due to depositional patterns of alluvial and fluvial systems. For example, the contour map of calculated transmissivity in Layer 5 (**Fig. 17**) shows several areas with low T values and very few exhibiting high values. In contrast, the model suggests that Layer 5 is mostly dominated by high T values.

Objective 3: Candidate areas for pump tests

Figure 18 shows the six recommended locations for pump tests.

Recommendation#1 (Fig. 19):

The Lower Tuscan's (LT) western extent reaches into the Corning sub-basin. In order to test the LT's hydraulic properties and its lateral and vertical connection to nearby areas and zones, we suggest a pump test at this location. Key characteristics include:

- "high density" area for irrigation wells for the section: 8 wells with mean depths of 475' bgs (77' min, 1320' max).
- "medium density" area for domestic wells for the section: 8 wells with mean depths of 242' bgs (80' min, 780' max, though this maximum is a questionable datapoint).
- This area is located in the middle of nut orchards.
- In the SVSim model, the heavy use zones (Layers 4 and 5) show high hydraulic conductivity values as does the transmissivity values according to WCR data. However, AEM shows midrange resistivity values. A pump test could clarify values.
- There are 2 existing multi-completion, continuous monitoring wells within 1 mile radius.
- 1 domestic well has been reported to be dry nearby.

Recommendation #2 (Fig. 20):

Although fairly close to Recommendation #1, this location is an example of the discrepancy in Kh and T values between the SVSim model and calculated T values from WCR data. Key characteristics include:

- "High density" for irrigation wells for the section: 9 wells with mean total depths of 316' bgs (150' min, 470' max).
- "medium density" for domestic wells for the section: 7 wells with a mean total depth of 146' bgs (92' min, 220' max).
- This area is in the middle of nut orchards.
- Layers 4 and 5 in SVSim show high T and Kh values although nearby WCR data predicts low values.
- AEM shows mid-range resistivity values with Layer 4 appearing to be laterally continuous.
- Layers 3,4,5 are heavy use zones.
- 5 existing monitoring wells within 1 mile radius though none are continuously monitored or are multi-completion wells.

- 4 domestic wells (under 100' total depth) have reported to have gone dry nearby.

Recommendation #3 (Fig. 21):

This recommendation will confirm the hydraulic properties of Layers 4 and 6 as well as show their vertical connectivity. Other key characteristics of this locality include:

- “high density” irrigation wells for the section: 5 wells with mean depths of 426' bgs (200' min, 760' max.).
- “medium density” domestic wells for the section: 10 wells with mean depths of 150' (98' min, 295' max). There is a “high density” rating of domestic wells in the section to the west containing 36 wells with a mean depth of 136' bgs (85' min, 238' max).
- The area is adjacent to nut orchards.
- Most irrigation wells are screened in Layer 6 though some are as deep as Layer 7. Most domestic wells are screened in Layers 4 and 5.
- Layer 4 shows high modeled Kh in SVSim, and well data shows high T; Layer 6 shows lower Kh and low T values in WCRs.
- AEM shows mid-to-low resistivity values in Layer 6.
- 5 existing monitoring wells are within 1 mile radius; 1 is a multi-completion and continuously monitored well.
- 4 domestic wells under 100' have reported to have gone dry nearby.

Recommendation #4 (Fig. 22):

This recommended location could also test the lateral and vertical connectivity of the Lower Tuscan zone with shallower zones and nearby areas. It also utilizes the Corning-1 well. Key characteristics include:

- “high density” area of irrigation wells for the section in northern part of cross-section: 8 wells with a mean depth of 228' bgs (64' min, 560' max).
- “high density” domestic wells for the section: 22 wells with a mean depth of 118' (80' min, 220' max).
- The location is in the middle of nut orchards.
- Most of the irrigation wells total depths are in Layers 4, 5, some as deep as Layer 6; most domestic wells' total depths are in Layers 3 and 4.
- Layer 4 shows high modeled Kh in SVSim, and WCRs shows high T values.
- AEM shows high/mid-range resistivity values in all layers.
- 2 existing monitoring wells are within 1 mile radius; 1 of these is a multi-completion and continuously monitored (Corning-1).
- An owner of one domestic well has volunteered their wells: 120' deep and another well at 275' deep.

Recommendation #5 (Fig. 23):

This recommended location would test a zone that has little to no useful AEM response, yet WCR lithology data indicate there are aquifer materials here. It also utilizes the Corning-4 well. Key characteristics include:

- “medium density” area for irrigation wells for the section: 4 wells with a mean total depth of 623’ bgs (280’ min, 890’ max).
- “low density” area for domestic wells for the section: 5 wells with a mean total depth of 241’ bgs (168’ min, 290’ max).
- The area is in the middle of nut orchards.
- Most irrigation wells’ total depth is in Layer 6 but some are as deep as Layer 8. Domestic wells’ total depths are in Layers 4 and 5.
- AEM shows mid-low range resistivity values.
- SVSim model has low Kh values throughout.
- 3 existing monitoring wells are within 1 mile radius; 1 of these is a multi-completion well that is continuously monitored (Corning-4, 940’ deep).

Recommendation #6 (Fig. 24):

This location can test the connectivity of shallow and deep zones as well as utilize the Corning-2 well. Other key characteristics include:

- “medium density” area for irrigation wells for the section: 4 wells with a mean total depth of 542’ bgs (290’ min, 1230’ max).
- “medium density” area for domestic wells for the section: 7 wells with a mean total depth of 160’ bgs (102’ min, 310’ max), but “high density” for the section to the south (29 wells, 167’ mean, 85’ min, 300’ max).
- The location is in the middle of nut orchards.
- Most domestic wells have their total depth in Layer 4; most irrigation wells in Layer 6, but as deep as Layer 8.
- AEM shows mid-range resistivity values but deep zones show no coarse materials.
- There are 2 existing monitoring wells within 1 mile radius; one is multi-completion and continuously monitored (Corning-2, 388’ deep); the other is 1000’ deep (25N03W31R001M).
- 6 domestic wells have been reported to have gone dry nearby, as deep as 120’.

CONCLUSION/RECOMMENDATIONS

We present results and recommendations for three objectives that expand the geologic knowledge-base for the Corning sub-basin as defined in Task 3.9 of the Master Agreement for the Corning sub-basin GSP.

The first objective addressed the overall structure of the sub-basin by mapping two surfaces pertinent to the main aquifers: 1) base of the combined Tehama/Tuscan formations, and 2) base of Quaternary deposits. By using well-log signatures, WCR data, point-counts of sand grains from well cuttings, and published literature, we created structure and isopach maps that depict general structural trends of basin deposits that can be used in hydrogeologic groundwater models. We also determined the lateral boundary between Tehama Fm. and the Lower Tuscan deposits in map view and in cross-section.

The second objective highlighted significant discrepancies between SVSim-modeled and WCR-calculated transmissivity values. Specifically, SVSim model assumes a more uniform distribution of transmissivity across Layers 4 and 5, whereas calculated values indicate significant lateral heterogeneity most likely due to depositional patterns. The WCR-derived transmissivity values show that SVSim groundwater model generally overestimates T values.

The third objective addresses recommendations for six pump-tests across the sub-basin. The recommendations prioritize the need to understand aquifer properties, vertical connectivity of the shallow and deeper aquifers, and the radius of influence from heavy pumping from the Lower Tuscan aquifer.

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ATTACHMENTS

- Figures 1-24 referred to in text
- Table 1 of sand grain point count data, normalized percents
- Grid (.grd) files for:
 - Base of Tehama/Tuscan
 - Base of Quaternary

Datum and projection: EPSG 3310, NAD 83 California Albers

Figure 1

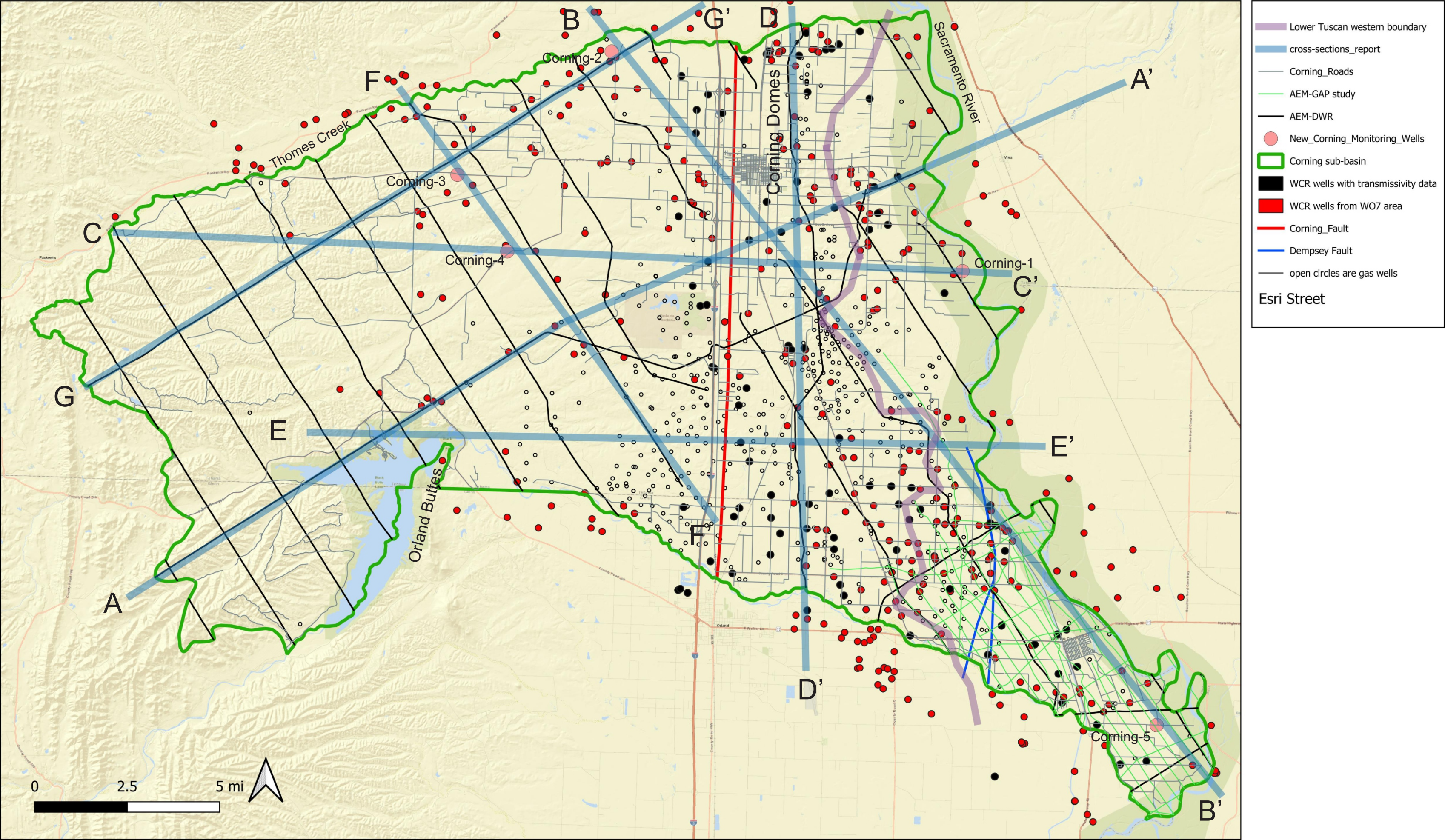


Figure 1. Corning-sub basin map showing project well data, structural and geographic features, cross-sections, and western boundary of Lower Tuscan deposits.

