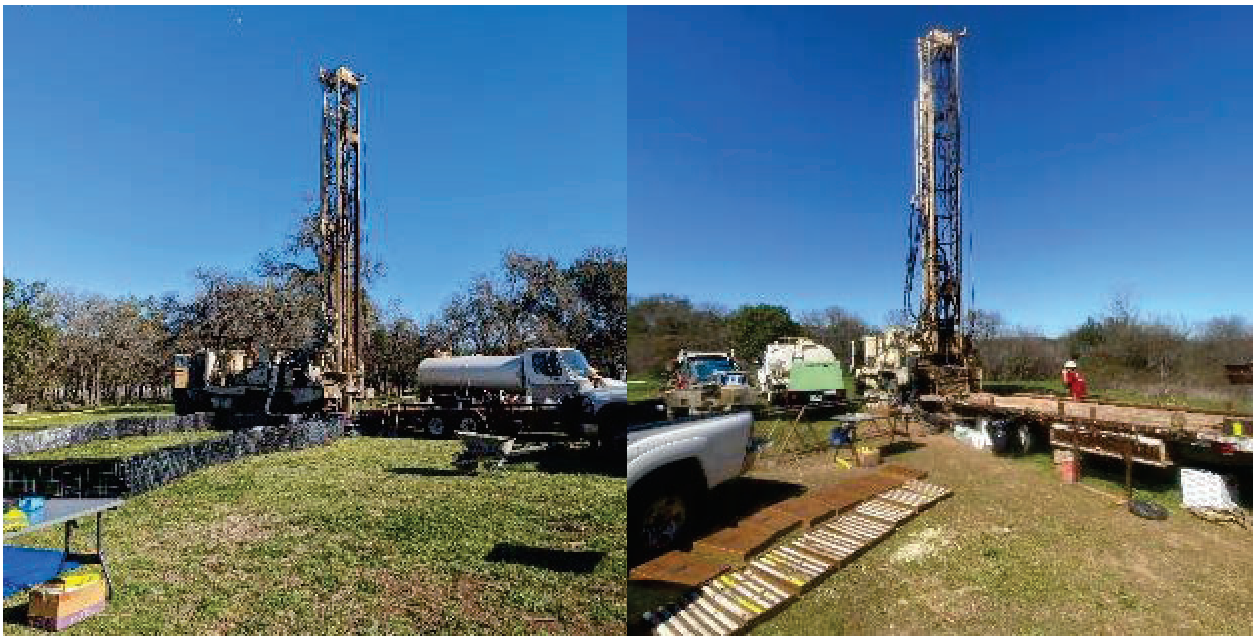
Barton Springs
Edwards Aquifer
CONSERVATION DISTRICT

Preliminary Data Report on Two Monitoring Wells Installed in the Barton Springs Segment of the Edwards Aquifer, Austin, Texas.



BSEACD Technical Memorandum 2024-1202

December 2024

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Cover. Well drilling sites for the Garrison Park Monitoring Well (left) and the Barton Springs Multiport Well (right). Boxes of aquifer core sample collected from the Barton Springs borehole are in the foreground.

PRELIMINARY DATA REPORT ON TWO MONITORING WELLS INSTALLED IN THE BARTON SPRINGS SEGMENT OF THE EDWARDS AQUIFER, AUSTIN, TEXAS.

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Introduction

Monitoring wells are an essential tool for tracking groundwater levels and water quality over time, as well as conducting studies to better understand how an aquifer functions. Dedicated monitoring wells are non-pumping wells that are intended for monitoring ambient aquifer conditions over time. These wells provide valuable data, with their hydrographs providing temporal records of aquifer water levels, free from the effects of short-term water level drops due to pumping within the well borehole.

In early 2024, Barton Springs Edwards Aquifer Conservation District (BSEACD) drilled two dedicated scientific monitoring wells in Austin, TX. One is located in Garrison Municipal Park just south of the intersection of Menchaca Road and Stassney Lane, and is a standard monitoring well with open-hole completion. The other is located just south of Barton Springs Municipal pool and is a multiport well with 15 discreet monitoring zones distributed through the vertical thickness of the aquifer (Figure 1). Funding for the project came from a combination of OneOK Inc., as part of a 2013 agreement between BSEACD and OneOK Inc. (formerly Magellan Pipeline Company, L.P.) to monitor the Barton Springs Segment of the Edwards Aquifer for petroleum hydrocarbons, the City of Austin Conservation Fund, and both monetary and in-kind contributions from BSEACD (District). Completion of these dedicated monitoring wells fills key gaps in available Edwards Aquifer monitoring locations and opens up a variety of new opportunities for study to improve our understanding of the Aquifer.

This data report presents data collected during well drilling operations and preliminary water level and water quality data collected from the wells in the months after well completion. Additional datasets that were too large to include in this report are available for digital download on the District website.

Hydrogeologic Background

The Barton Springs Segment of the Edwards Aquifer is an important groundwater resource for municipal, industrial, domestic, recreational, and ecological needs. Just under 100,000 people depend on water from the Barton Springs Segment of the Edwards Aquifer as their sole source of drinking water, and the various spring outlets at Barton Springs are the only known habitats for the endangered Barton Springs Salamander and Austin Blind Salamander.

The Edwards Aquifer is composed of the Cretaceous-age Edwards Group (Kainer and Person Formations) and the Georgetown Formation (Figure 2). Sediments making up the Edwards Group accumulated on the Comanche Shelf as shallow marine, intertidal, and supratidal deposits (Rose, 1972). The Georgetown Formation, disconformably overlying the Edwards Group, was deposited in a more openly circulated, shallow-marine environment (Rose, 1972). Previous studies have shown that the upper ~150 ft of the Trinity Aquifer, Upper Glen

Rose Formation is hydraulically connected to the Edwards Aquifer within some portions of the Barton Springs segment (Wong et al., 2014; Hunt et al., 2016). Thus, in these localities the base of the Edwards Aquifer effectively extends into the Upper Glen Rose.

The Edwards Aquifer evolved over millions of years as the result of numerous geologic processes such as deposition, tectonism, erosion, and diagenesis. The formation of the aquifer was influenced significantly by fracturing and faulting associated with the Balcones Fault Zone (BFZ) and dissolution of limestone and dolomite units by infiltrating meteoric water (Hunt et al., 2019).

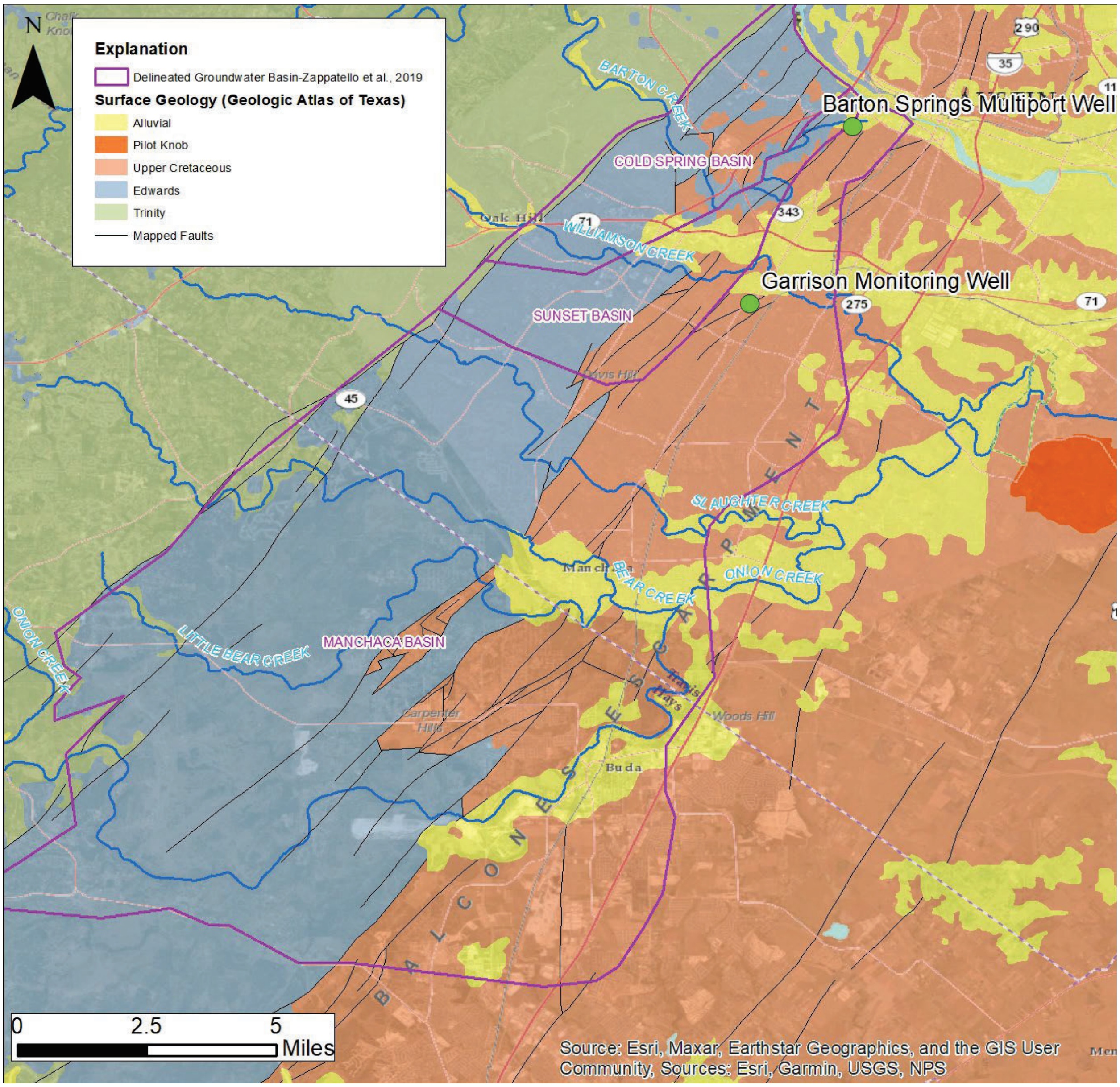

Figure 1. Map of study area with surface geology and Edwards Aquifer groundwater basins delineated by Zappatello et al., 2019.

