Haley Griffith (adpce.ad)

Subject: RE: Garland County Class 4 Landfill - Piezometer Installation Report and Groundwater Separation Documentation (Permit 0300-S4, AFIN 26-00405)

From: Carpenter, Owen <Owen.Carpenter@terracon.com>
Sent: Tuesday, August 26, 2025 1:28 PM
To: Jennifer Pearson (adpce.ad) <jennifer.pearson@arkansas.gov>
Cc: Bill Sadler (adpce.ad) <bill.r.sadler@arkansas.gov>; Banic, Greg <greg.banic@adeq.state.ar.us>; Darryl Mahoney <dmahoney@garlandcounty.org>; John Rogers <john.rogers@craftontull.com>; Rotenberry, Merrick L. <Merrick.Rotenberry@terracon.com>
Subject: Garland County Class 4 Landfill - Piezometer Installation Report and Groundwater Separation Documentation (Permit 0300-S4, AFIN 26-00405)

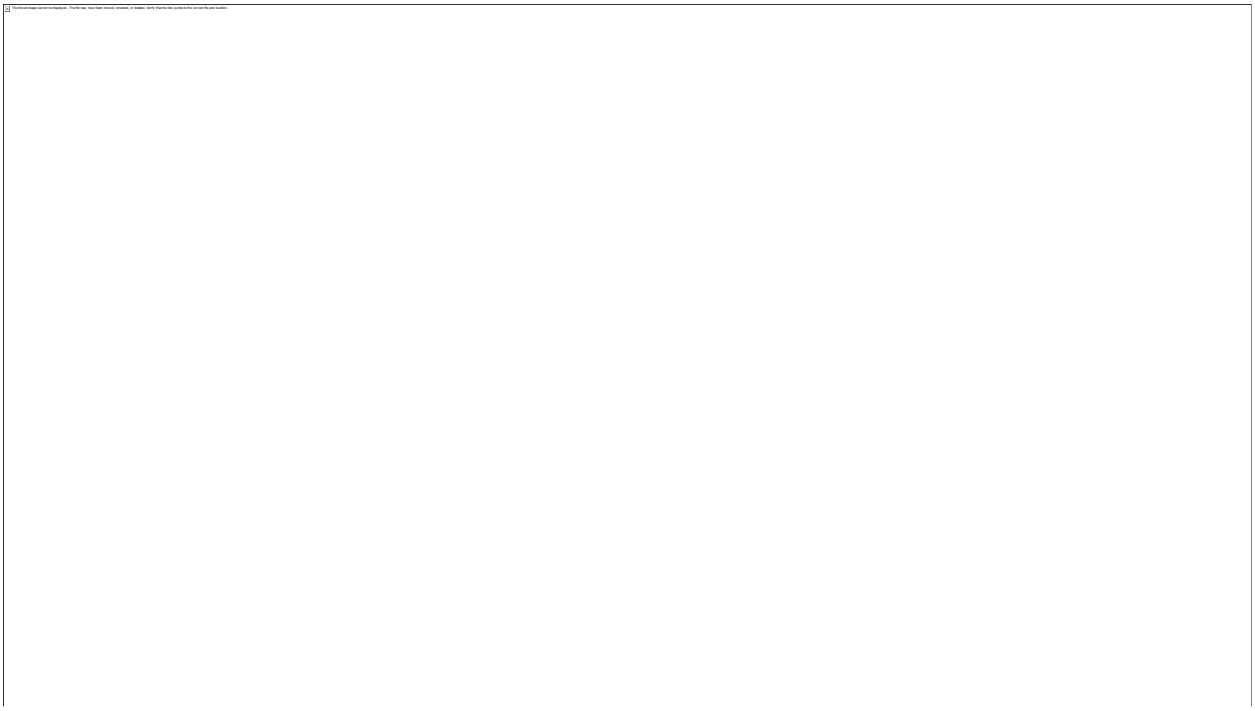
Good morning Ms. Pearson!