Figure 2

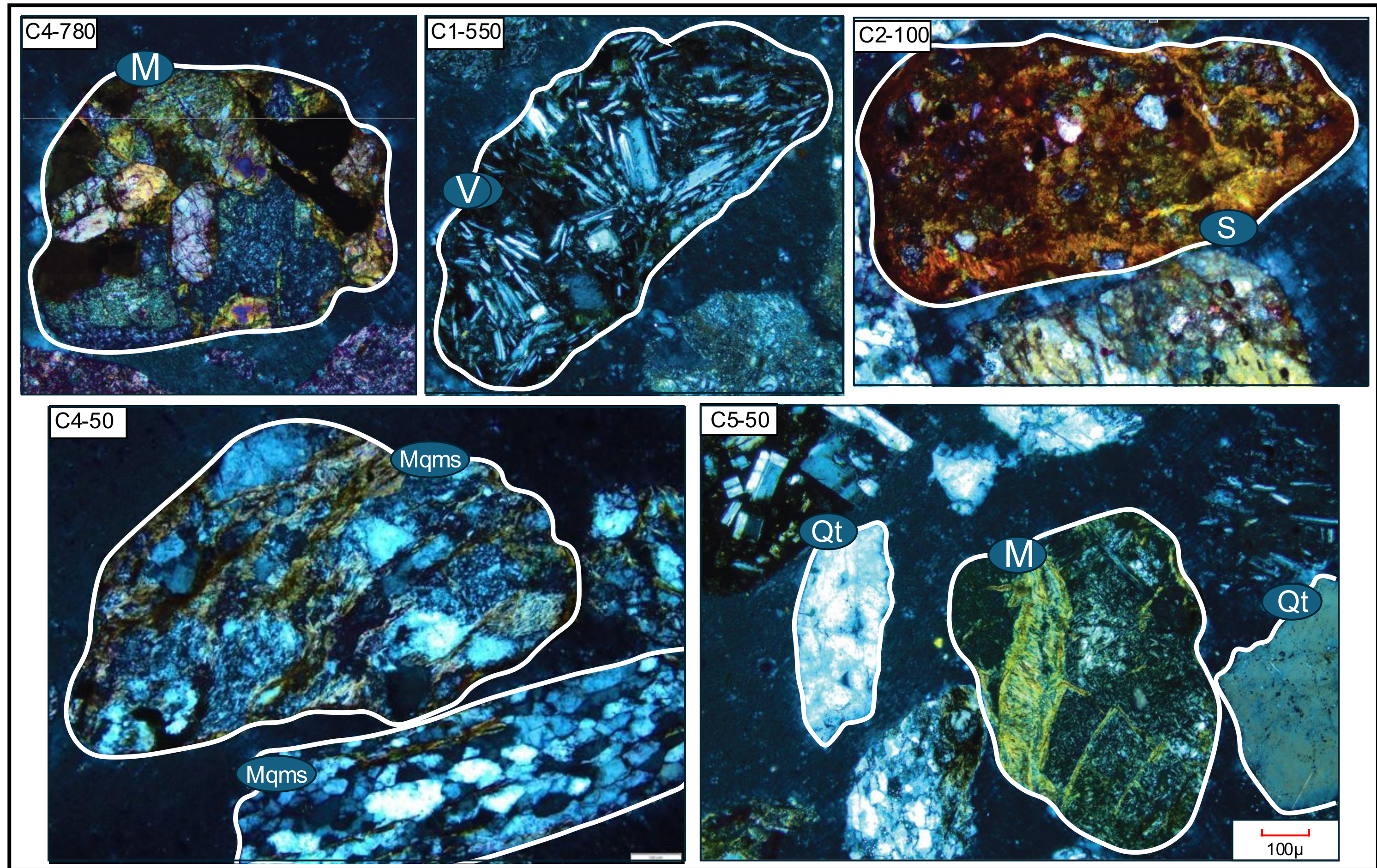
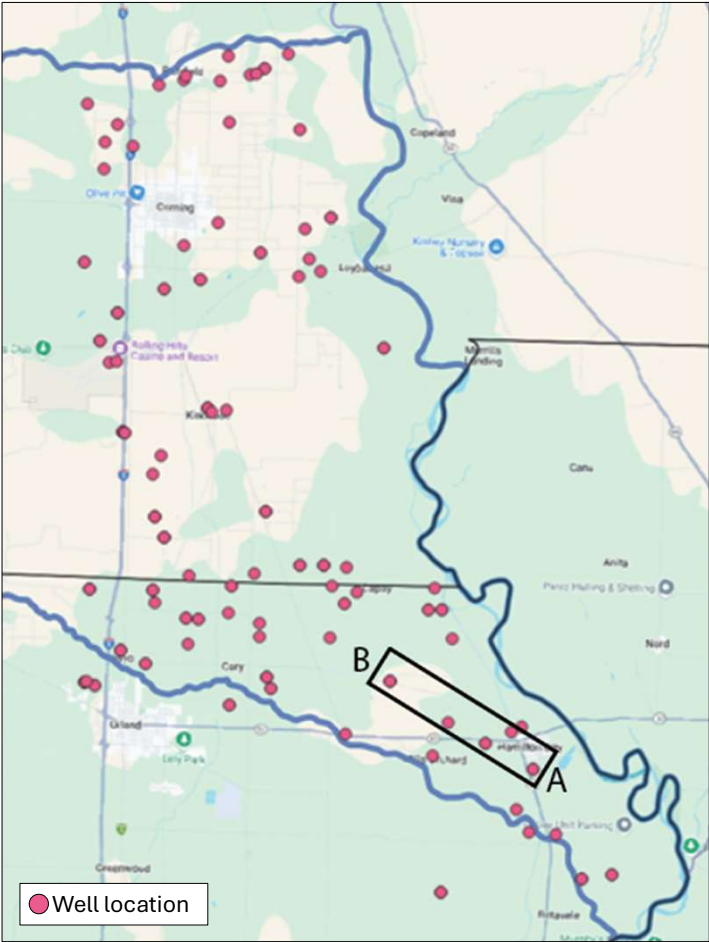
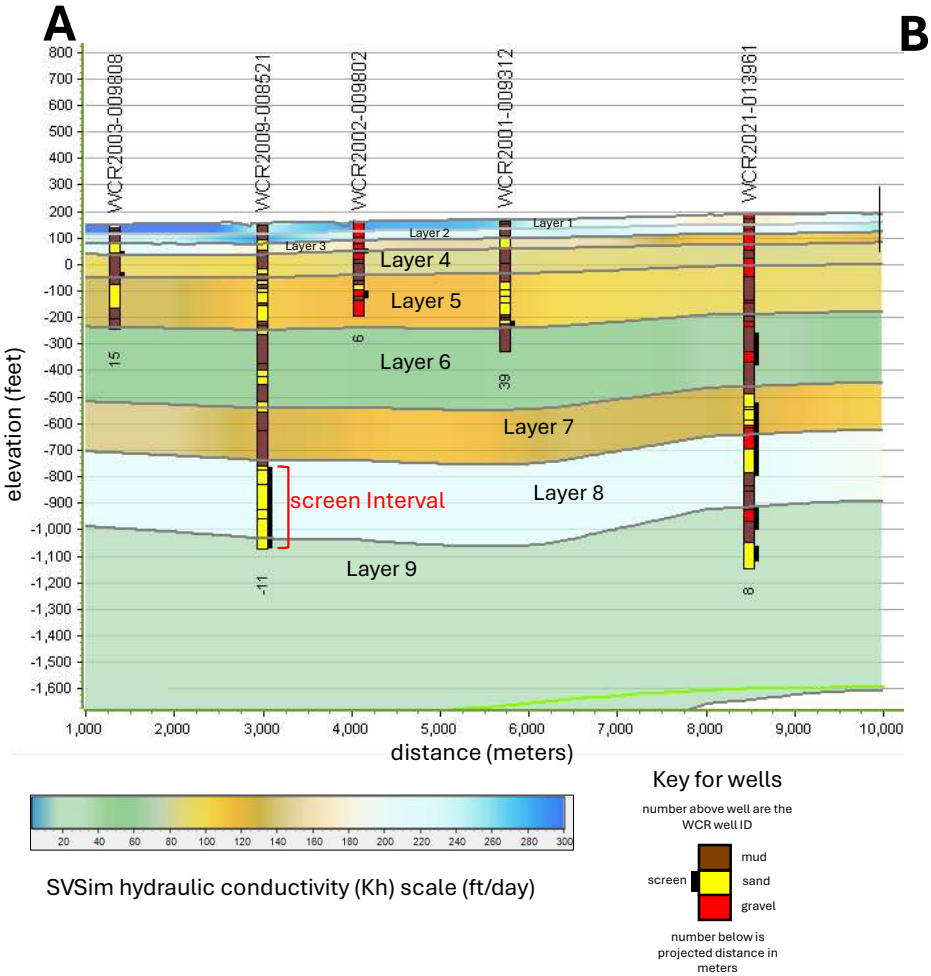


Figure 2. Photomicrographs of grain types in thin-section with cross-nichols. Labels refer to well name (C4=Corning-4, etc.) and number refers to depth of sample below ground surface. Grain types include: Qt = total quartz grains, V = volcanic rock fragments, M = metamorphic rock fragments except quartz-mica schist grains, Mqms = metamorphic quartz-mica schist grains, S = sedimentary rock fragments. Scale bar of 100 microns on lower right photo is the same for all photos.

Figure 3



Map showing well locations, with a box highlighting the wells used in the cross section.

Figure 3. Cross-section and map of SVSim modeled layers with Kh values (Mendoza and Greene, 2024).

Figure 4

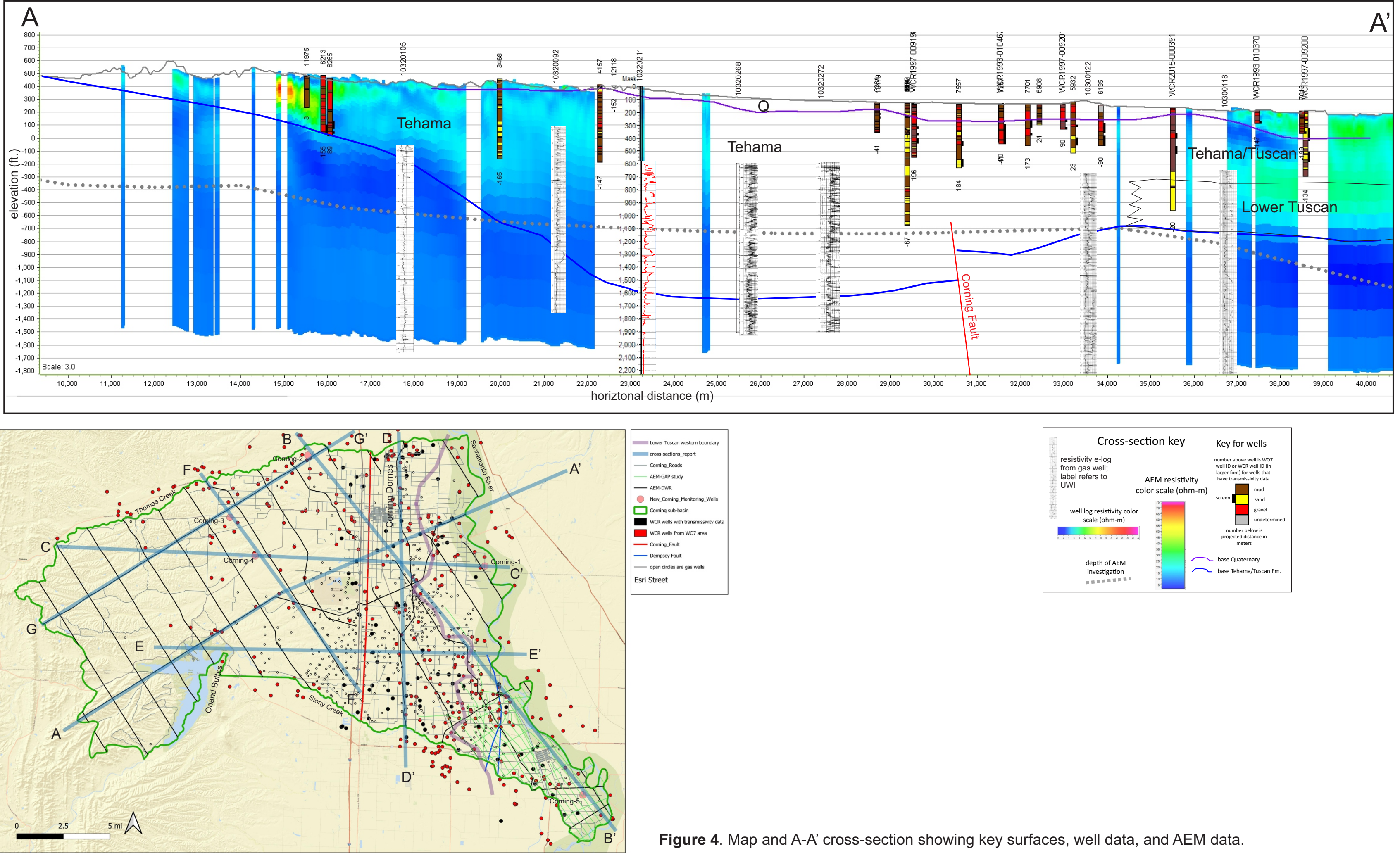


Figure 4. Map and A-A' cross-section showing key surfaces, well data, and AEM data.