The areal extent of the Barton Springs Segment of the Edwards Aquifer is about 166 mi^2 (Hunt et al., 2019). Approximately 64% of the aquifer is unconfined; the remainder is confined (Hunt et al., 2019). The aquifer is bounded to the north by the Colorado River. The east boundary is the interface between the fresh-water zone and the saline-water or "bad-water" zone of the aquifer, characterized by a sharp increase in dissolved constituents (more than 1,000 mg/L total dissolved solids) and a decrease in permeability. The west boundary of the aquifer is defined by the western limit of Edwards Aquifer hydrogeologic units and the BFZ and is limited locally by saturated thickness of the aquifer. The southern hydrologic divide between the Barton Springs and San Antonio segments of the Edwards Aquifer is dynamic, shifting north or south between the Blanco River and Onion Creek depending on hydrologic conditions (Smith et al., 2012).

The majority of recharge to the Barton Springs segment of the Edwards Aquifer comes from streams crossing the recharge zone, often through discreet caves and karst features in streambeds (Hunt et al., 2019). Direct and diffuse upland recharge also contributes but represents a smaller portion of the overall recharge component of the water budget (Hunt et al., 2019). Numerous dye tracing studies have delineated flow paths and groundwater basins within the Barton Springs segment of the Edwards Aquifer. Zapatello et al., (2019) provides a comprehensive review of these studies. Generally, groundwater flows from south-to-north within the Barton Springs segment, discharging at either Barton Springs or Cold Springs.

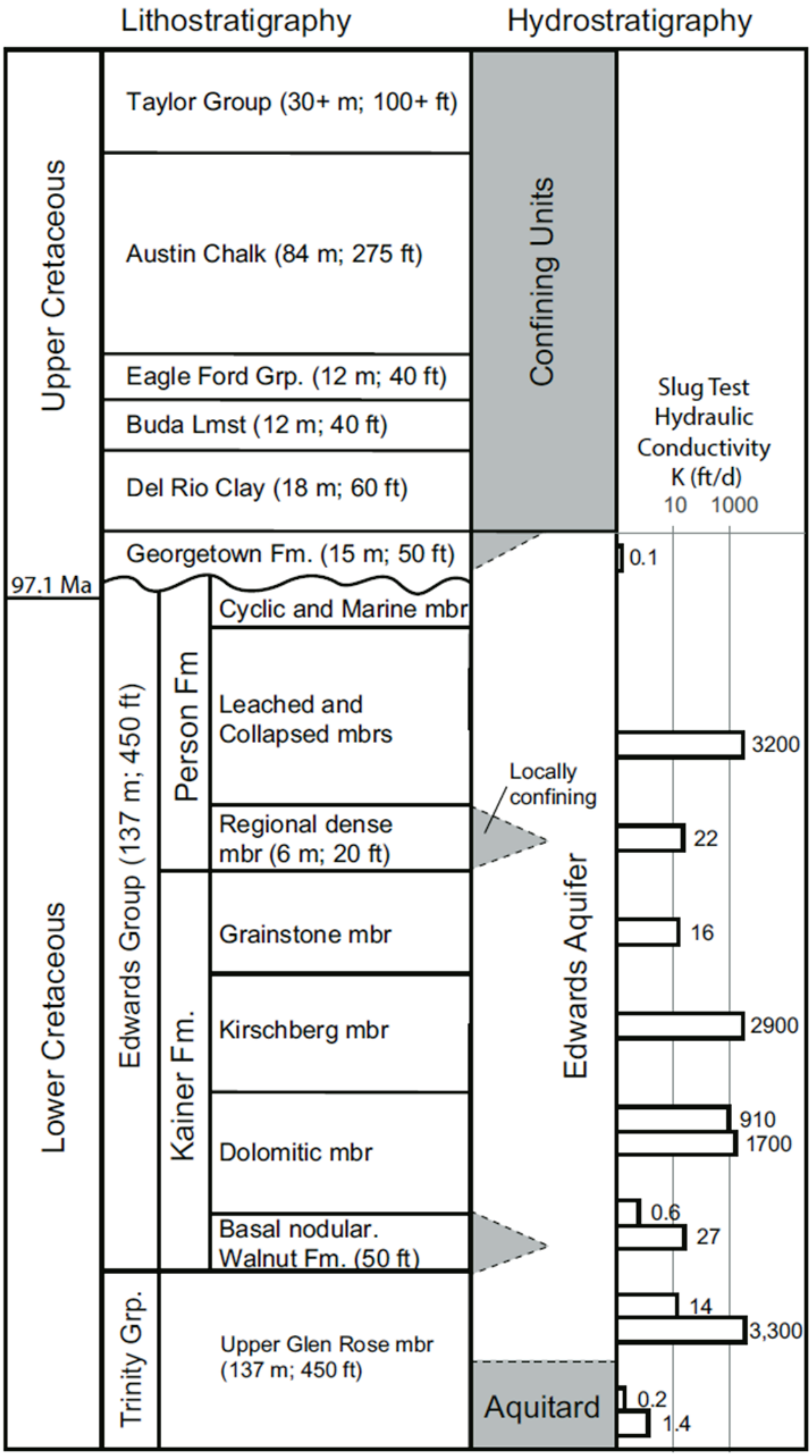

Figure 2. Lithostratigraphic and hydrostratigraphic section of the Edwards Aquifer from Hunt et al., (2019).

Garrison Park Well

The Garrison Park well was drilled just northwest of the Garrison Park Municipal Pool (Figure 3, Figure 4). The Garrison Well location was selected to provide an Edwards Aquifer monitoring location along longer, generally northeast trending groundwater flowpaths within the Manchaca Groundwater Basin as delineated by Zapitello et al., (2019) (Figure 1). These flowpaths are capable of rapidly transmitting groundwater to the Barton Springs Complex and are likely associated with a primary conduit system. The Garrison Monitoring Well will thus provide a valuable monitoring location for tracking aquifer conditions and groundwater quality over time. Below is a summary of drilling operations and borehole lithology inferred from evaluation of driller's cuttings and geophysical logs. A schematic of well completion with geophysical logs and annotated downhole camera log screenshots is presented in Figure 5.

Drilling and Well Completion Summary

Drilling operations for the Garrison Park Well occurred between January 18 and January 23, 2024. The well was drilled using air rotary technique. Total well depth was 524 feet from ground surface at the time of well completion. Circulation was maintained throughout drilling operations and cuttings were collected at 10-ft intervals.

Minimal water was encountered in the upper portion of the borehole above 260 feet total depth during drilling. Below this depth the borehole began producing significant amounts of jetted water with increasing water quantity with depth. After completion of borehole drilling, static water level equalized at 216 ft-bgs.

The borehole was cased and cemented through the top 130 feet, creating a seal throughout the Buda and Del Rio, and a portion of the Georgetown formation. Below the cased and grouted interval, the borehole was left open hole throughout the Edwards Formation. Based on cuttings and geophysical log interpretation, the bottom of the well is likely still above the Walnut Formation (also referred to as the Basal Nodular Member of the Kainer Formation in some publications). A lithologic description of well cuttings from the Garrison Park Well is included in Appendix A of this report. In July 2024 well was instrumented with a multiparameter sonde providing a continuous record of water level, temperature, conductivity, pH, and dissolved oxygen. To date, this will be the first time that these water quality parameters have been measured in-situ in the deeper portion of the Edwards Aquifer away from the main Barton Springs outlets. The sonde is connected to a telemetry system at the surface which will make this dataset available in real time to the public. A link to this data is available on the District website.