Figure 5

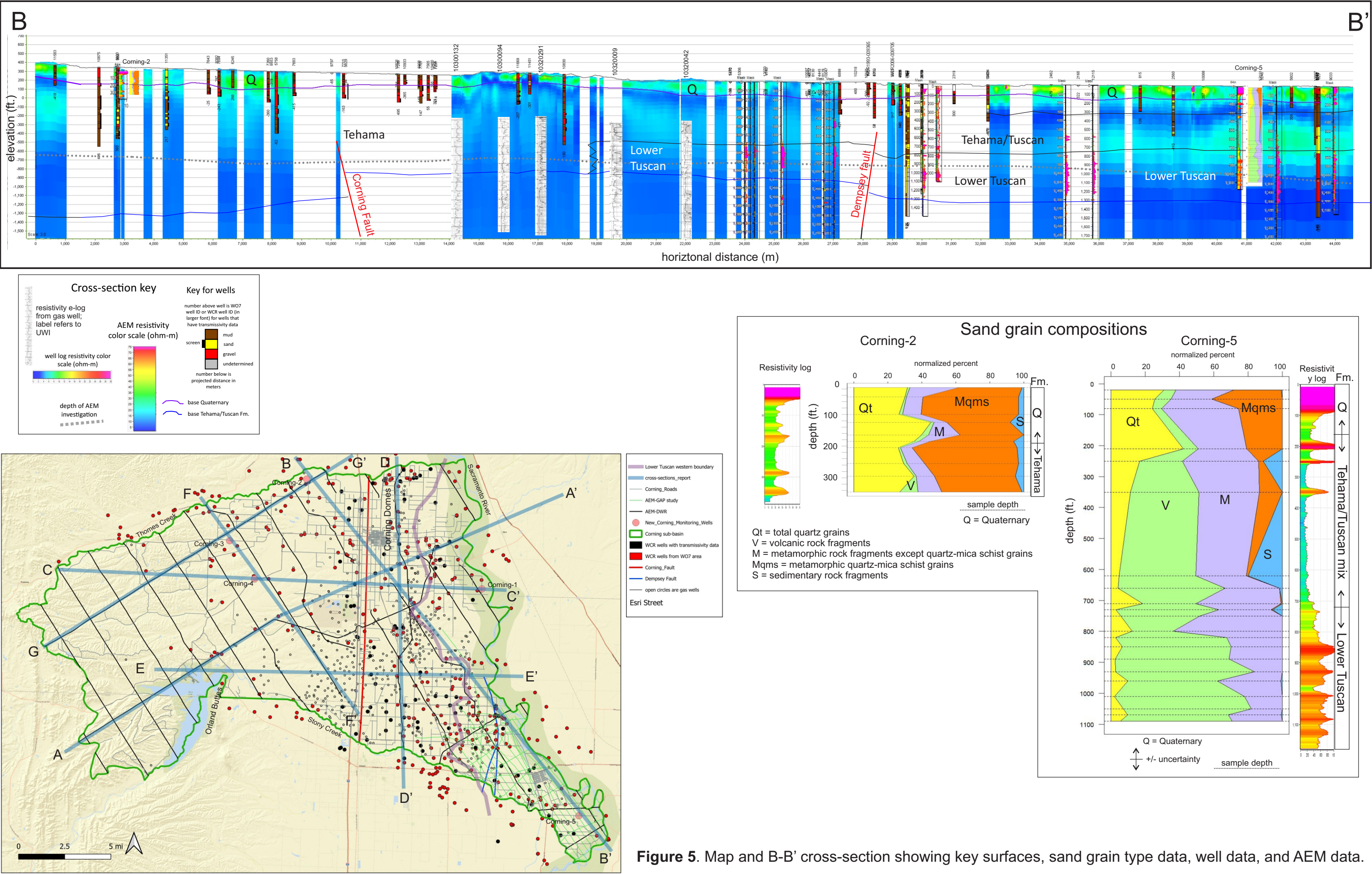


Figure 6

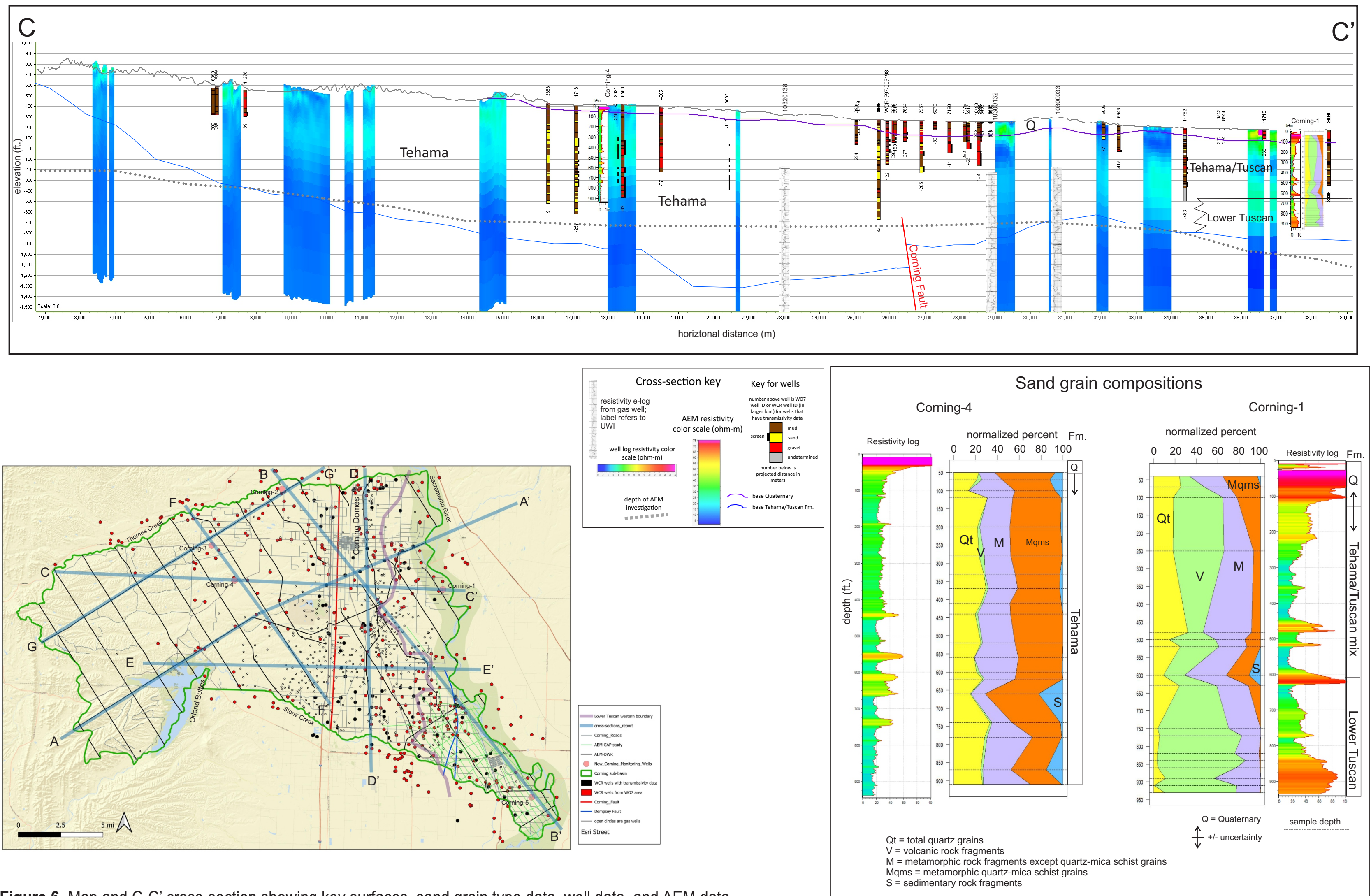


Figure 6. Map and C-C' cross-section showing key surfaces, sand grain type data, well data, and AEM data.

Figure 7

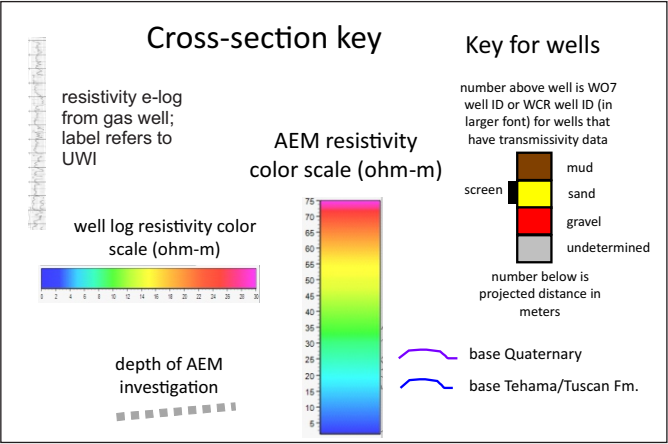
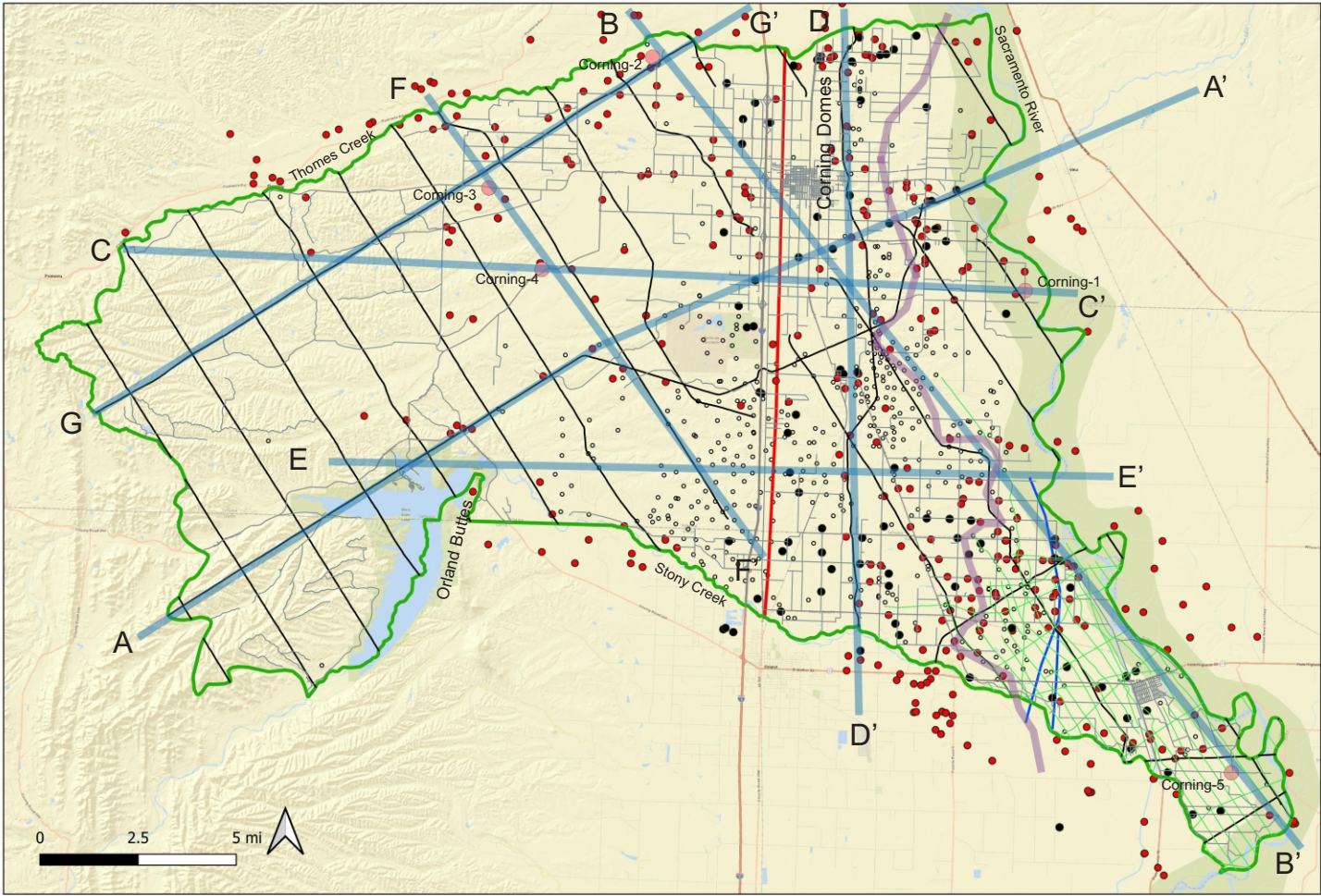
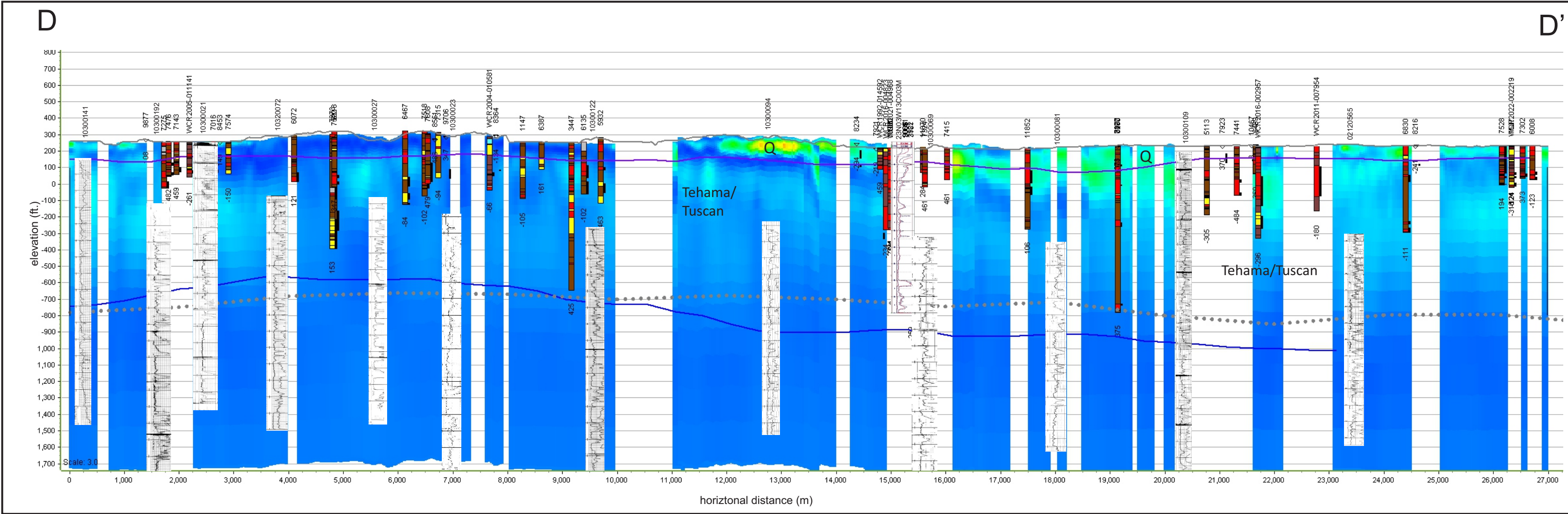


Figure 7. Map and D-D' cross-section showing key surfaces, well data, and AEM data.

Figure 8

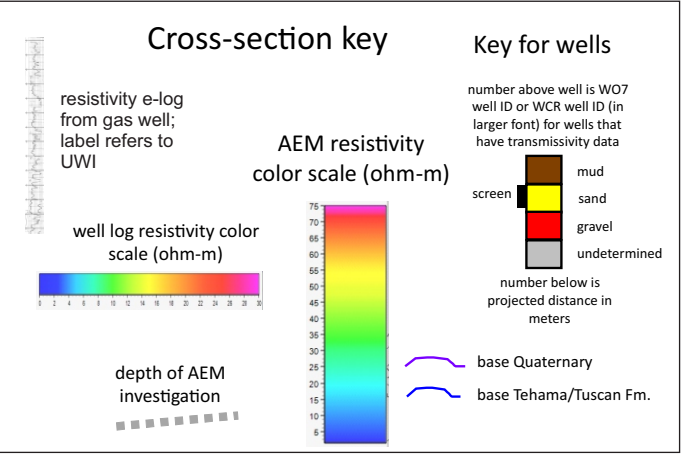
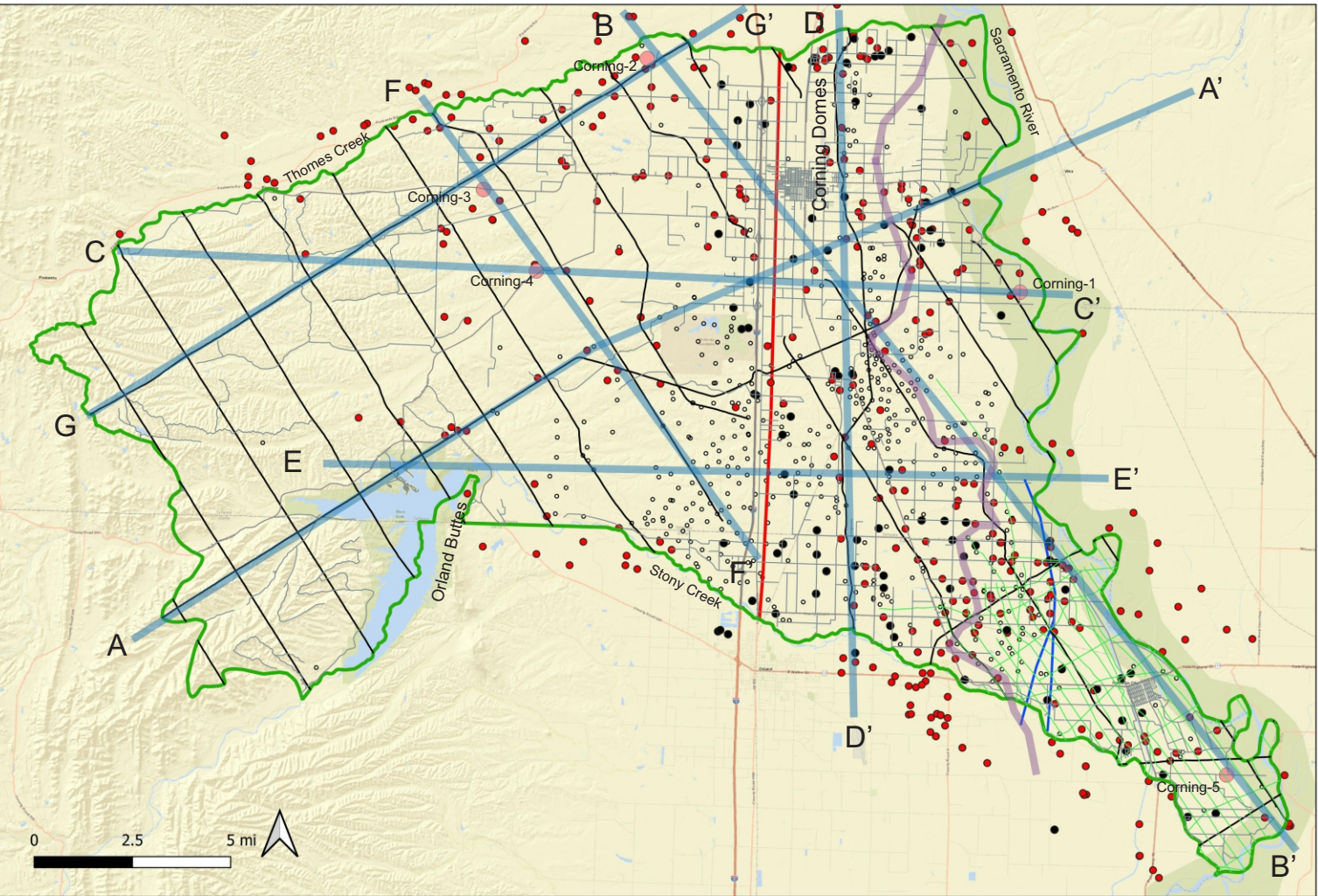
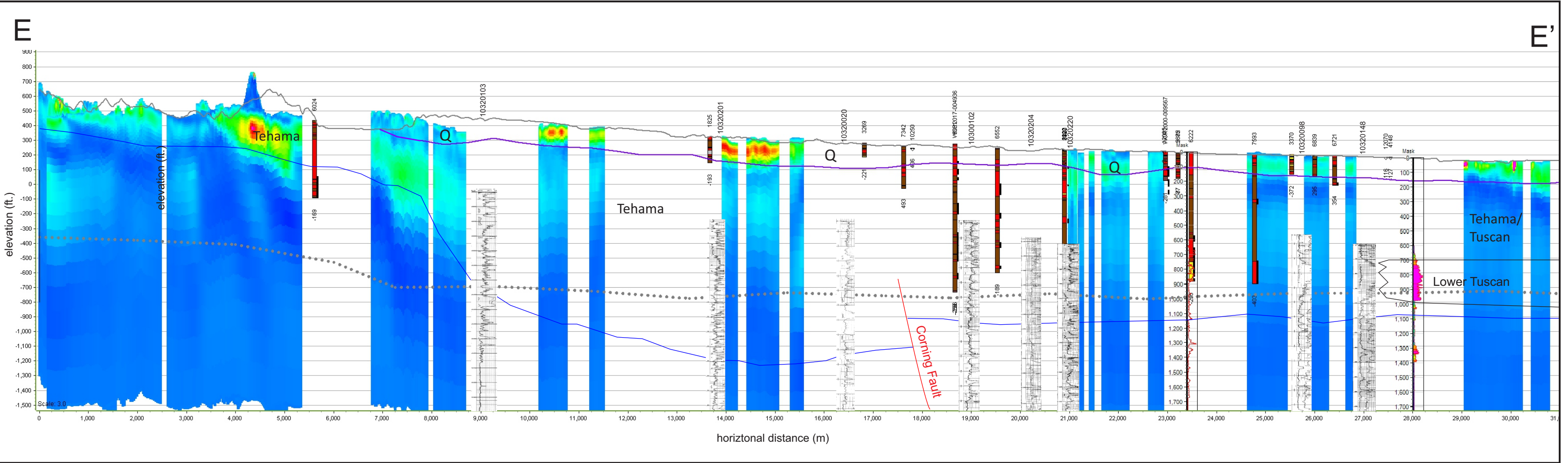


Figure 8. Map and E-E' cross-section showing key surfaces, well data, and AEM data.

Figure 9

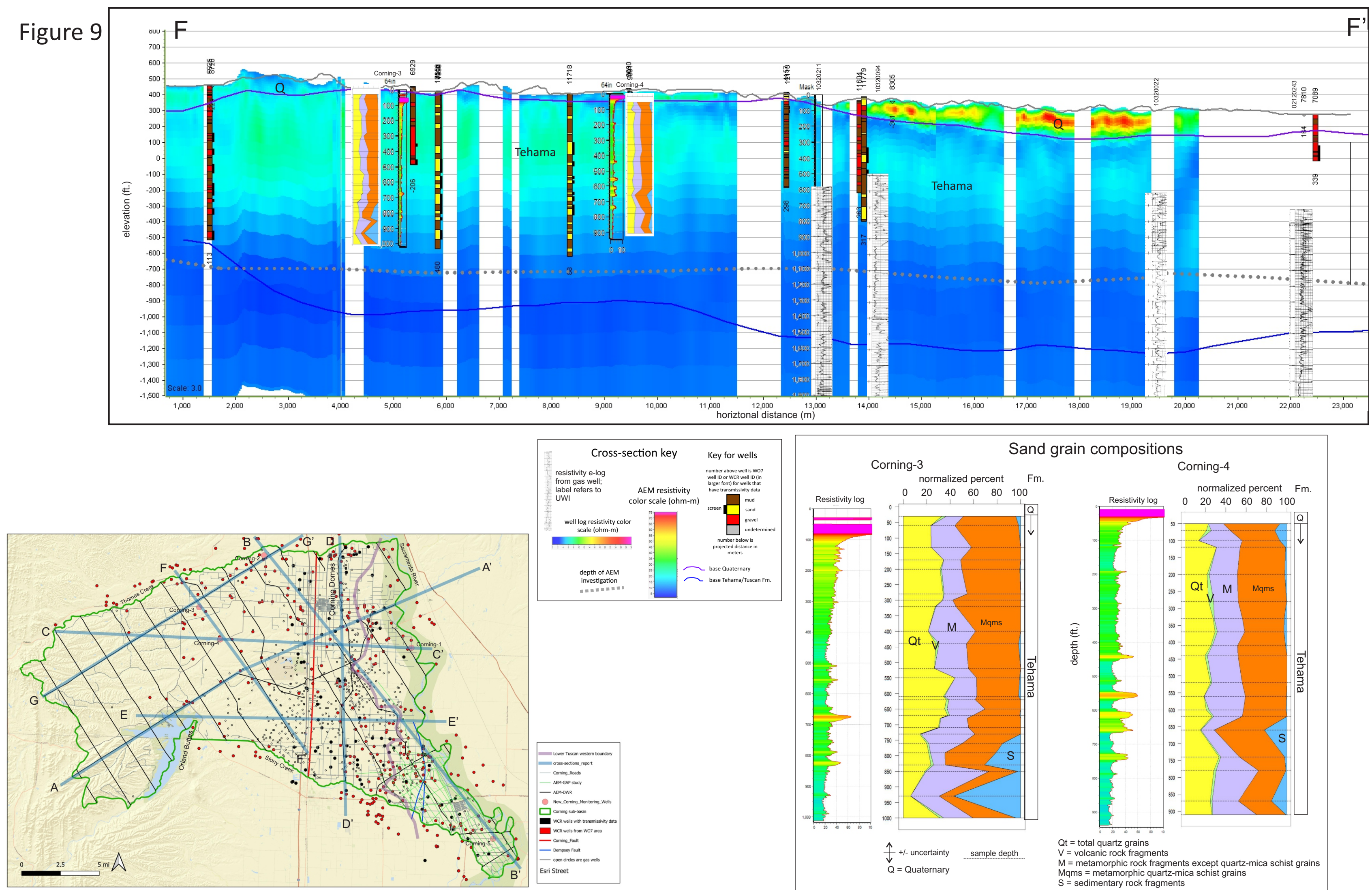


Figure 9. Map and F-F' cross-section showing key surfaces, sand grain type data, well data, and AEM data.

Figure 10

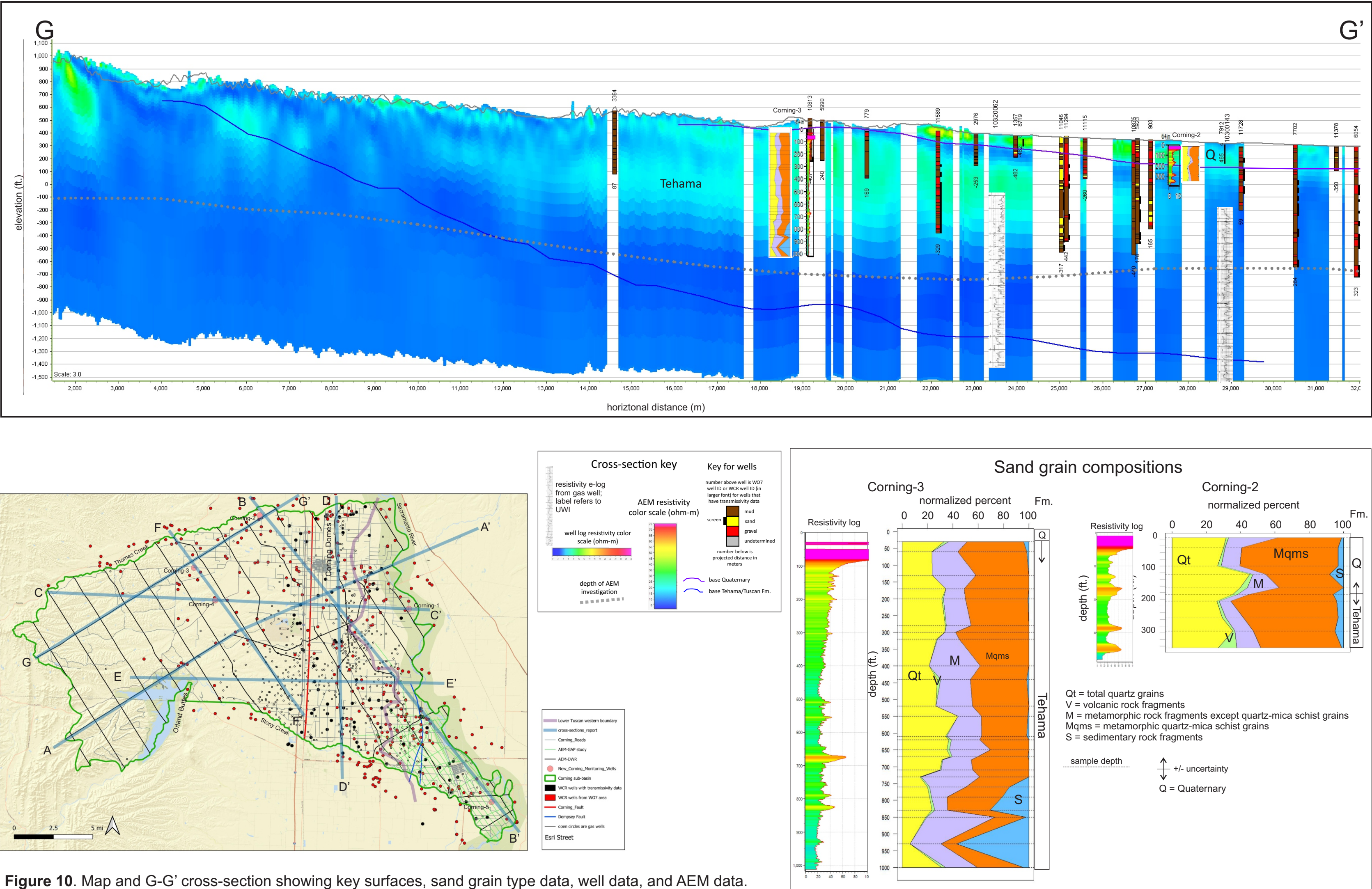


Figure 10. Map and G-G' cross-section showing key surfaces, sand grain type data, well data, and AEM data.

Figure 11. Base of Tehama/Tuscan Fm. (elevation-ft.)