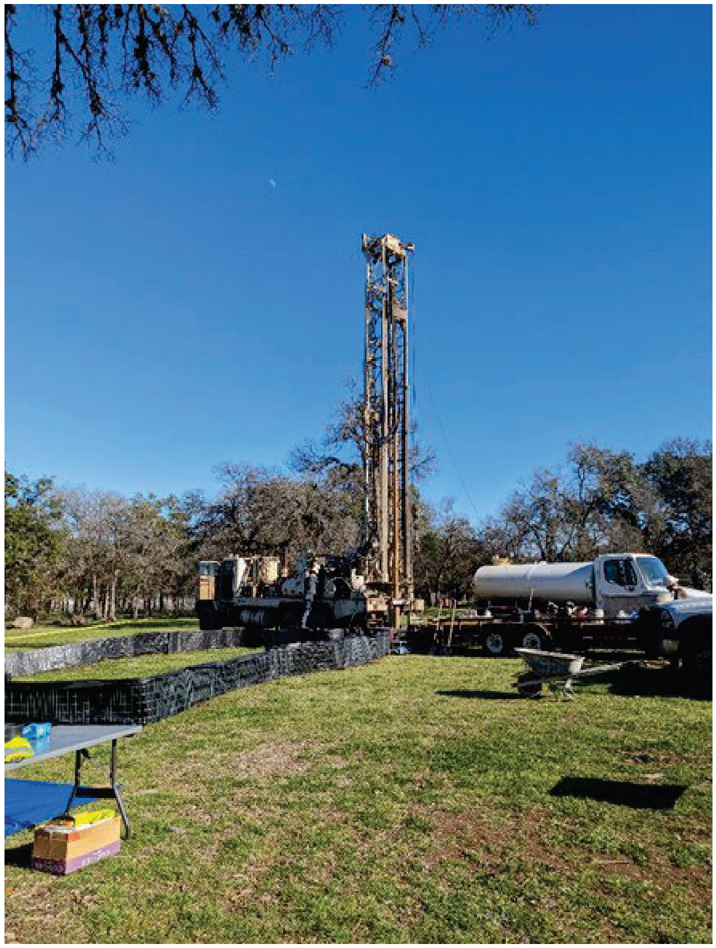

Figure 3. Photo of the Garrison Park Monitoring Well Drill Site.

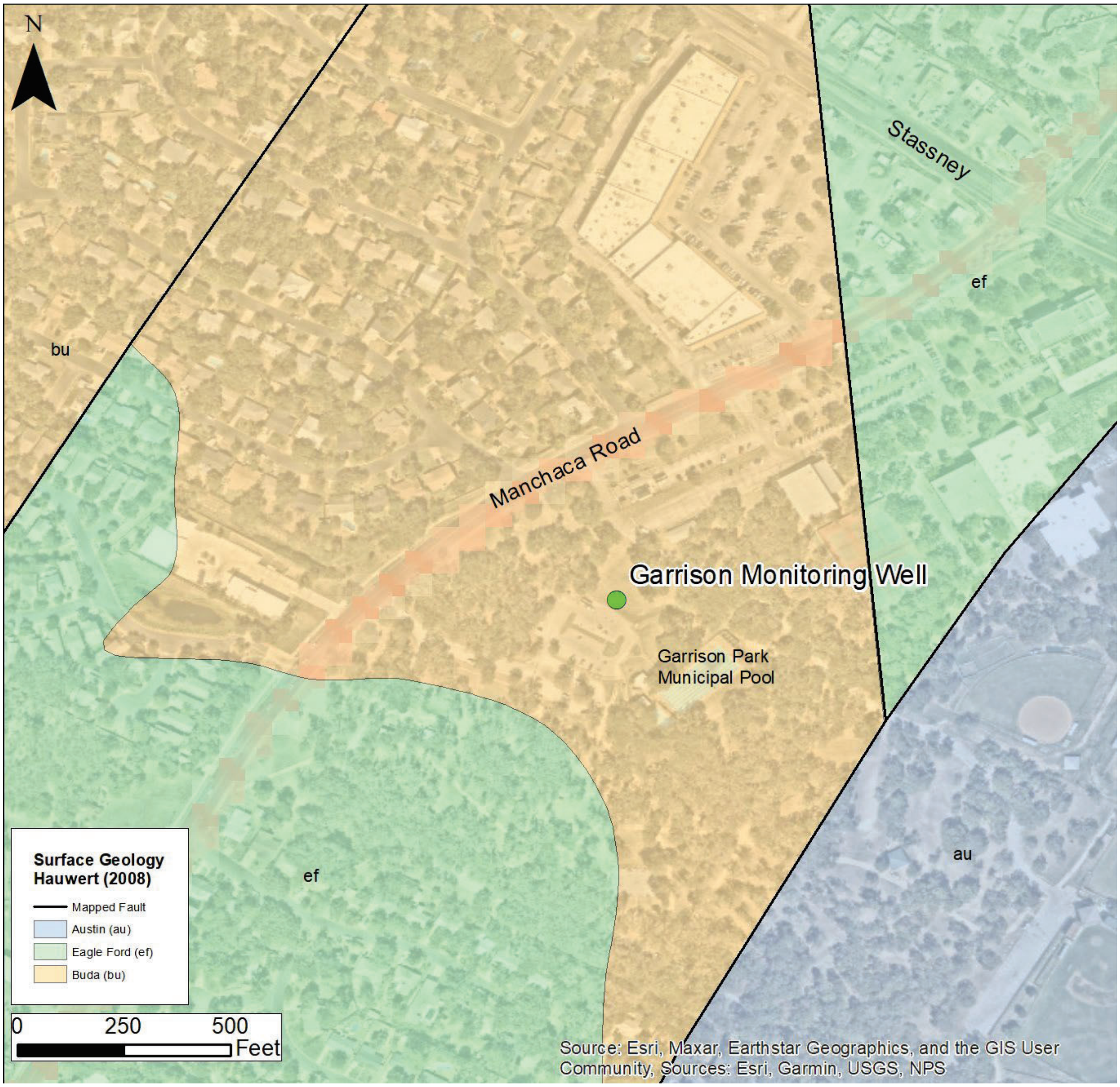

Figure 4. Geologic map of Garrison Monitoring Well Location

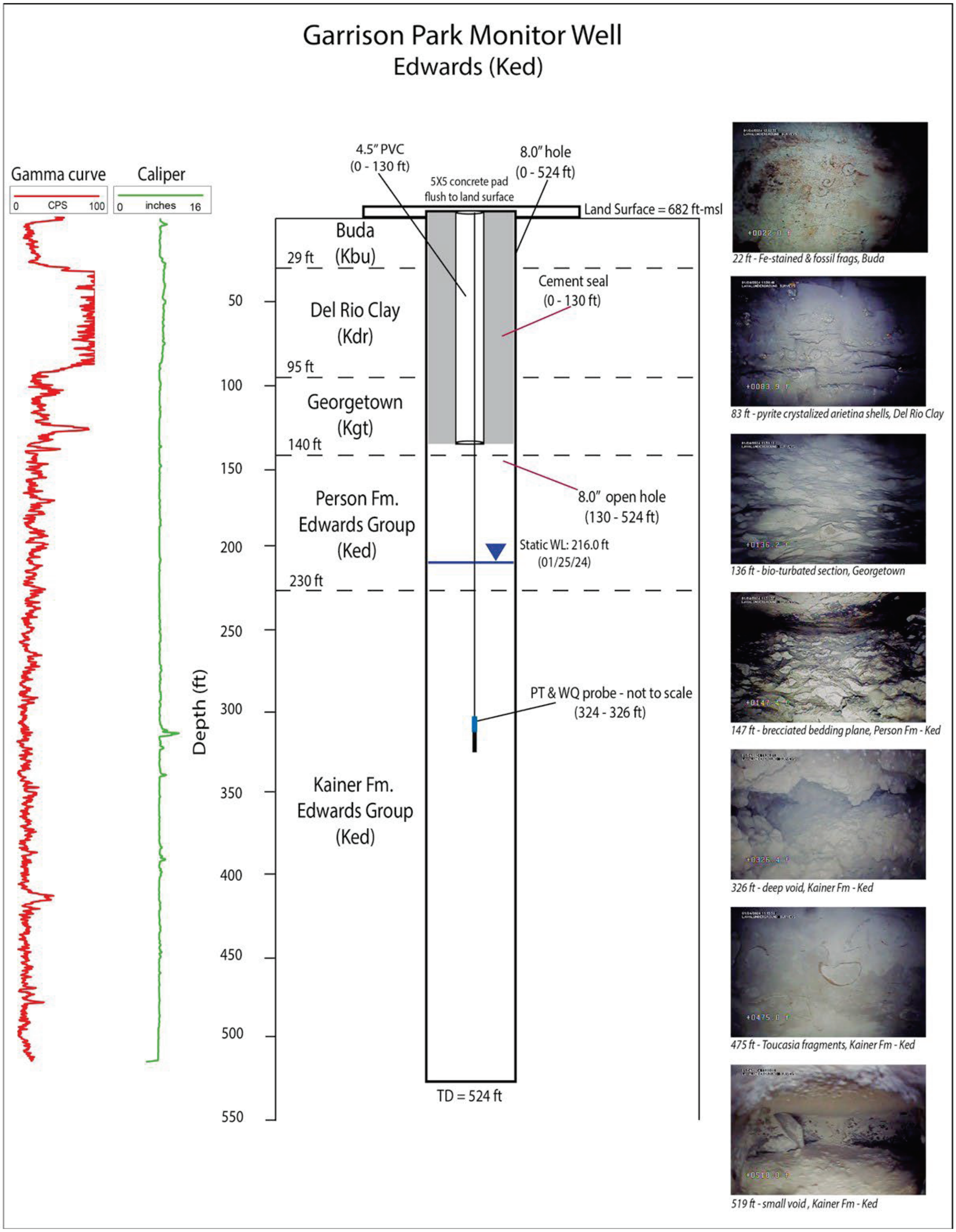

Figure 5. Schematic of Garrison Well Completion with Gamma/Caliper curves and selected downhole camera screenshots.