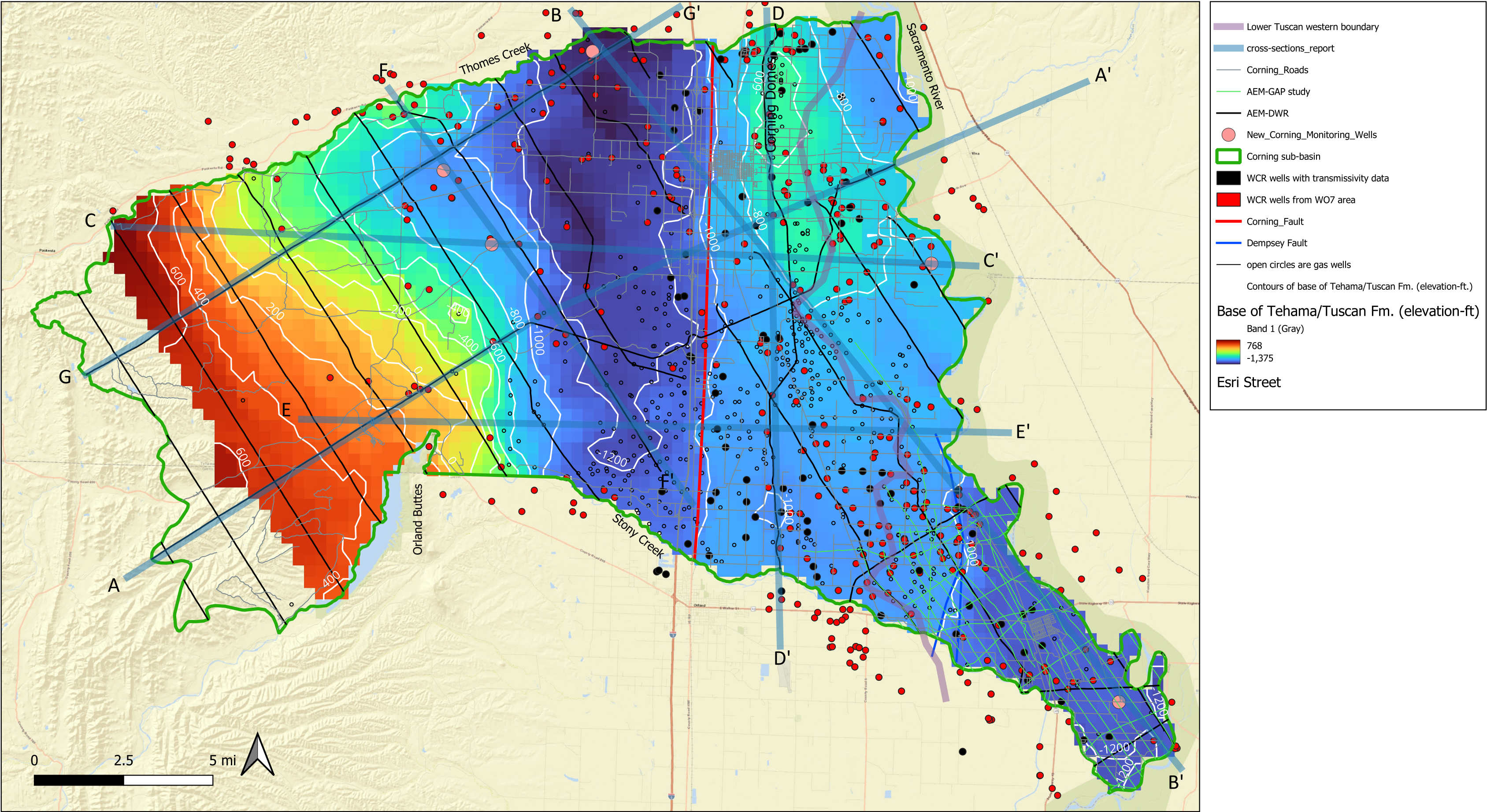


Figure 12. Base of Quaternary deposits (elevation-ft.)

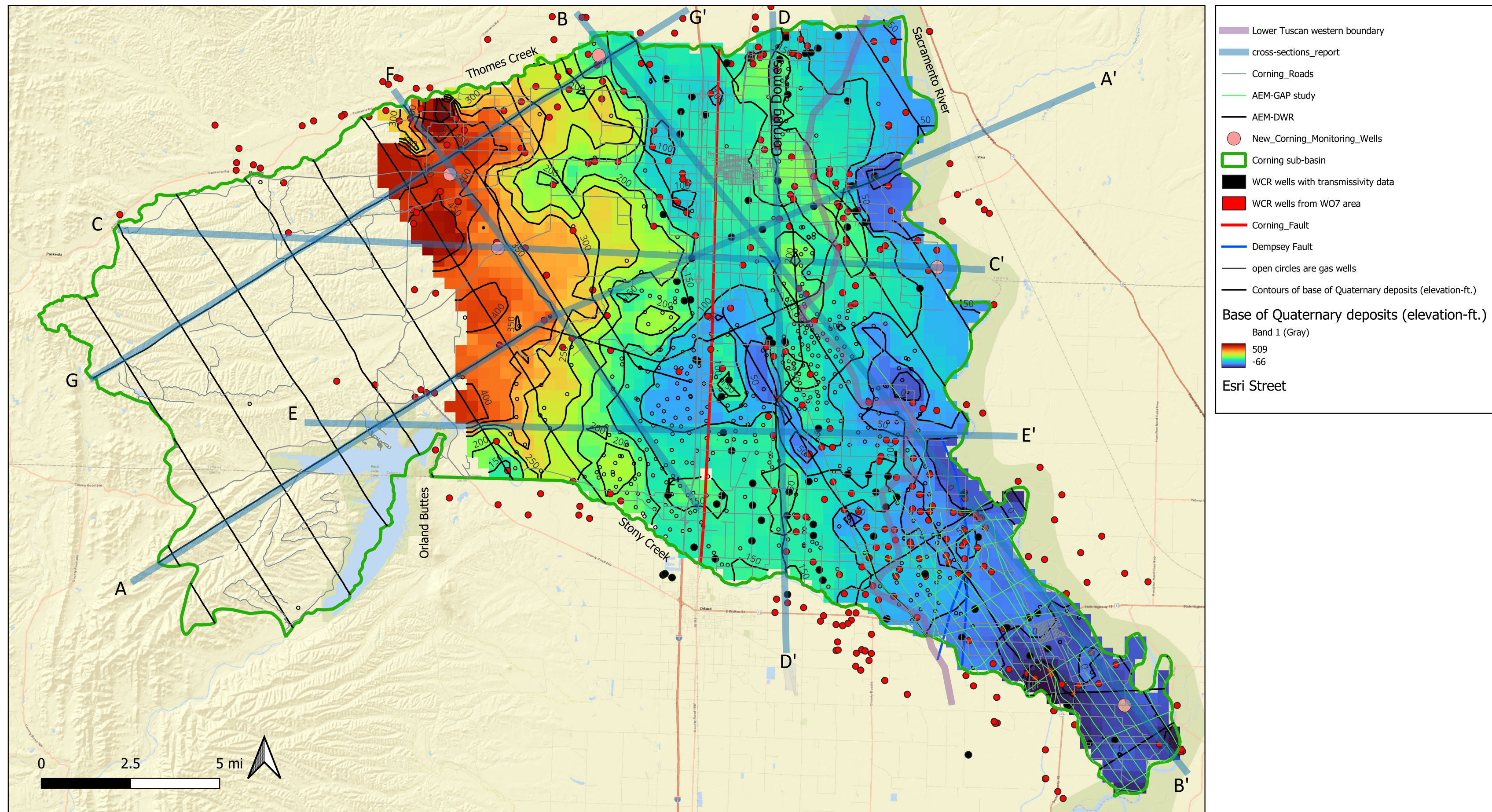


Figure 13. Thickness of Quaternary deposits (ft.)

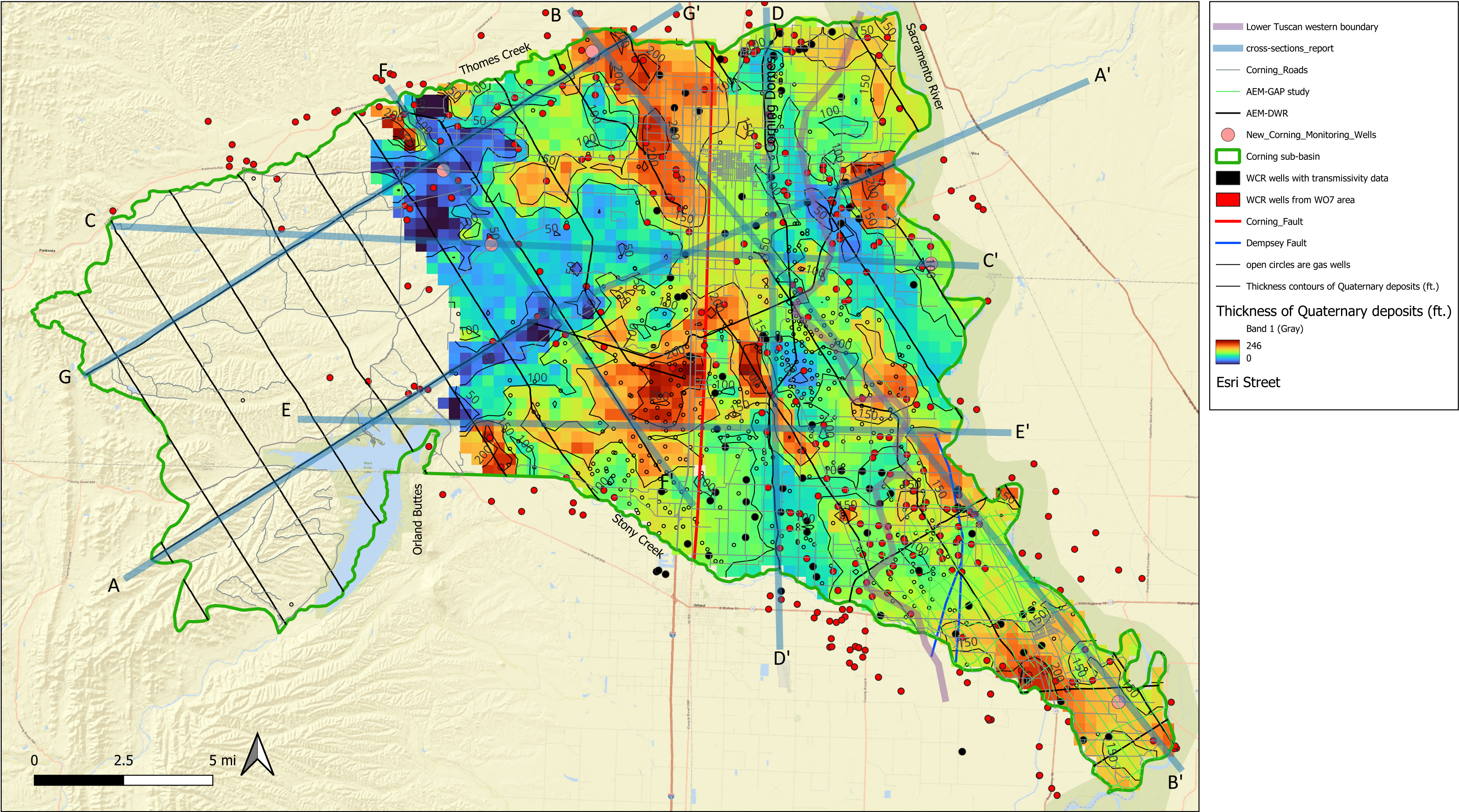


Figure 14. Thickness of combined Tehama/Tuscan Fms. (ft.)