Barton Springs Multiport Well

The Barton Springs Multiport Well is located in Zilker Park just south of Barton Springs pool (Figure 6, Figure 7). The site was selected because it coincides with the suspected location of karst conduits which feed the Barton Springs complex as evidenced from surface geophysical surveys (Saribudak and Hauwert, 2013) and a sediment plume which impacted Barton Springs in December 2018 sourced from nearby drilling of geothermal wells (BSEACD, 2019). Thus, the site provides an ideal location for studying the Barton Springs complex, as well as providing an access point for monitoring for water quality impacts proximal to the springs.

Figure 6. Photo of Barton Springs Multiport Well drill site. Core boxes filled with aquifer core samples can be seen in the foreground.

Multiport Wells

Multiport monitor wells have been used by the BSEACD to study complex, multilayer, and stacked aquifers in central Texas (Smith and Hunt, 2019). The BSEACD has used multiport wells to determine vertical variations in an aquifer and the hydraulic relationships between stacked aquifers. With multiport wells, properties such as hydraulic head, temperature, hydraulic conductivity, and water quality of discrete units within an aquifer can be determined. The use of multiport wells has shown how portions of the Upper Trinity lithologic units (i.e., the Upper Glen Rose Formation) are hydraulically connected to the overlying Edwards lithologic units in some locations, and how the

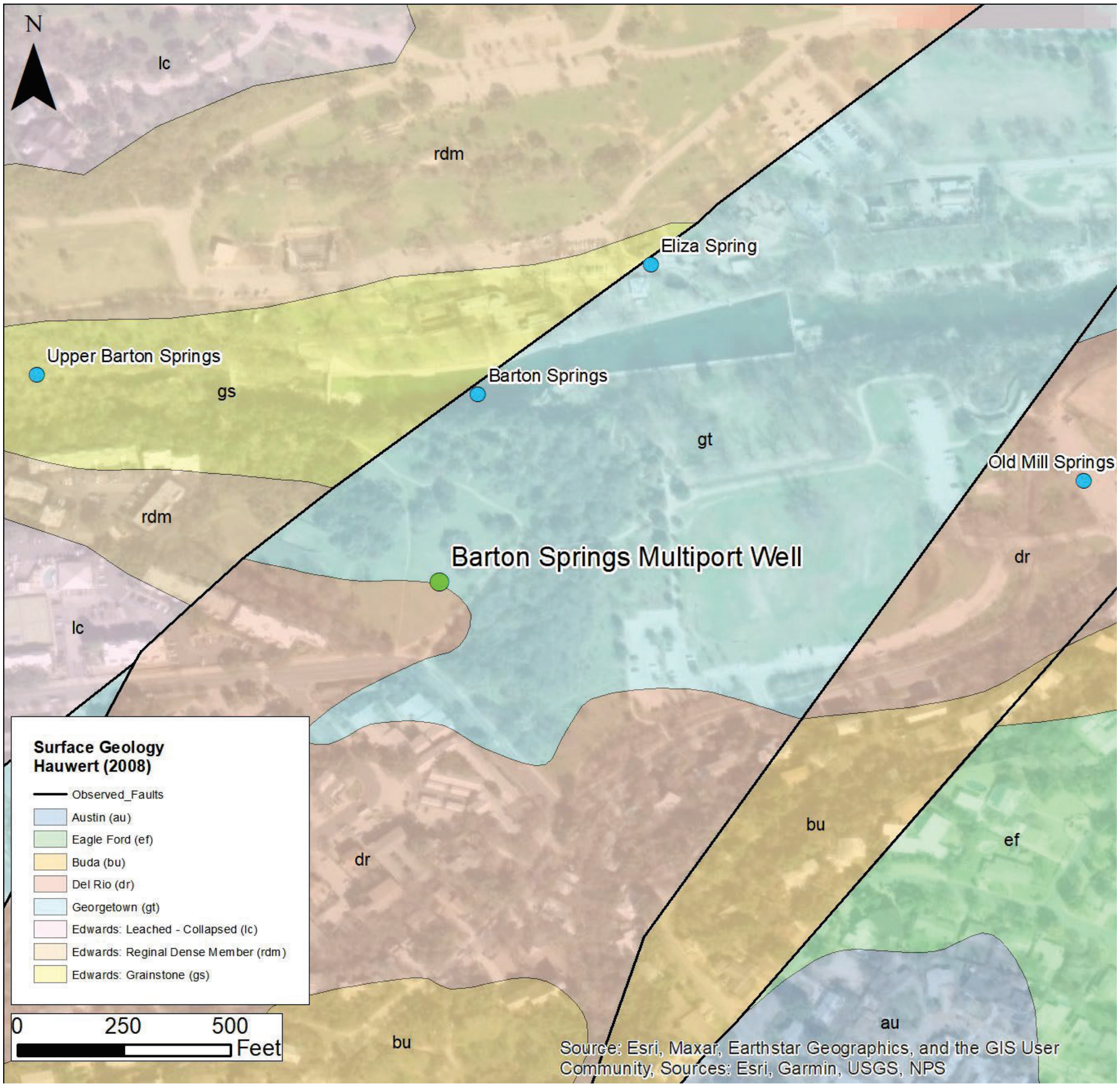

Figure 7. Location map for the Barton Springs Multiport Well with surface geology.

Edwards Aquifer is hydraulically isolated from the Middle and Lower Trinity Aquifers (Smith and Hunt, 2019). The Barton Springs Multiport Well is the 8th multiport well installed by the District.

Multiport wells work by using specialized well casing with inflatable packers to seal the annular space in specific intervals within a well borehole. The annulus is thus hydraulically separated above and below each inflated packer, creating multiple hydraulically distinct zones within a single borehole. Each zone can be accessed using a specialized tool which couples to the zone's measurement port, allowing head measurements or collection of groundwater samples (Figure 8).

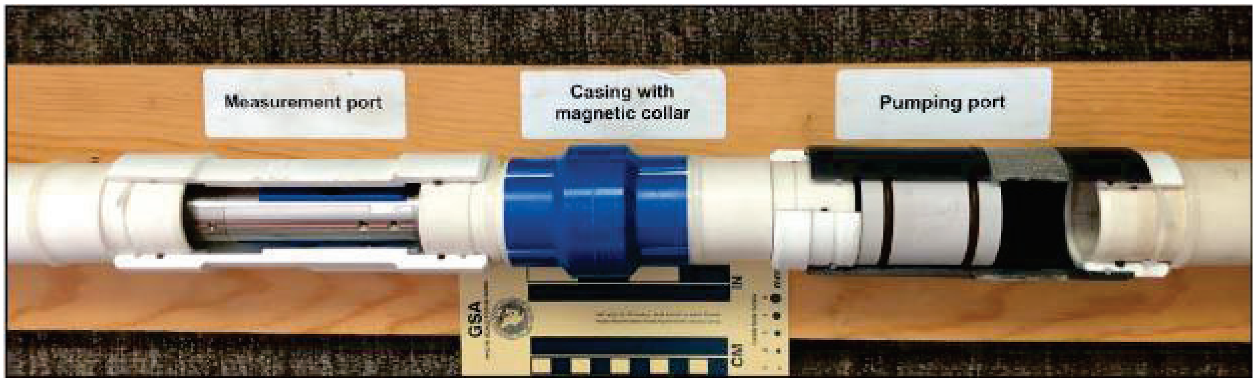

Figure 8. Cut away model of multiport measurement and pumping ports, magnetic collar, and section of casing of a typical multiport monitoring zone. Not shown are hydraulic packers that are inflated in the borehole to seal off the annular space of each zone from overlying and underlying zones (from Smith and Hunt, 2019).

Summary of Well Drilling and Borehole Evaluation

The Barton Springs Multiport Well borehole spudded on February 2, 2024 and reached a total depth of 560 feet on February 22, 2024. The borehole was drilled using air-rotary methods with a core bit which produced a 4.25-inch nominal borehole from surface to total depth. Core samples with a diameter of 2-inches were collected throughout the drilling process using 10-foot core recovery barrels. These barrels were retrieved through a wireline system that pulled them up to the surface through the interior of the drilling stem. Core recovery was excellent, with >90% recovery over the entire borehole. All core samples were donated to the Bureau of Economic Geology Core Repository, located at the University of Texas Pickle Research Campus.

Coring operations were slowed substantially through the upper ~350 feet of borehole due to an abundance of hard chert. The borehole was producing minimal water during the top 110 feet of drilling, which was counter to expectations given the borehole's proximity to Barton Springs. A static water level (e-line) of 68.2 feet from ground surface was measured on February 2, 2024 when the borehole was at a depth of 110 feet. Given that this water level depth is >30 feet below the elevation of the Main Barton Springs outlet, this suggests that the upper 110 feet of the borehole was not directly connected hydraulically to the Main Barton Springs conduit. Significant amounts of water were encountered in the borehole between 110-119.5 feet, at which point the static water level rose to 33.7 ft-bgs. The water level remained within several feet of this elevation for the remainder of coring operations. Throughout the remainder of drilling, the borehole produced increasingly more water with increasing depth. When the borehole was between 408.5-438.5 ft deep, a red-brown sediment plume was observed in Eliza Spring that was likely related to coring operations. The plume cleared within several hours and no other plumes were observed during the rest of drilling operations. This plume is unlikely to have harmed the salamanders in Eliza Spring. No plume was observed from the Main Barton Springs outlet.

After completion of borehole drilling/coring operations, geophysical logging was performed on the borehole on two separate dates. Caliper, gamma ray, resistivity, and fluid conductivity/temperature logs were collected on February 26, 2024 by the Edwards Aquifer Authority geophysical logging team. Caliper, gamma ray, fluid conductivity/temperature, vertical flow, and acoustic imaging logging were performed by Geocam on April 10, 2024. District staff conducted downhole video surveys on the open borehole on February 23 and April 4, 2024. Links to those videos are available on the District website. Geophysical logs collected from the Barton Springs Multiport Well borehole are presented in Appendix E.

Geophysical logs were analyzed alongside core samples to make geologic picks and guide design of the multiport well. Multiport well installation occurred May 22-24, 2024. A total of 14 discreet Westbay Multiport zones were installed in the borehole, each with a head measurement port, groundwater sampling port, and adjustable well screen. The annulus above the top inflatable multiport packer provides access for measuring water levels with an e-line in this shallow interval.

Appendix C contains a detailed schematic of Barton Springs Westbay Well design, as well as geophysical logs and selected screenshots from the downhole camera survey performed on April 4, 2024. Due to the large size of the acoustic imaging log, it has not been included in this report, but a download link has been made available on the District website for those interested in viewing the log. Links to the full downhole camera survey videos are also available on the District website.

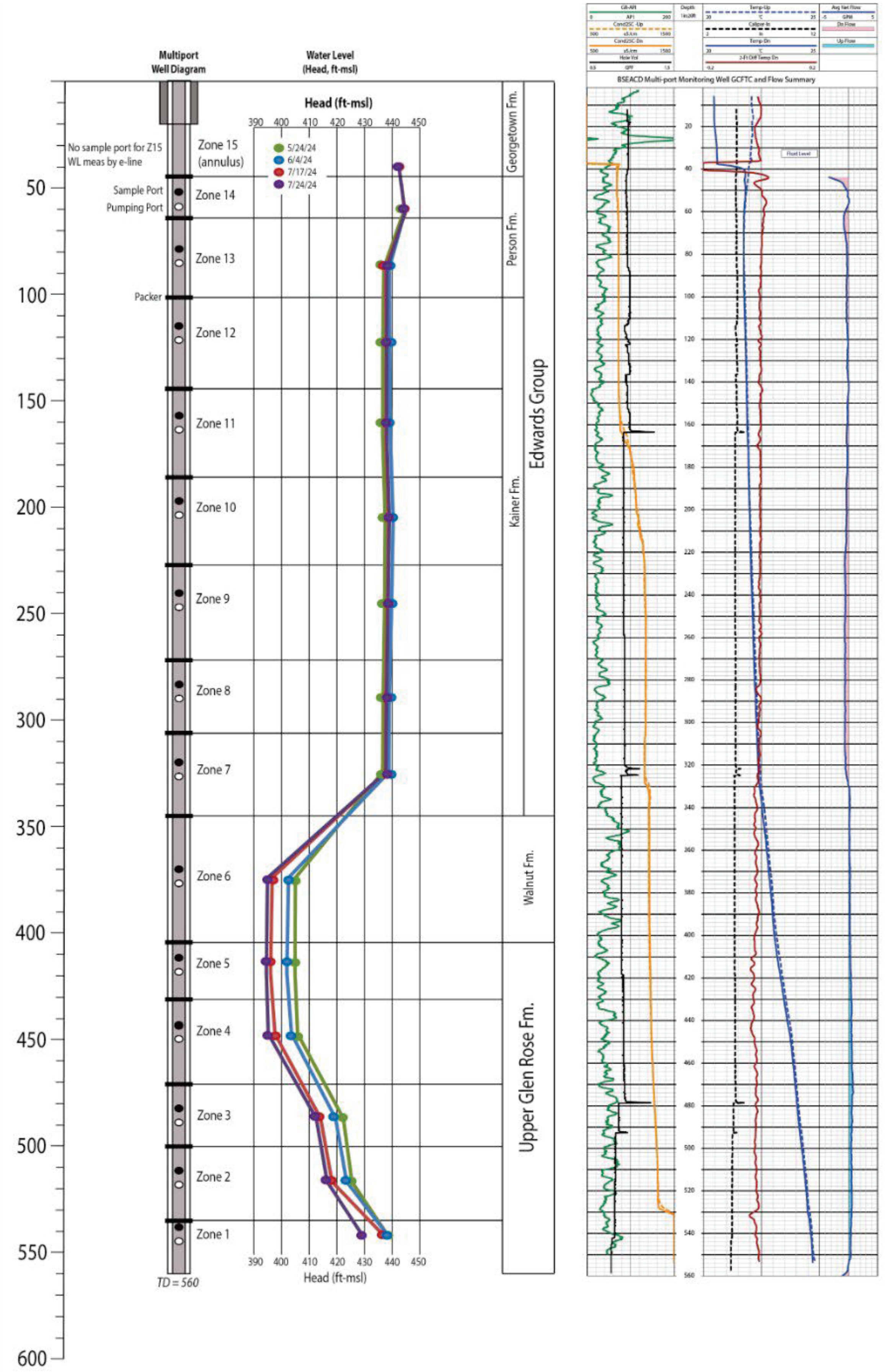

Figure 9. Schematic of the Barton Springs Multiport Well with vertical head profiles and geophysical logs.

Preliminary Multiport Data

After installation of Westbay multiport well casing and packer inflation/zone isolation, four separate hydraulic head profiles were collected from each of the 14 multiport zones on 5/24/2024, 6/4/2024, 7/17/2024 and 7/24/2024 (Table 1 and Figure 9).

Multiport hydraulic head measurements varied from 396.43-445.15 ft-msl across all zones and dates measured. Three distinct hydraulic head groupings are apparent from the preliminary head data:

1) Surface zones (Zones 14 and 15). Hydraulic head in these zones is ~5-7 ft higher in elevation than the underlying block of Edwards zones. Hydraulic head in zone 14 varied less than underlying zones between measurements (0.72 ft between 5/24/24 and 6/4/24). It is possible that these surface zones represent a perched system disconnected from the deeper Edwards zones. This perched model would be consistent with observations during drilling in which minimal water was encountered in the top 119.5 feet of the borehole.

2) Edwards zones (Zones 7-13). Head elevation in these zones were all within 1 ft of each other, suggesting vertical hydraulic connectivity across these intervals. Also, head elevation in these zones is above the elevation of the Main Barton Spring outlet elevation, indicating the potential for upward vertical flow from these zones to the Barton Springs outlets. From 5/24/24-6/4/24, hydraulic head within this zone grouping increased between 2.01-2.26 ft. From 6/4/24-7/24/24 hydraulic head decreased 0.83-1.06 ft.

   Zone 7 had the lowest head elevation of the Edwards group zones. This zone contains an interval of large voids from 320-326 ft bgs which were observed in caliper log, acoustic borehole image, and downhole video (see Appendix B). The vertical flow borehole log showed downward vertical flow above the voids, and upward flow below the voids, indicating that borehole flow was converging on the void interval when the borehole was open (see Appendix E). An inflection in fluid conductivity logs was also present coincident to the void interval (see Appendix E). This preliminary data from multiport head measurements and geophysical logs suggests that Zone 7 intersects a significant conduit system which likely transmits large volumes of water within the Aquifer.

3) Walnut/Upper Trinity Zones (Zones 2-6). Hydraulic head within these zones was significantly lower than the Edwards zone grouping, suggesting that they may be acting as confining units between the Trinity and Edwards Aquifer. In contrast to the Edwards zones, water levels in this zone group declined between the May and June measurements. Total decline between 5/24/2024-7/24/2024 was between 8.9-10.1 ft.

The deepest zone (zone 1) was an outlier from the above groups. Zone 1 hydraulic head elevation was higher than the overlying five zones. It is possible that this is a low Transmissivity zone and is still equilibrating to ambient aquifer head conditions after initial multiport equipment installation. Data from future head profiles should help to better understand what hydrogeologic factors may be affecting zone 1 head.

Preliminary head data collected from the Barton Springs Multiport Well indicate that the hydrostratigraphic bottom of the Edwards Aquifer is vertically placed at the base of the Edwards Formation and above the Walnut Formation at this location. This observation is different from previous multiport studies at the Ruby Ranch and Antioch Wells –located in the southern portion of the Barton Springs segment of the Edwards Aquifer— which showed hydraulic connection between the upper ~150 ft of the Upper Glen Rose and Edwards Aquifer (Wong et al., 2014; Hunt et al., 2016). Thus, the preliminary multiport head data suggest that connectivity between Upper Glen Rose and Edwards Aquifer varies spatially within the Barton Springs segment. A detailed study of core samples collected during well drilling could help determine what lithologic factors may be contributing to hydraulic confinement at the base of the Edwards.

Table 1. Summary of initial head measurements collected at the Barton Springs Multiport Well between May-July, 2024. Note Zone 15 is borehole annulus on top of multiport zones and was measured with an e-line instead of the Westbay multiport tool.