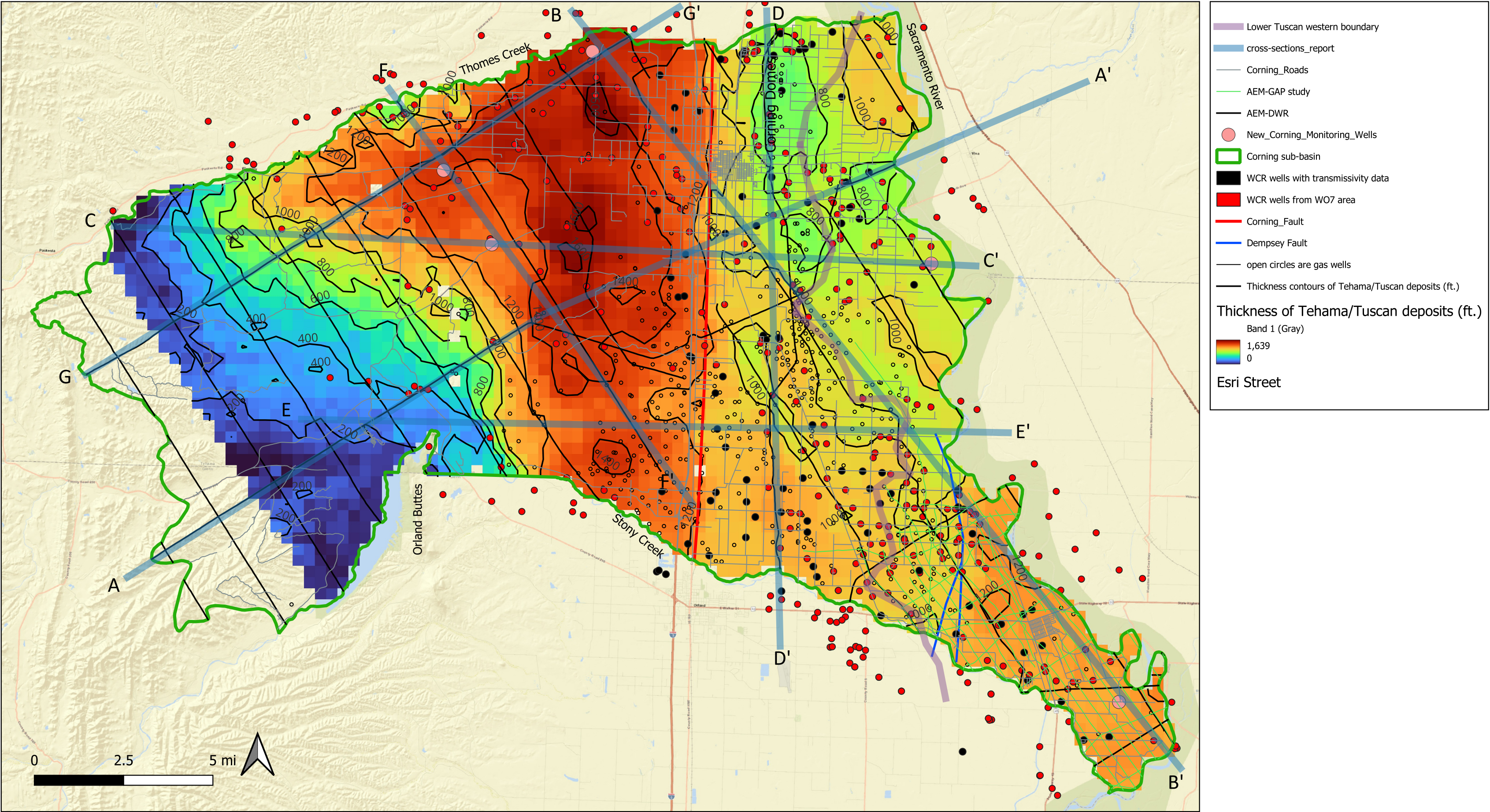


Figure 15

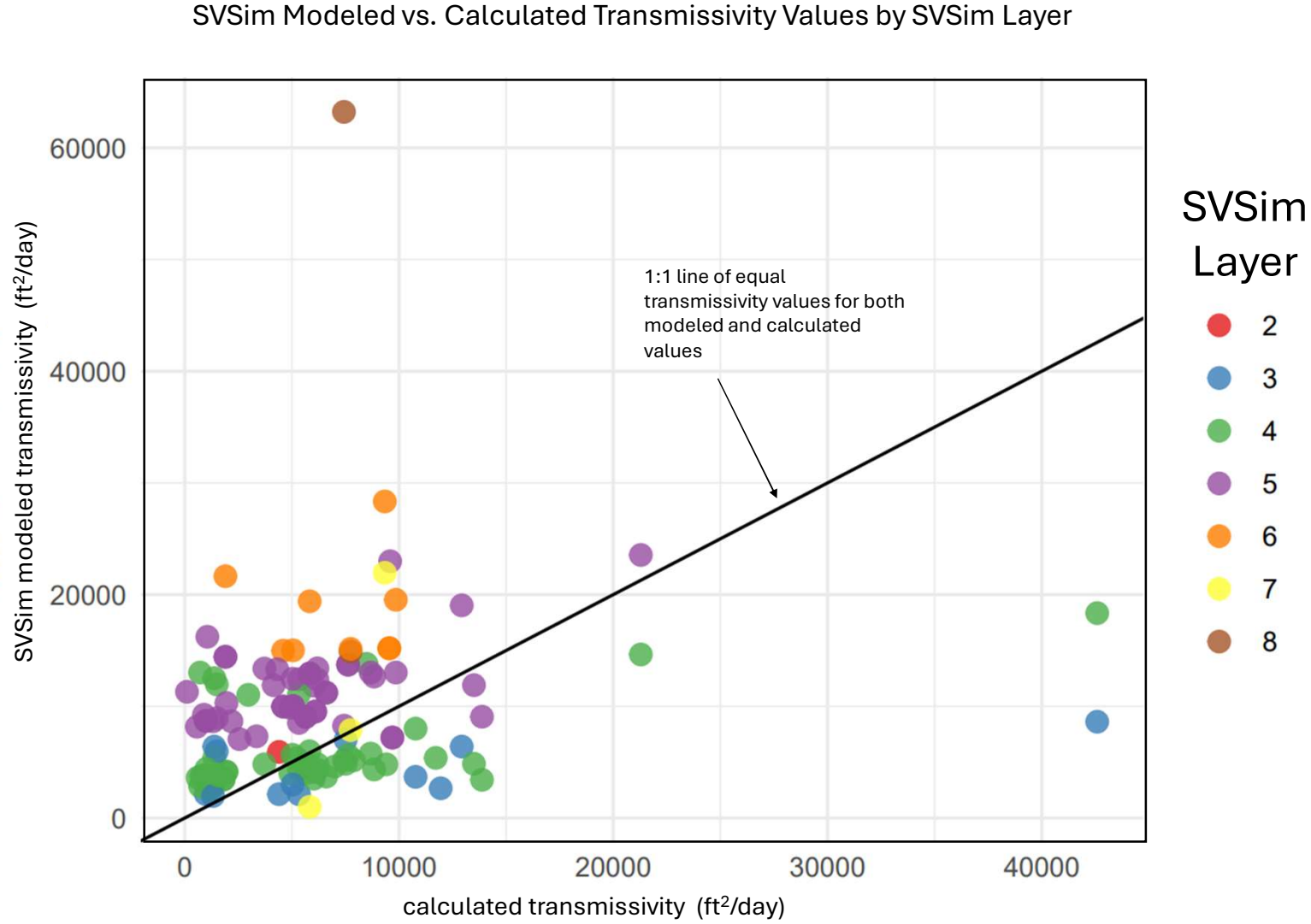


Figure 15. Plot of calculated T vs. SVSim-modeled T values (Mendoza and Greene, 2024).

Figure 16

Contour maps displaying spatial variation of T values (ft²/day) in Layer 4

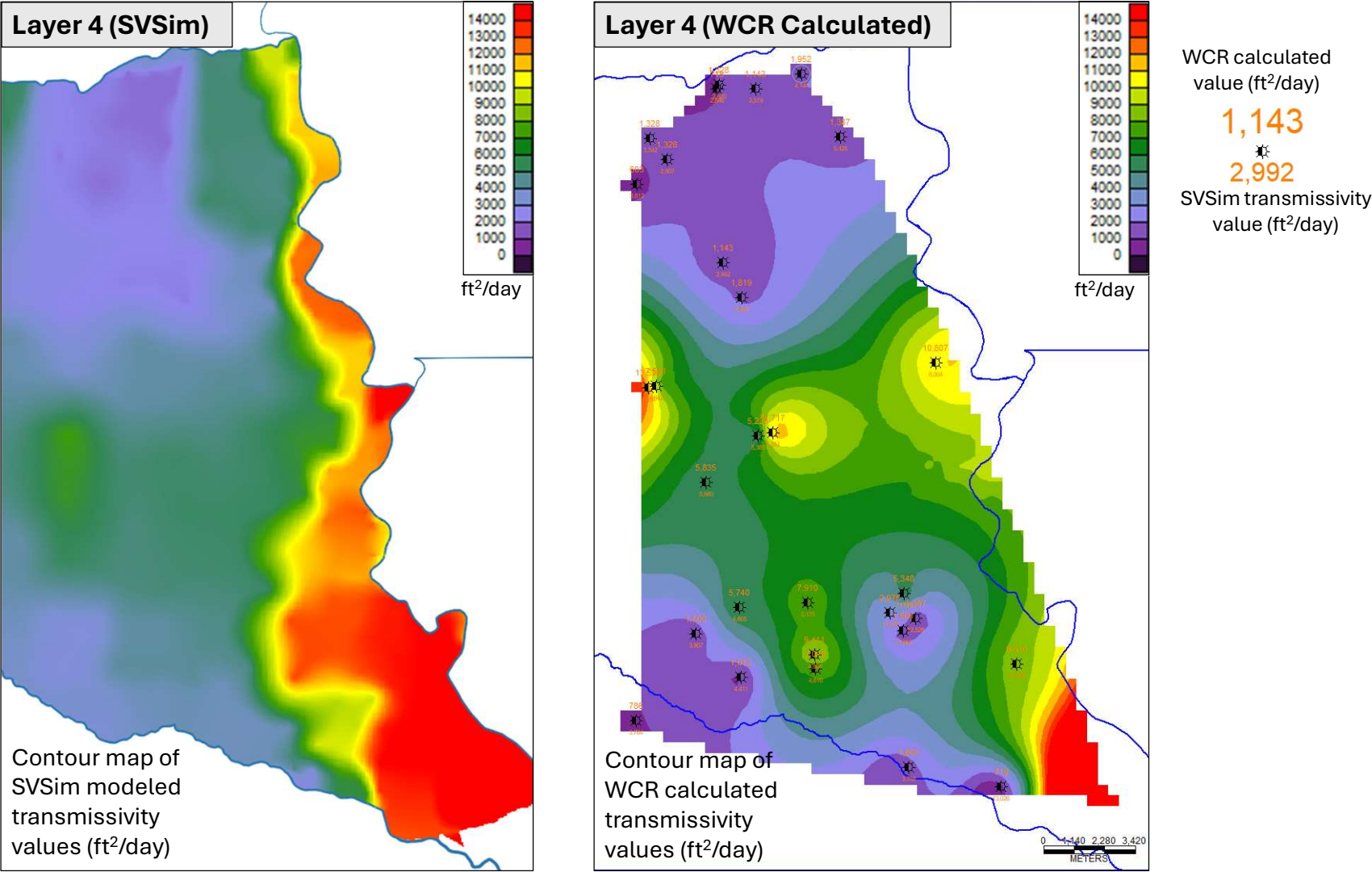


Figure 16. Comparison of Layer 4 T values between SVSim model and calculated WCR values (Mendoza and Greene, 2024).

Figure 17

Contour maps displaying spatial variation of T values (ft²/day) in Layer 5

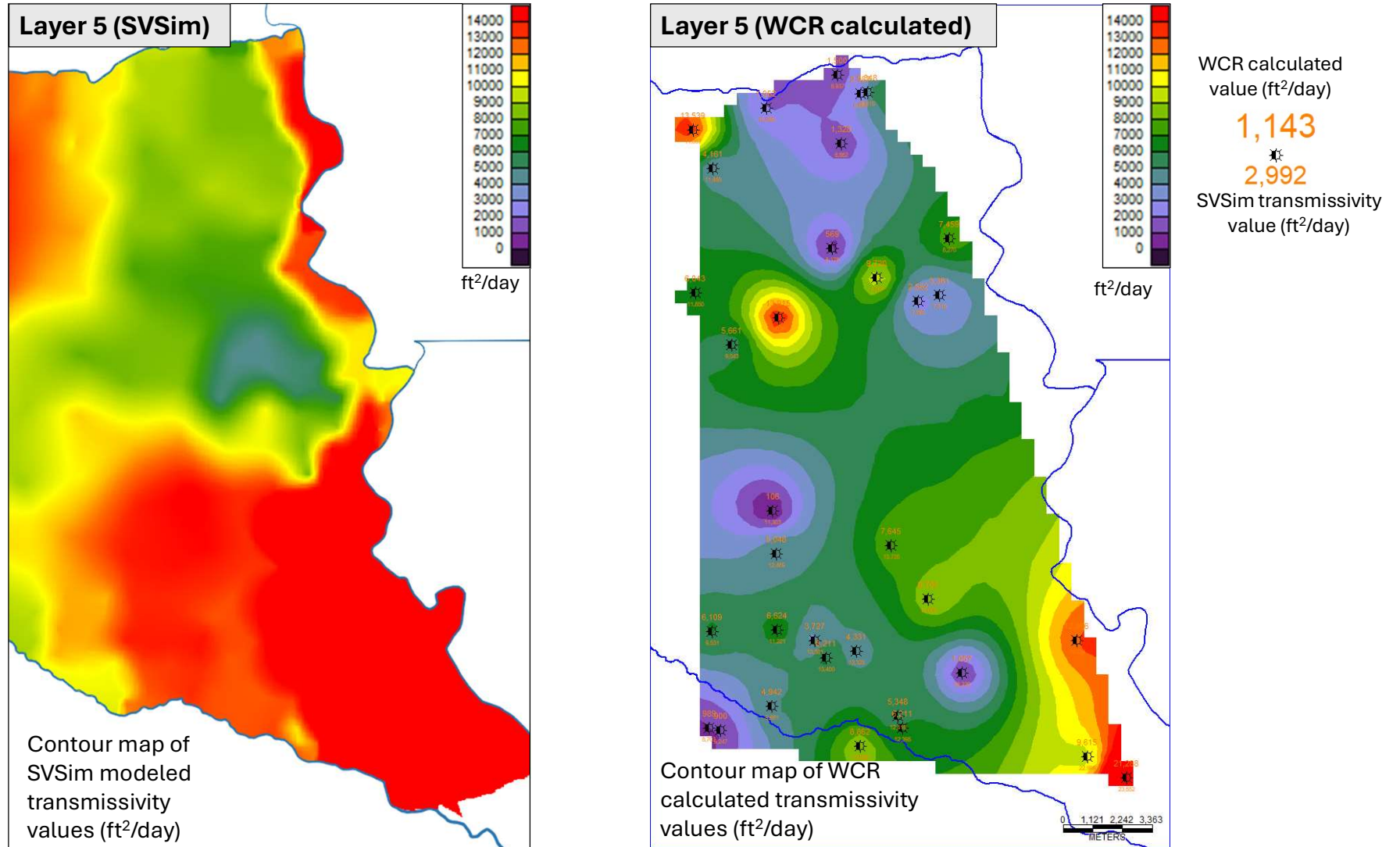


Figure 17. Comparison of Layer 5 T values between SVSim model and calculated WCR values (Mendoza and Greene, 2024).

Figure 18

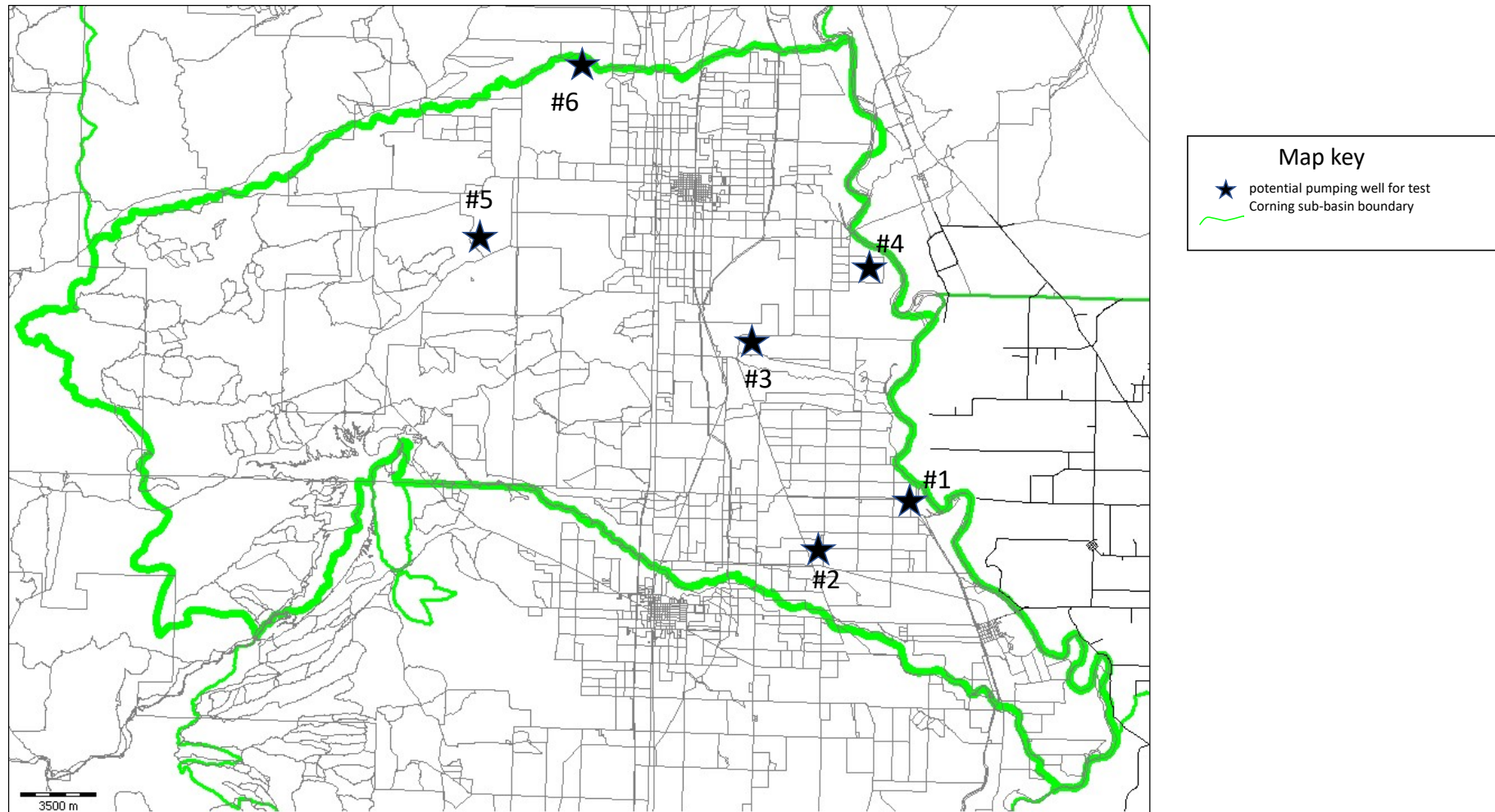


Figure 18. Map of Corning sub-basin with locations of six recommended pump-tests.