			Zone Water Level Elevation (ft-msl)			
Zone	**Port Depth (ft-bgs)**	**Port Elevation (ft-msl)**	**5/24/24**	**6/4/24**	**7/17/24**	**7/24/24**
1 (Upper Glen Rose Fm.)	533.0	-57.0	438.64	438.62	437.03	429.4821
2 (Upper Glen Rose Fm.)	508.0	-32.0	425.88	423.96	418.68	416.9273
3 (Upper Glen Rose Fm.)	478.0	-2.0	422.78	419.98	414.56	412.9712
4 (Upper Glen Rose Fm.)	438.0	38.0	406.24	404.02	398.02	395.6009
5 (Upper Glen Rose Fm.)	409.0	67.0	405.27	402.32	396.43	394.9123
6 (Walnut Fm.)	364.0	112.0	405.43	402.93	397.03	395.3218
7 (Edwards/Kainer Fm.)	314.0	162.0	436.99	439.25	438.03	438.1938
8 (Edwards/Kainer Fm.)	279.0	197.0	437.18	439.35	438.11	438.4302
9 (Edwards/Kainer Fm.)	234.0	242.0	437.71	440.27	438.75	438.9319
10 (Edwards/Kainer Fm.)	194.0	282.0	437.92	440.80	439.14	439.3933
11 (Edwards/Kainer Fm.)	155.0	321.0	437.01	439.82	438.19	438.4625
12 (Edwards/Kainer Fm.)	110.0	366.0	437.05	439.47	438.27	438.4567
13 (Edwards/Person Fm.)	75.0	401.0	437.40	439.41	438.02	438.5779
14 (Edwards/Person Fm.)	49.0	427.0	444.44	444.90	445.15	445.0161
15 (Annulus-Georgetown Fm.)	35.0	441.0			443.7	443.77

Future Work

Installation of these monitoring wells opens many potential avenues of study, both in the vicinity of the Barton Springs complex (Barton Springs Multiport Well) and further upgradient and along major flow paths in the unconfined portion of the Edwards Aquifer (Garrison Park Well). Some potential areas of further research include, but are not limited to:

- Comprehensive logging of the Barton Springs Multiport Well core lithology, including mineralogical and chemical analyses of core samples.
- Dissolved oxygen profiling of the BS Multiport zones.
- Slug testing of Multiport zones to determine vertical variability of Transmissivity throughout the Edwards and Upper Trinity zones.
- Collecting multiport head profiles before, during, and after storm events to investigate how vertical head distribution throughout the aquifer changes in response to recharge events.
- Geochemical and isotope sampling of multiport zones to investigate vertical variability in geochemical facies, nutrients, and groundwater age proxies.
- Fluorescent dye injection into individual multiport zones to track localized flowpaths in the vicinity of the Barton Springs complex.
- Collecting continuous time series data from individual multiport zones for comparison to US Geological Survey Barton Springs gage and pool water levels.

Acknowledgements

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Appendix A: Garrison Park Well Lithology Description from Well Cuttings

Surface (0-2.5 feet)

Surface geology consists of loosely consolidated clay soil, with bedrock from the Buda Formation encountered at 2.5 feet.

Buda Limestone (2.5-29 feet)

Calcite-cemented wackestone-to-packstone with iron-staining, mollusk fragments.

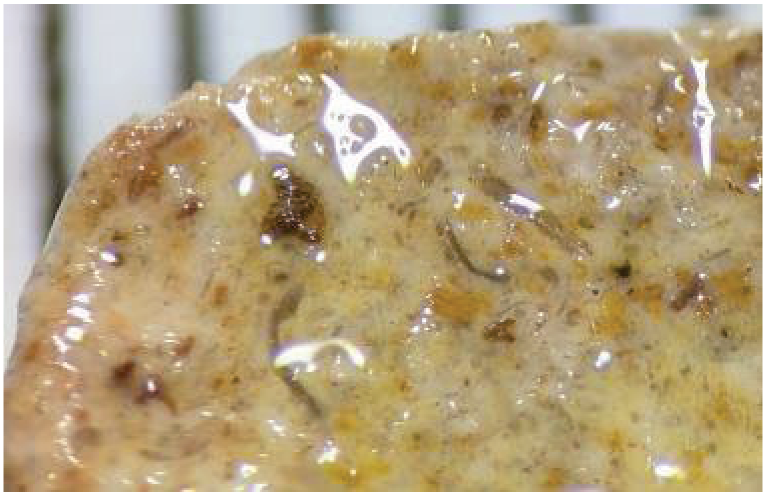


Figure 10. Photomicrograph of Buda Limestone cuttings from 10-20 ft depth in the Garrison Park Borehole. Background scale is millimeters.

Del Rio Clay (29-95 feet)

Wet, very sticky, dark gray clay (Figure 10).

Figure 11. Photo of Del Rio Clay sample recovered from the Garrison Park Well borehole.

Georgetown Formation (95-140 feet)

Dark gray, fine-grained micritic limestone with occasional pyrite grains. Lighter colored and less friable with increasing depth.

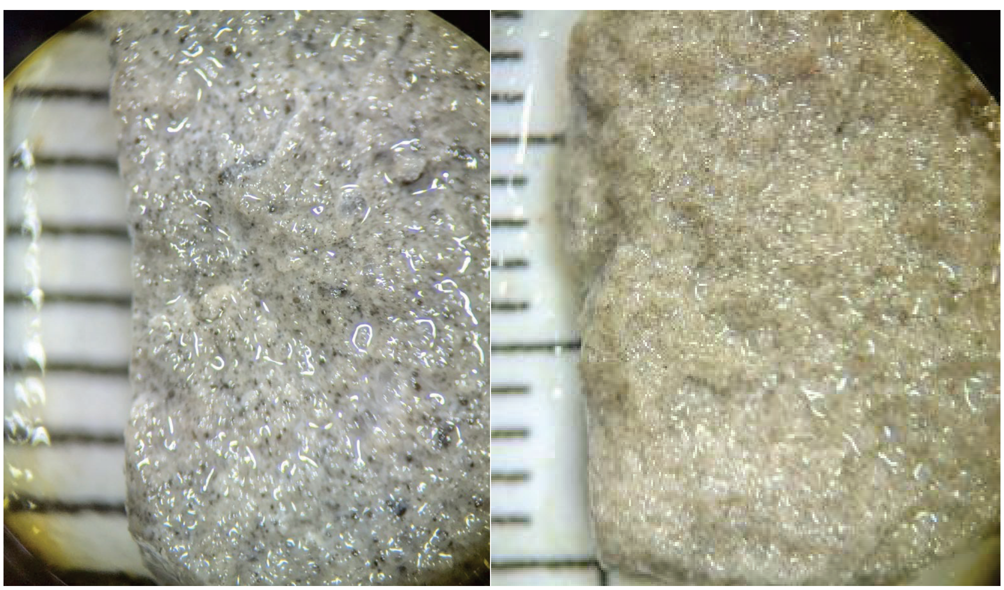


Figure 12. Photomicrographs of drillers limestone cuttings from Georgetown formation. Left: 110-120 ft bgs; Right 120-130 ft bgs. Graduated scale is millimeters.

Edwards Group (140-524 feet)

Person Formation (140-230 feet)

Calcite cemented limestones, mudstones, siltstones, and wackestones, occasional packstones. Grains generally consisting of mollusk fragments with occasional miliolids. Dolomite present in some intervals with sucrosic texture and moldic porosity.

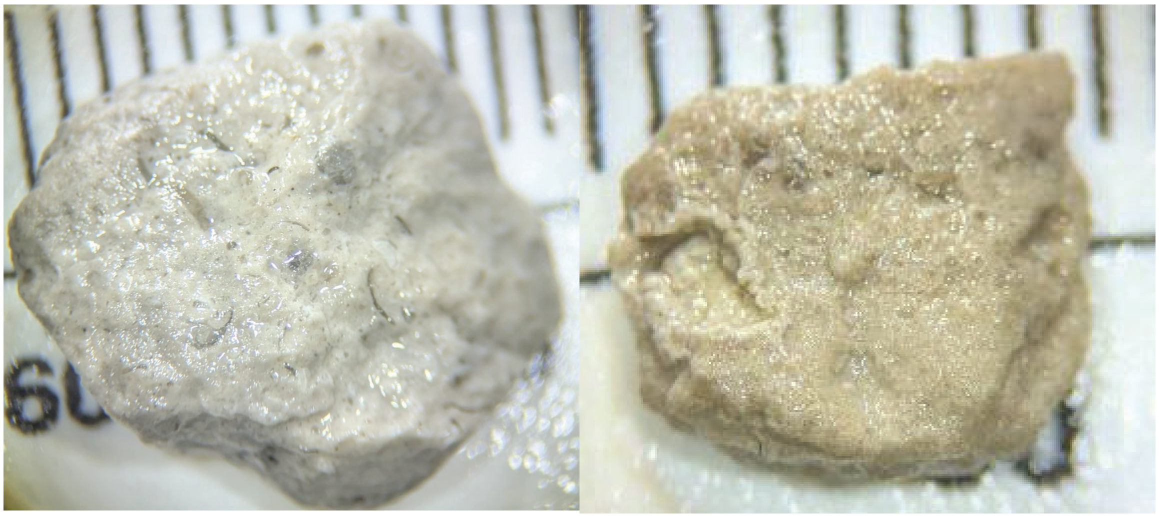


Figure 13. Photomicrographs of selected cuttings intervals from the Person Formation. Left: White limestone wackestone with calcite-infilled bivalve fragment molds (190-200 ft); Right: Fine-grained, sucrosic-textured dolomite (180-190 ft). Background scale is millimeters.

Kainer Formation (230-524 feet)

Upper section (230-300 feet) generally consisting of packstones and grainstones and highly altered and recrystallized limestones containing intraclasts and calcite-healed joints. Grains consisting of varying abundance of miliolids and containing bivalve and gastropod fragments. Lower section (300-524 feet) cuttings include appearance of buff-colored cuttings with voids infilled with red terra rosa clay and dolomite cuttings present in generally increasing abundance with depth. Well total depth at 524 feet is likely still above the informal Basal Nodular hydrostratigraphic member.

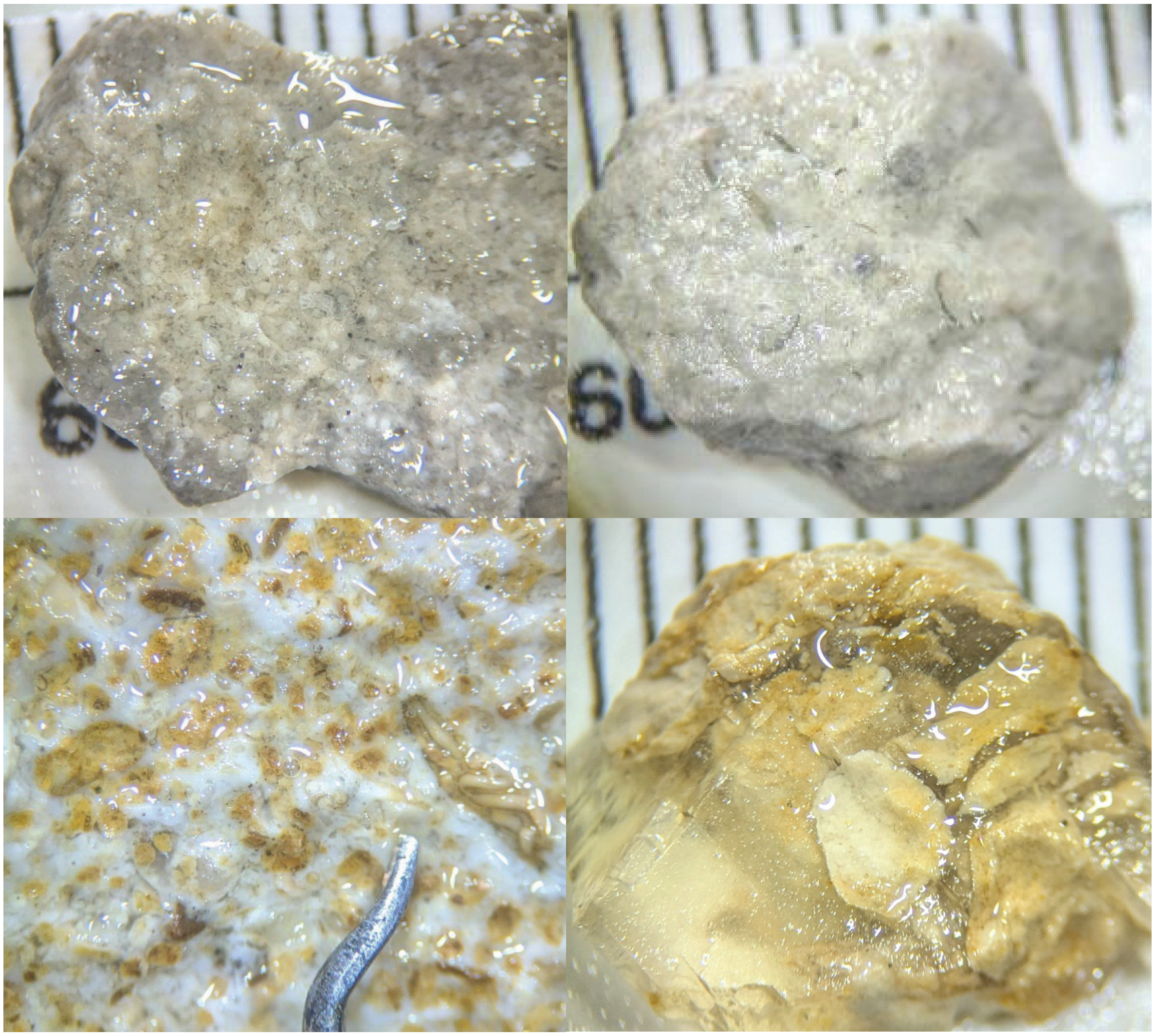


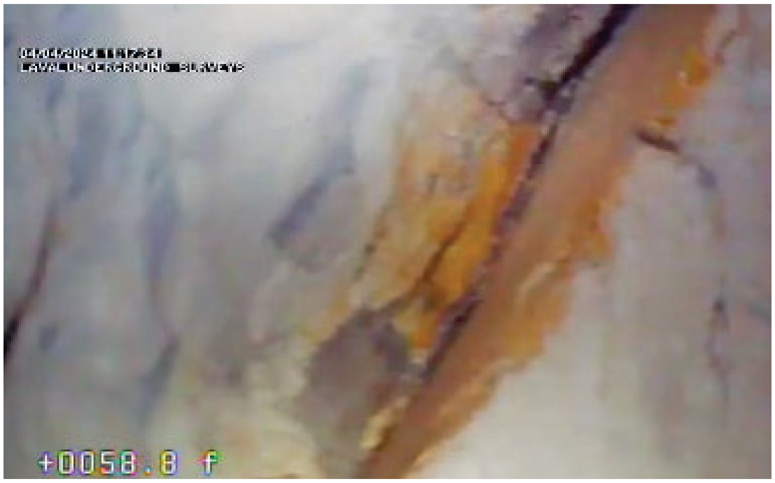
Figure 14. Photomicrographs of selected cuttings intervals from the Kainer formation. Top left: Miliolid grainstone (230-240 feet), top right: Wackestone with mollusk fragments (190-200 feet), bottom left: calcite-cemented packstone with iron staining and voids infilled with terra rosa clay (370-380 feet), pick tool for scale is ~0.5 mm wide, bottom right: calcite crystal with embedded limestone intraclasts (490-500 feet). Background scale is in millimeters.

Appendix B: Selected Captures from Barton Springs Multiport Well Downhole Camera Survey

Selected screenshots from the downhole camera survey of the Barton Springs Multiport Well Borehole are presented below. Note that some depths shown on screenshots are not accurate due to an accidental reset of the depth counter during the survey. Captioned depths are correct.

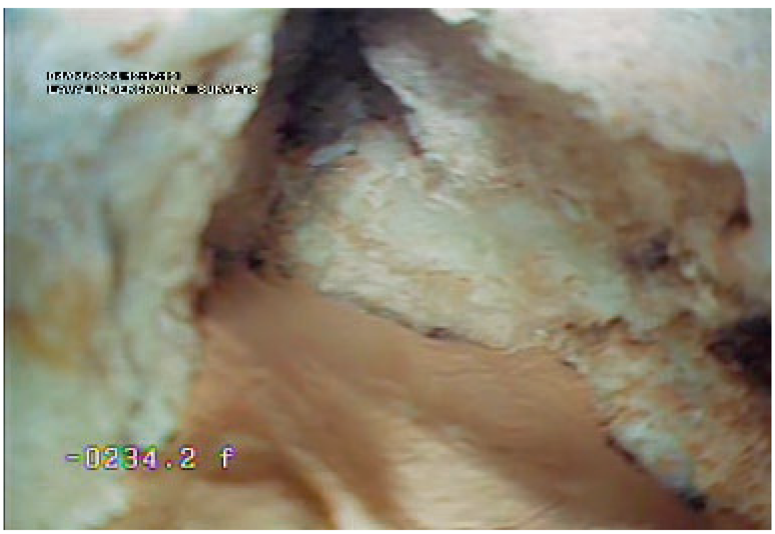
52.3 feet: Abrupt color/lithology change

58.8 feet: Solution enlarged fault/fracture



71 feet: Tight fine-rich beds in RDM

325-326 feet: Edwards fm. (contact b/w Dolomitic and BNM); solution enlarged vertical void within brecciated fault zone



329 feet: Edwards fm. (contact b/w Dolomitic and BNM); Likely fault.

348 feet: Edwards fm. (Basal Nodular Member); Infilled bivalve clasts in dark-colored matrix.

381 feet: Walnut fm. Likely fault intersecting fine-rich, tight beds.

388 feet: Walnut fm. Small void infilled with large crystals

479-480 feet: Upper Glen Rose; large void/conduit; base infilled with oxidized sediment. Void was detected by caliper log. 2nd photo: possible tracks in sediment of void floor?

506 feet: Upper Glen Rose; dissolved bivalve molds-appears to be secondary porosity

541 feet: Upper Glen Rose; Small void infilled with oxidized sediment. Numerous similar voids were present throughout the UGR.