Figure 19
Pump Test Recommendation #1

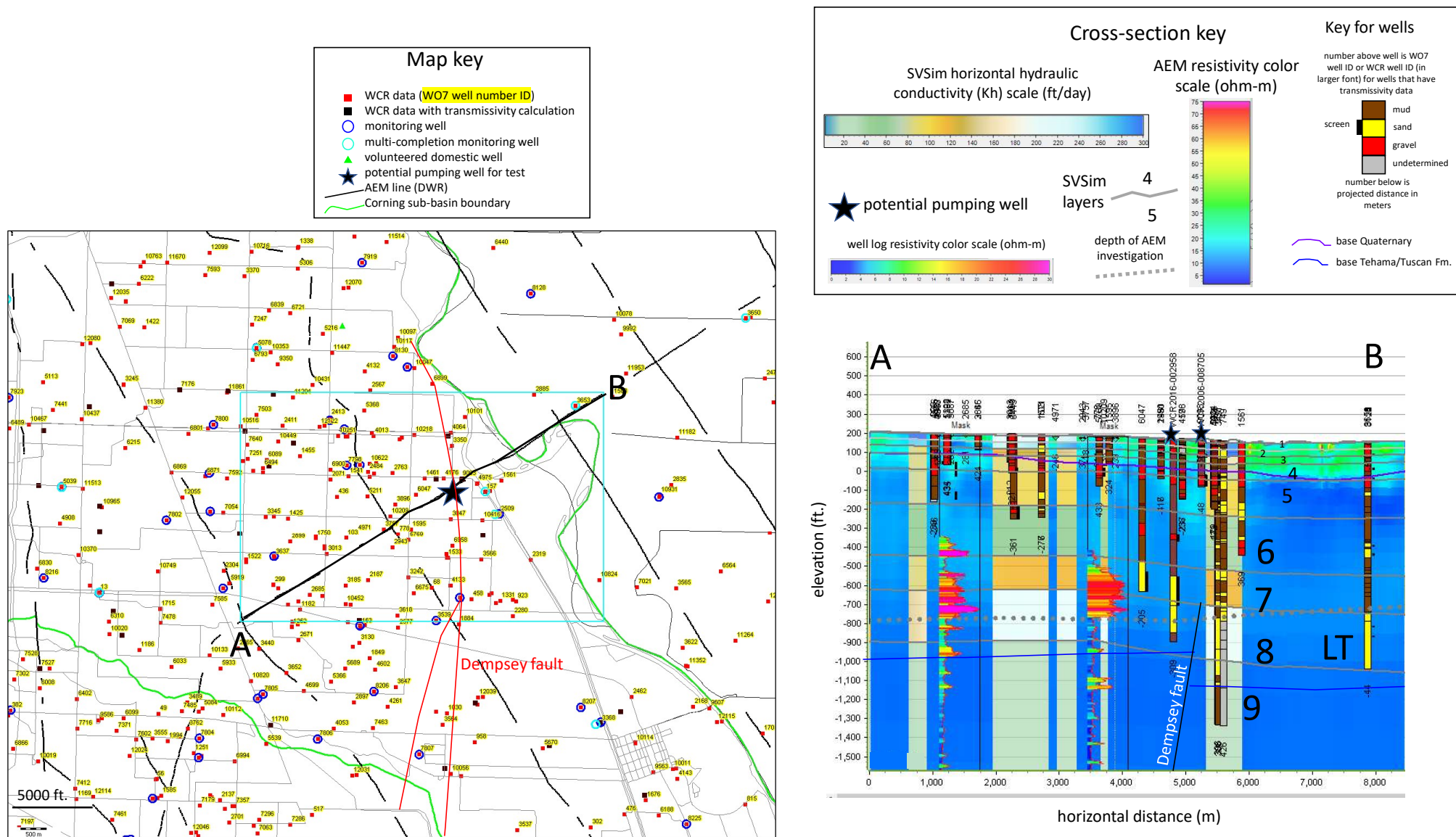


Figure 20
Pump Test Recommendation #2

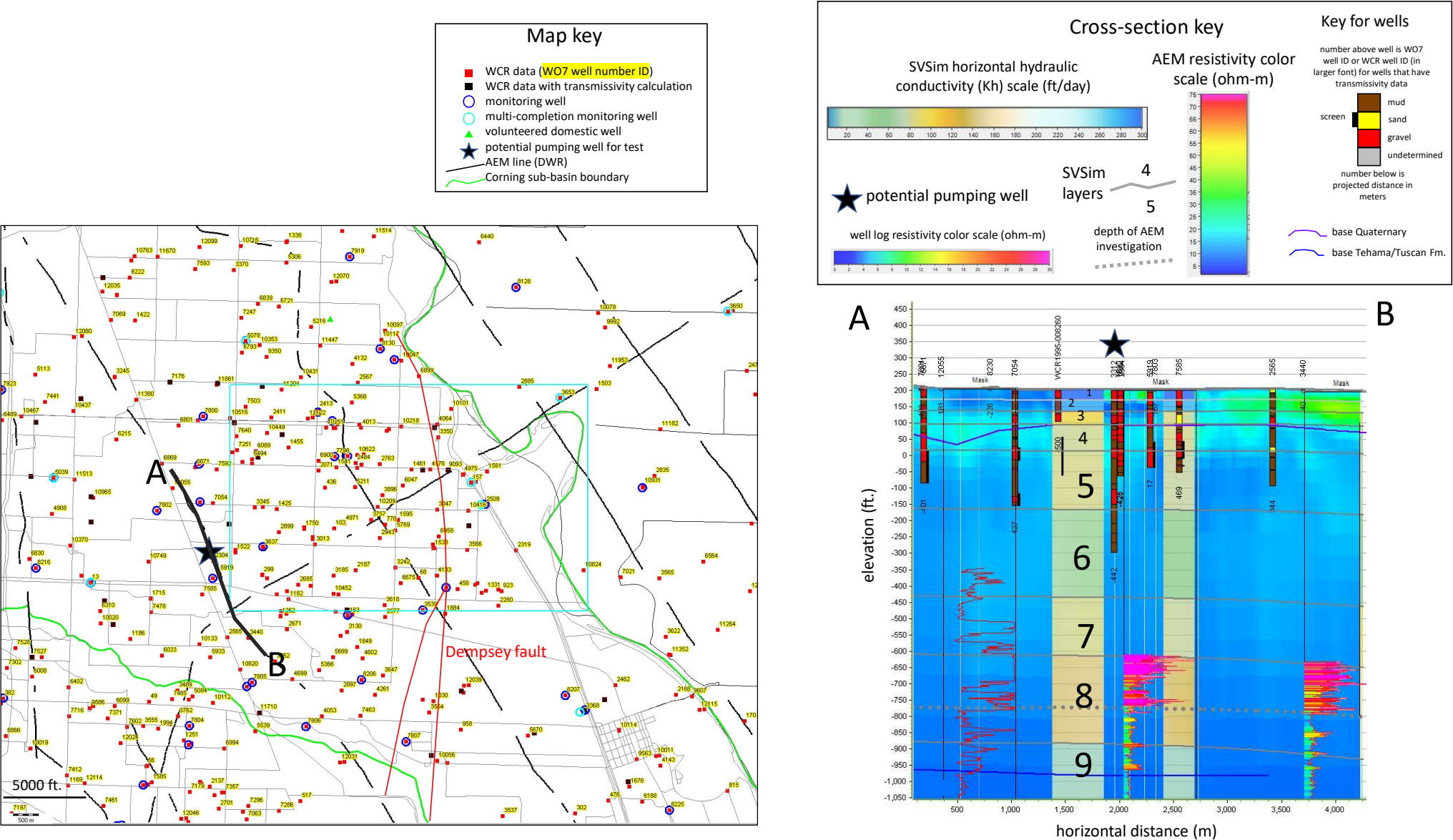


Figure 21

Pump Test Recommendation #3

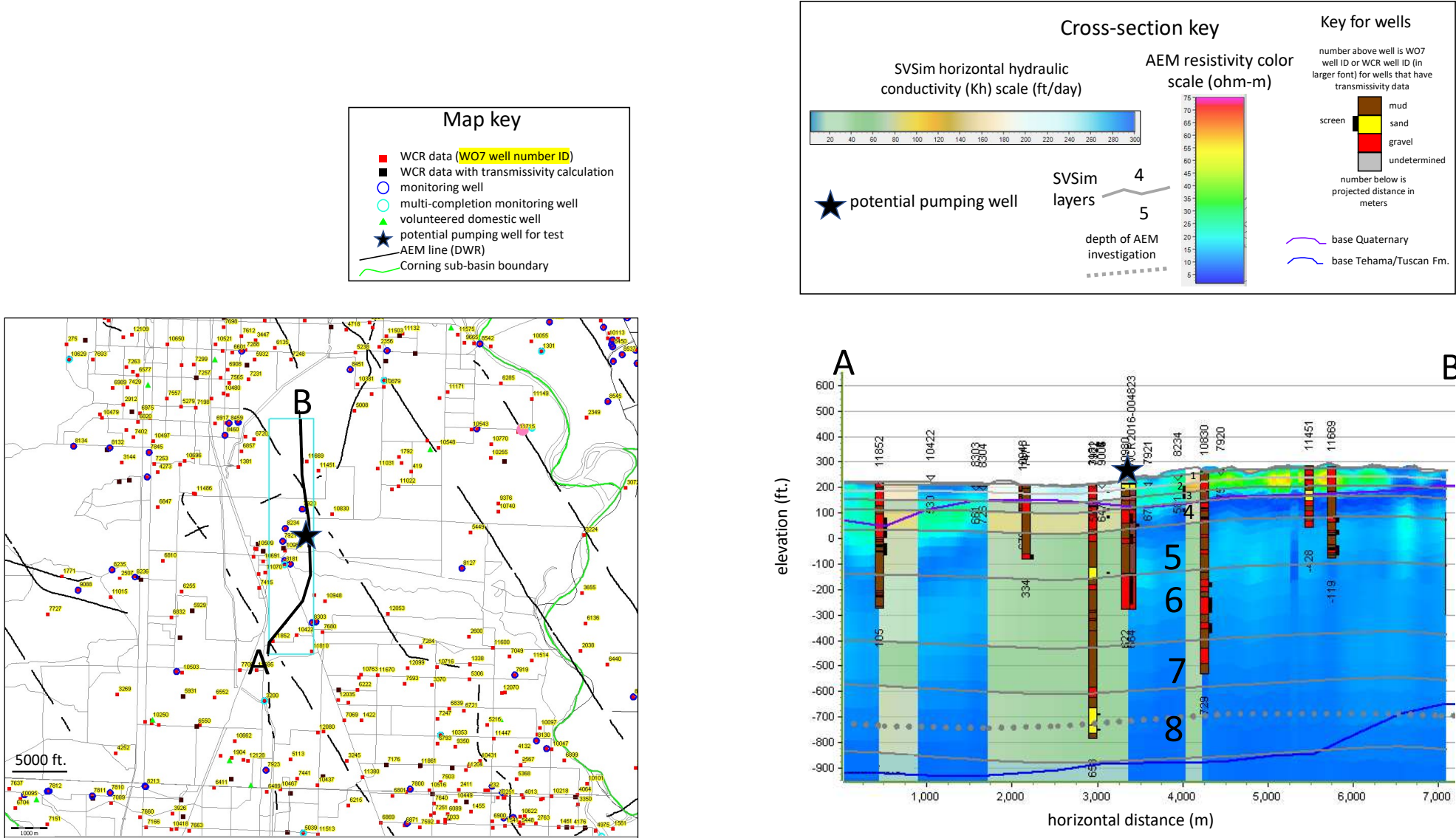


Figure 22

Pump Test Recommendation #4

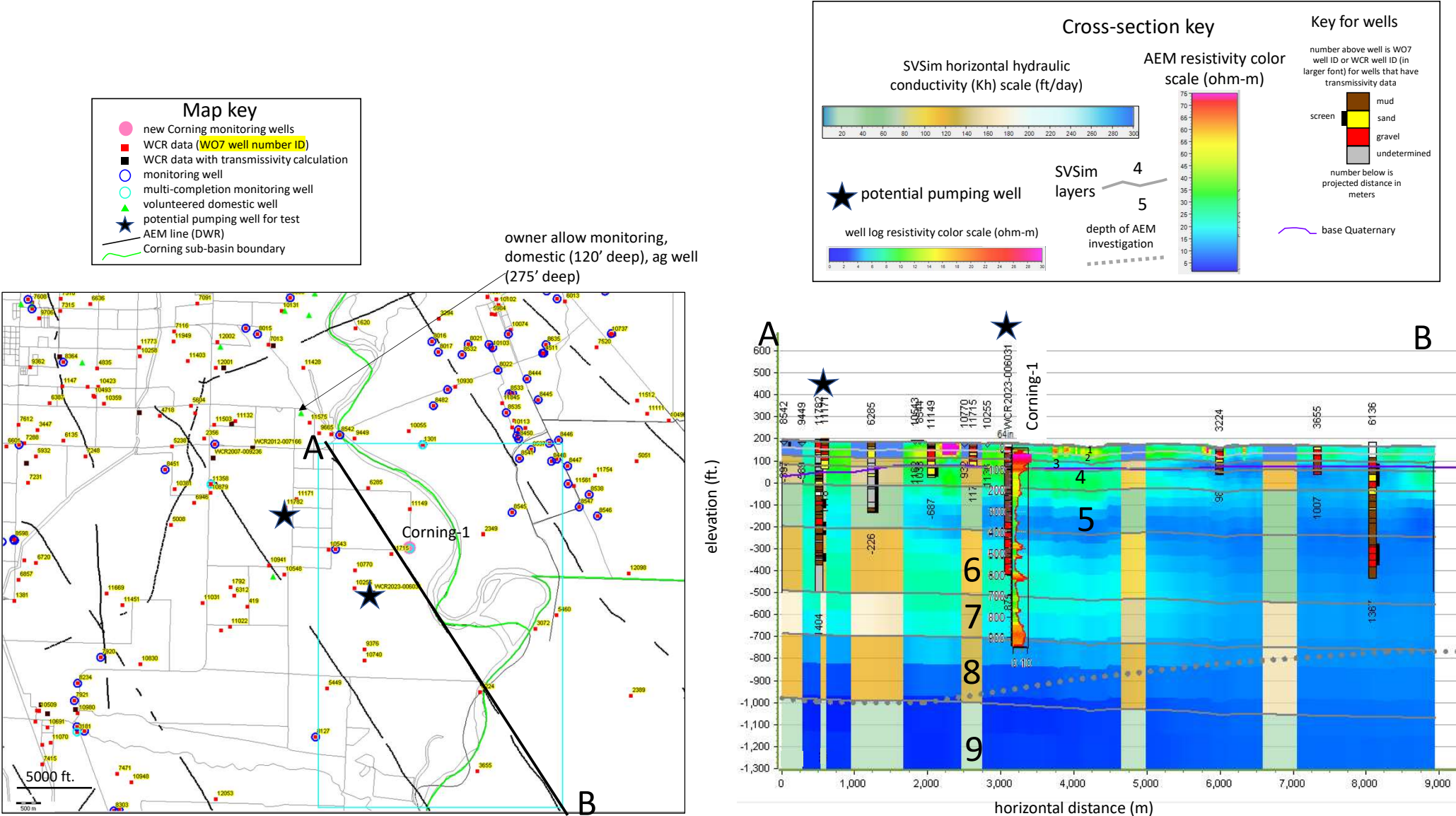


Figure 23 Pump Test Recommendation #5

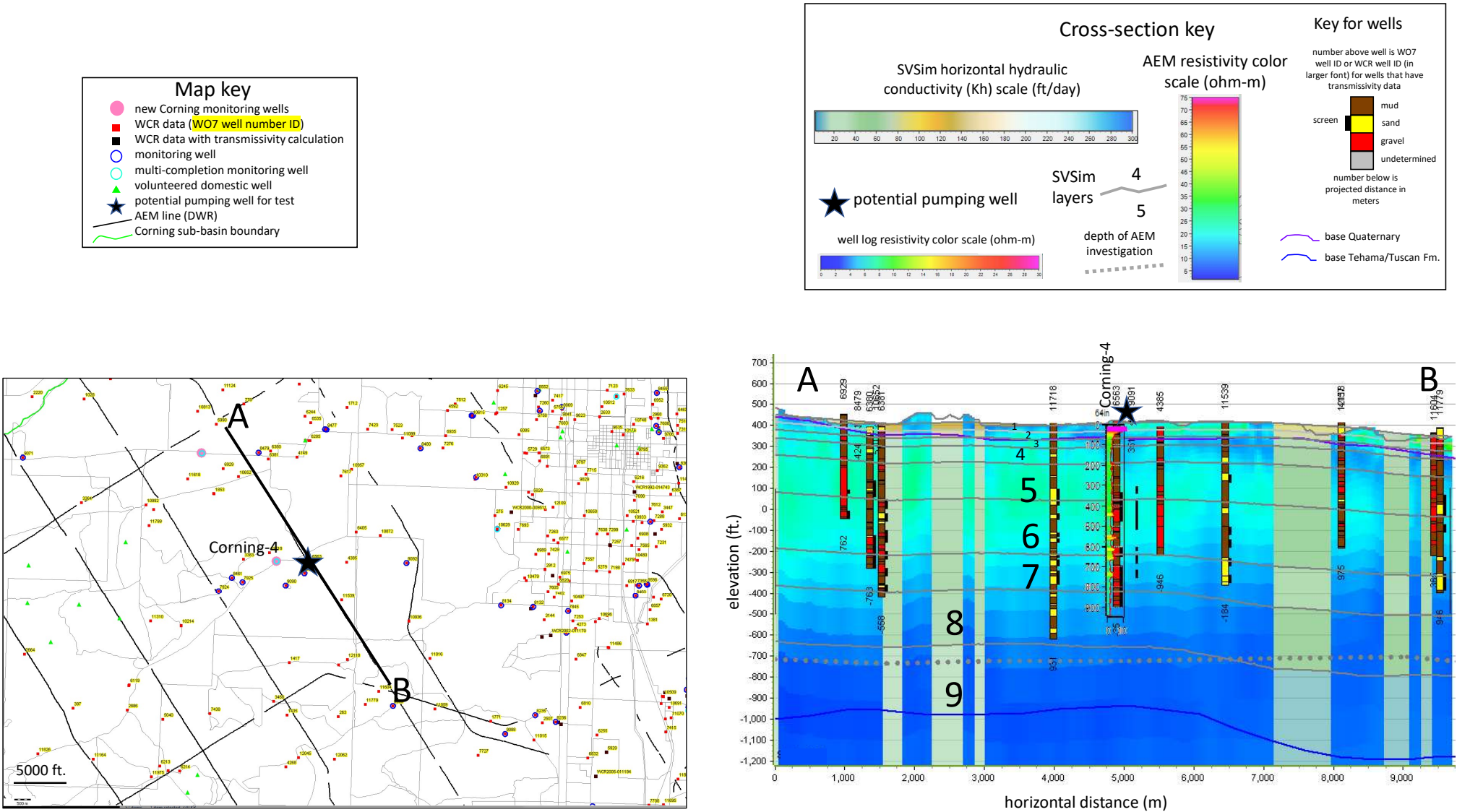


Figure 23. Recommendation #5 for a pump test with cross-section and map.

Figure 24 Pump Test Recommendation #6

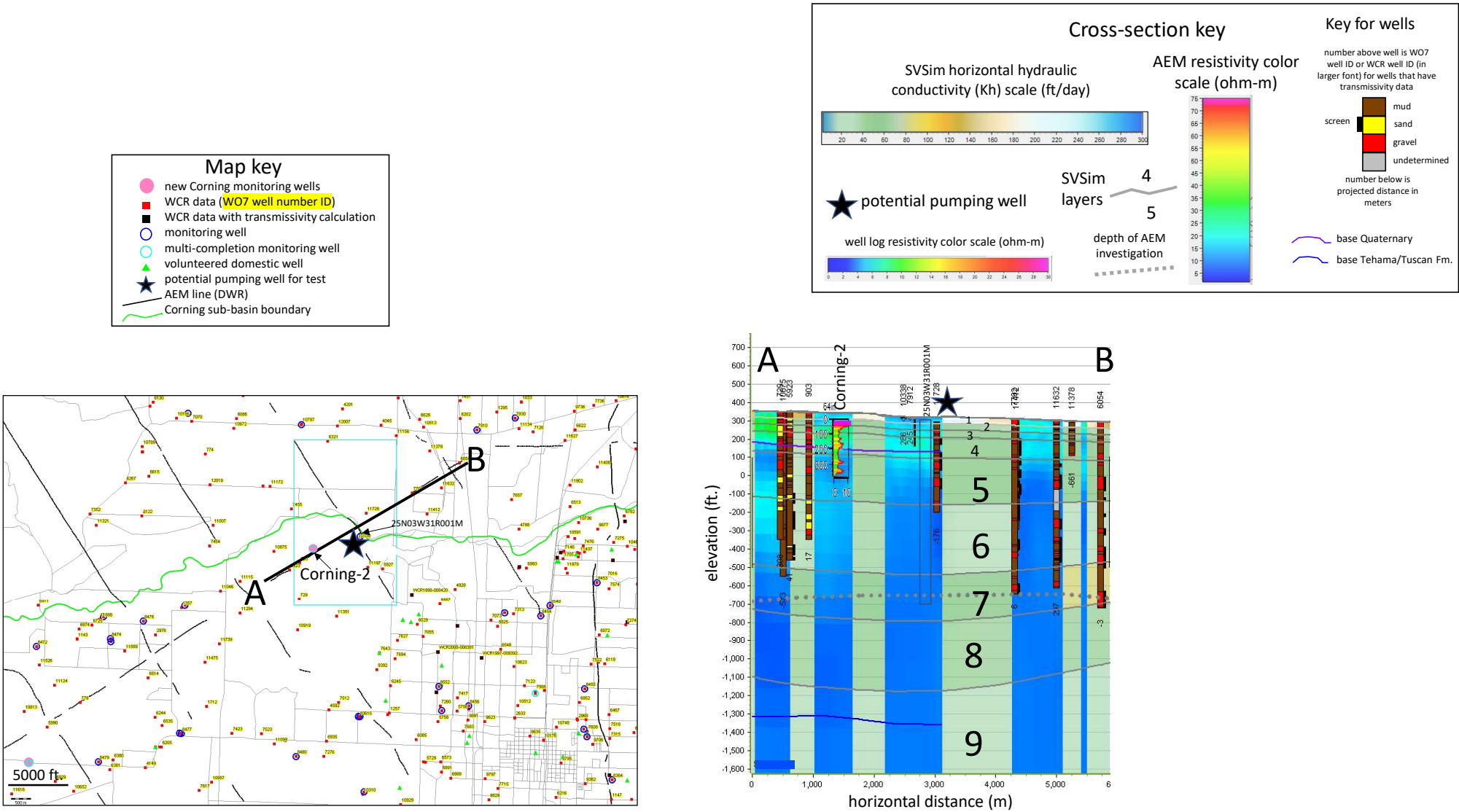


Table 1. Normalized percent composition for Corning wells.

Well	Depth (ft. bgs)	S	Mqms	M	V	Qt
Corning-1	40	3	33	31	9	24
Corning-1	70	0	29	23	22	25
Corning-1	100	0	22	13	46	19
Corning-1	250	0	7	28	48	18
Corning-1	480	0	8	45	14	32
Corning-1	500	0	15	28	43	15
Corning-1	520	0	13	26	36	25
Corning-1	600	11	21	39	20	9
Corning-1	630	0	11	30	35	24
Corning-1	750	0	0	30	67	4
Corning-1	770	0	0	17	77	6
Corning-1	820	0	1	23	72	3
Corning-1	840	0	1	13	83	3
Corning-1	860	0	1	22	73	4
Corning-1	890	0	0	43	46	11
Corning-1	910	0	0	22	77	1
Corning-1	930	0	1	22	67	10
Corning-2	15	1	37	29	1	32
Corning-2	45	3	56	10	1	30
Corning-2	100	3	57	11	2	27
Corning-2	125	8	37	7	2	45
Corning-2	165	0	38	18	4	40
Corning-2	185	6	49	7	3	36
Corning-2	205	4	62	7	1	26
Corning-2	255	3	55	10	2	29
Corning-2	295	5	47	11	1	35
Corning-2	345	1	47	14	11	27
Corning-3	30	4	44	15	4	33
Corning-3	60	2	54	20	0	24
Corning-3	130	0	42	34	0	24
Corning-3	170	0	51	14	0	34
Corning-3	200	1	49	17	1	31
Corning-3	280	0	46	20	1	34
Corning-3	300	0	58	8	0	34
Corning-3	320	0	55	17	1	27
Corning-3	400	0	38	40	0	21
Corning-3	440	2	45	24	3	28
Corning-3	520	0	45	29	0	27
Corning-3	550	1	37	18	0	44