Appendix C: Barton Springs Multiport Summary Completion Log

Legend

(Qty)	MP Components (Library - WD Library 7/27/00)
(2)	0203 - MP38 End Cap
(2)	020101 - MP38 Casing 4 (1F/0.3M)
(2)	020102 - MP38 Casing 3 (2F/0.6M)
(38)	020110 - MP38 Casing 1 (10F/3M)
(20)	020105 - MP38 Casing 2 (5F/1.5M)
(14)	0238 - MP38 Packer 74mm (5F/1.5M)
(48)	0202 - MP38 Regular Coupling
(14)	0205 - MP38 Measurment Port
(14)	0224 - MP38 Pumping Port
(17)	0216 - Magnetic Location Collar

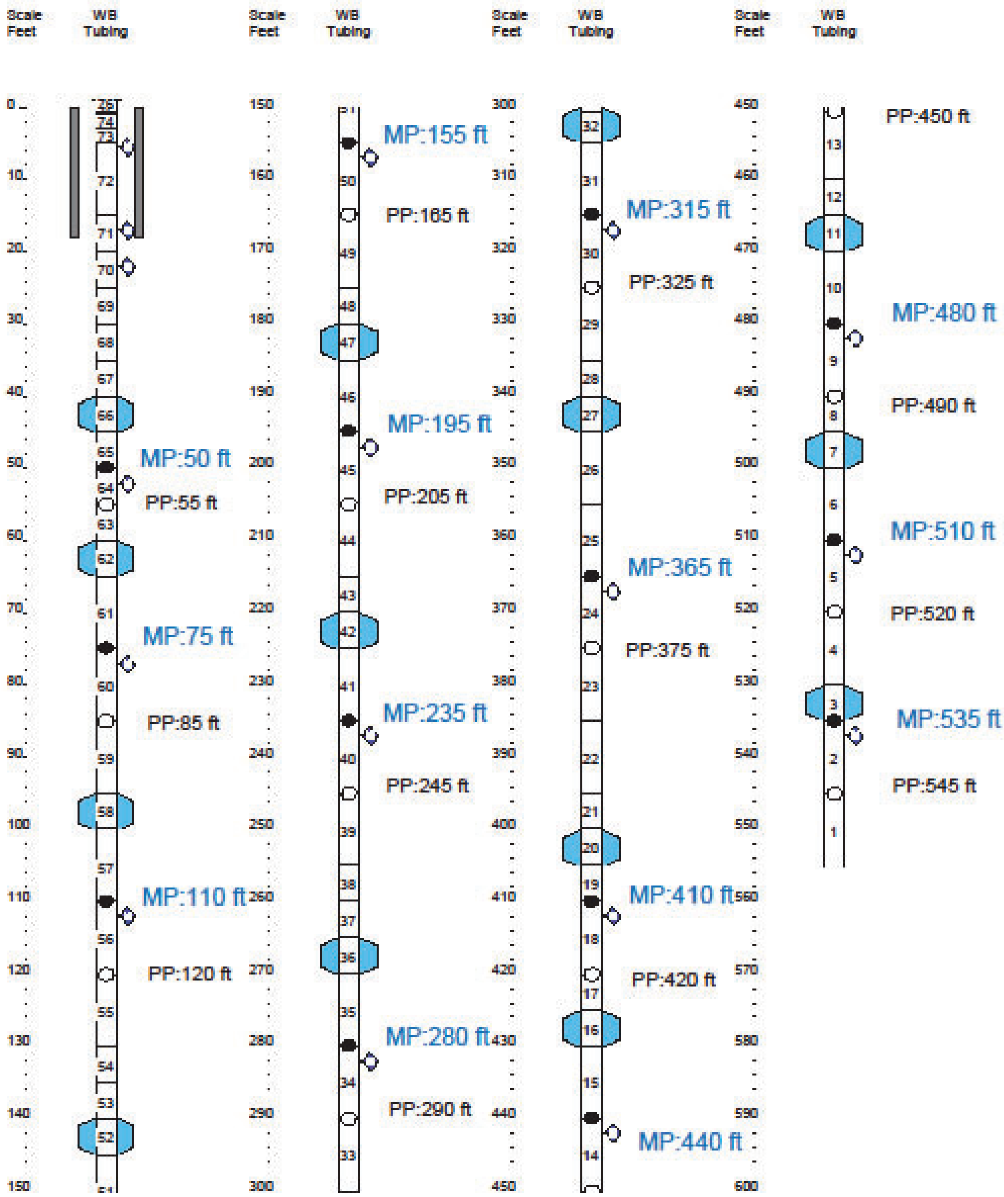
Geology

Backfill/Casing

Mild Steel

Summary Completion Log
BSEACD

Job No: WB868
Well: Barton Spring Westbay



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Appendix D: Garrison Park Geophysical Log

EDWARDS AQUIFER AUTHORITY

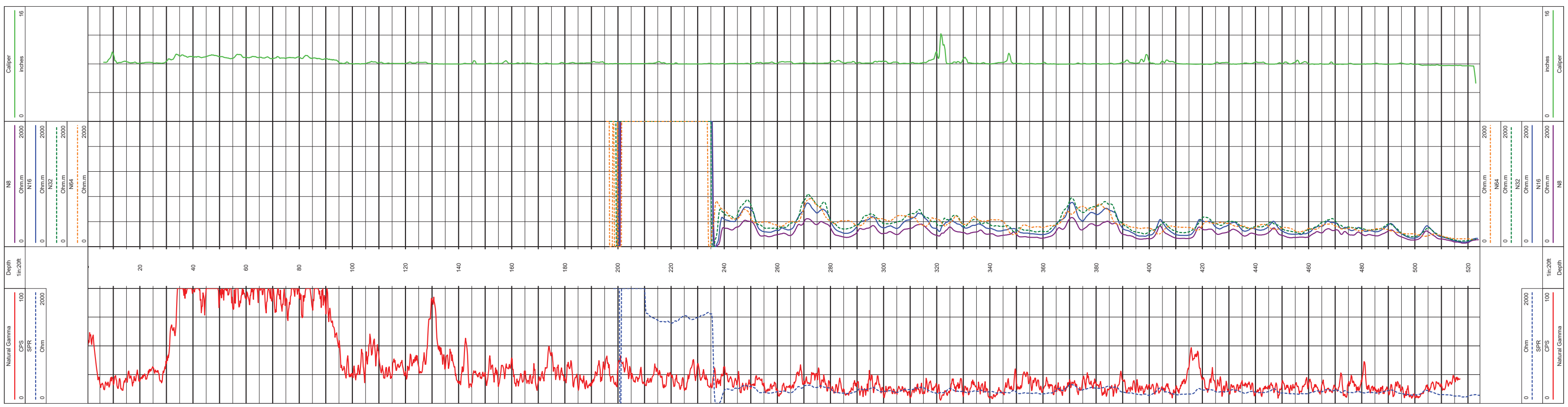
BSEACD - Garrison Well

COMPANY	Edwards Aquifer Authority	OTHER SERVICES
WELL ID	BSEACD Monitoring Well	
STATE	Texas	
COUNTY	Travis	
LATITUDE	30° 12' 46.8"	
LONGITUDE	-97° 48' 01"	
LOCATION	Garrison Park, Austin	

PERMANENT DATUM	Land Surface	ELEVATION 682 feet above MSL	K.B.
LOG MEASURED FROM	Land Surface		D.F.
DRILLING MEAS. FROM	Land Surface		G.L.

DATE	January 25, 2024	TYPE FLUID IN HOLE	Edwards
RUN No	Combined logs	SALINITY	
TYPE LOG	NGR/Resistivity Up Borehole/Caliper	DENSITY	
DEPTH-DRILLER	523 feet bgs	DEPTH TO WATER	214 feet bgs
DEPTH-LOGGER	5243 feet bgs		
LOG DEEPEST			
LOG SHALLOW			
AMBIENT TEMP.			
RECORDED BY	M. Schwarz		
WITNESSED BY	J. Camp and R. Esquilin		

RUN	BOREHOLE RECORD			CASING RECORD			
NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO
	8 inch	0	523				



Appendix E: Barton Springs Multiport Well Geophysical Log

EDWARDS AQUIFER AUTHORITY

Barton Springs Multiport Monitoring Well

COMPANY	Edwards Aquifer Authority
WELL ID	BSEACD Multiport Monitoring Well
STATE	Texas
COUNTY	Travis
LATITUDE	30° 15' 44.3"
LONGITUDE	-97° 46' 18.0"
LOCATION	Zilker Park, Austin

OTHER SERVICES

PERMANENT DATUM	Land Surface	ELEVATION 474 feet above MSL (approx.)	K.B.
LOG MEASURED FROM	Land Surface		D.F.
DRILLING MEAS. FROM	Land Surface		G.L.

DATE	February 26, 2024	TYPE FLUID IN HOLE	Edwards
RUN No	4	SALINITY	
TYPE LOG	Resistivity - Up Borehole	DENSITY	
DEPTH-DRILLER	560 feet bgs	DEPTH TO WATER	35.2 feet bgs
DEPTH-LOGGER	560 feet bgs		
LOG DEEPEST			
LOG SHALLOW			
AMBIENT TEMP.			
RECORDED BY	C. Crawford		
WITNESSED BY	J. Watson and R. Esquilin		

BOREHOLE RECORD				CASING RECORD			
RUN NO.	BIT	FROM	TO	SIZE	WGT.	FROM	TO