Corning-3	610	2	36	28	1	34
Corning-3	620	0	39	23	2	37
Corning-3	650	0	30	32	2	35

Well	Depth (ft. bgs)	S	Mqms	M	V	Qt
Corning-3	670	1	40	20	1	38
Corning-3	670	0	46	22	1	31
Corning-3	710	0	44	25	1	30
Corning-3	730	0	39	46	1	14
Corning-3	760	15	34	29	2	20
Corning-3	790	21	43	12	1	22
Corning-3	830	31	34	10	2	24
Corning-3	850	2	25	54	1	19
Corning-3	930	57	12	24	0	6
Corning-3	1000	4	36	25	3	31
Corning-4	50	7	56	15	0	23
Corning-4	70	12	44	19	5	21
Corning-4	100	7	37	42	0	14
Corning-4	120	1	45	23	0	31
Corning-4	200	2	47	28	2	22
Corning-4	280	0	47	24	5	23
Corning-4	330	3	41	28	1	28
Corning-4	370	3	39	27	2	30
Corning-4	410	1	47	25	1	25
Corning-4	440	0	48	30	2	20
Corning-4	520	0	44	30	1	25
Corning-4	560	0	40	40	0	19
Corning-4	600	1	42	34	3	21
Corning-4	620	0	44	28	1	27
Corning-4	660	22	49	13	1	15
Corning-4	740	2	44	18	2	33
Corning-4	780	1	27	42	2	28
Corning-4	870	15	32	26	2	25
Corning-4	910	1	29	43	1	26
Corning-5	20	1	27	34	7	31
Corning-5	50	0	41	24	9	26
Corning-5	80	0	26	45	5	24
Corning-5	210	0	21	28	9	42
Corning-5	250	11	3	44	25	17
Corning-5	350	0	13	35	40	11
Corning-5	620	20	1	30	45	5
Corning-5	660	2	0	32	63	4
Corning-5	710	0	1	50	31	19
Corning-5	730	6	1	30	60	3
Corning-5	750	0	0	48	46	6
Corning-5	800	0	0	64	24	12
Corning-5	820	0	0	32	65	3
Corning-5	850	0	0	30	63	7

Well	Depth (ft. bgs)	S	Mqms	M	V	Qt
Corning-5	890	0	0	31	66	2
Corning-5	930	0	0	16	81	3
Corning-5	960	1	0	37	52	10
Corning-5	1010	0	0	22	76	2
Corning-5	1050	0	0	18	75	7
Corning-5	1070	1	0	31	59	10
Corning-5	1090	0	0	29	65	6

Qt = total quartz grains

V = volcanic rock fragments

M = metamorphic rock fragments except quartz-mica schist grains

Mqms = metamorphic quartz-mica schist grains

S = sedimentary rock fragments