Attached is a piezometer installation report with seasonal high groundwater findings for the referenced facility. Water level measurements were gathered over the time period of September 2024 through August 2025. Please see the certification below. If you have any questions or need any additional information, please do not hesitate to contact Merrick Rotenberry or me.

Thanks!
Owen

F. Owen Carpenter, P.E., P.G.

D (501) 943 1020 | C (501) 622 0887
owen.carpenter@terracon.com



Terracon provides environmental, facilities, geotechnical, and materials consulting engineering services delivered with responsiveness, resourcefulness, and reliability.

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Piezometer Installation Report

Garland County Cedar Glades Class 4 Landfill
Hot Springs, Arkansas
Permit No. 0300-S4
AFIN: 26-00405

August 22, 2025 | Project Number: 35237033

Prepared for:

Garland County
501 Ouachita Avenue, Room 210
Hot Springs, Arkansas 71901

and

Crafton Tull

928 Airport Road
Hot Springs, AR 71913

501.767.2366 (ph)

Prepared by:

Terracon Consultants, Inc.
25809 Interstate 30 South
Bryant, Arkansas 72022
(501) 847-9292

Terracon

Nationwide
Terracon.com

- Facilities
- Environmental
- Geotechnical
- Materials

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2.1 Subsurface Exploration 3
2.2 Piezometer Installation 3
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Figure 1 Site Location Map
Figure 2 Site Layout and Piezometer Location Map

List of Appendices

Appendix A Soil Boring Logs
Appendix B Piezometer Construction Diagrams
Appendix C Survey

1.0 Introduction

Garland County currently owns, operates, and maintains a Class 4 landfill (Permit 0300-S4) located at 1040 Cedar Glades Road in Hot Springs, Garland County, Arkansas.

The Division of Environmental Quality Office of Land Resources (DEQ) completed a review of the Certification Report of the CQA Plan requirements for the Phase II Cell 4 landfill bottom liner system construction (B&F Engineering, Report No. 7-2852-1012 dated August 2022). The Certification Report indicated that the Phase II Cell 4 bottom liner system was constructed in accordance with the approved Construction Quality Assurance technical specifications, which are consistent with current DEQ regulations.

However, DEQ noted that because Phase II Cell 4 had already been constructed and that no prior verification of the minimum of five (5) feet of separation distance between the top of the landfill liner system and seasonally high ground water elevation was submitted, as required by Rule No. 22.431(8 CAR § 60-431), DEQ requested that permanent piezometers be installed at the facility (Document ID. 82897).

In response to the ADEQ request, Terracon submitted a Proposed Piezometer Installation Workplan (Workplan) to ADEQ dated March 8, 2024 to install three (3) piezometers. ADEQ approved the Workplan on March 18, 2024.

This Piezometer Installation Report details the field activities associated with the installation of the three (3) piezometers to comply with Rule No. 22.431 and the October 25, 2022 DEQ request.

1.1 Site Location

The general location of the site is shown on **FIGURE 1**. More specifically, the landfill is located on a portion of the S 1/2 of the SW 1/4, Sec. 19, T-2-S, R-l9-W, located east, south and west of the existing Garland County landfill and west of Wildcat Road; A portion of the W 1/2, Sec. 30, T-2-S, R-19-W, located north of Cedar Glades Road and excepting the NE 1/4 of the NW 1/4, Sec. 30; A portion of the E ½ Sec. 25, T-2-S, R-20-W, located east of a Bull Bayou Creek; And a portion of the SE 1/4 of the SE 1/4, Sec. 24, T-2-S, R-20W, located south of the existing Garland County landfill and east of an existing City of Hot Springs parcel of land; Containing approximately 200 acres of land, with 61 acres permitted for Class 4 disposal.

2.0 SITE ACTIVITES

2.1 Subsurface Exploration

In accordance with the approved Workplan, three (3) permanent piezometers (PZ-1, PZ-2 and PZ-3) were installed in the vicinity of the Phase 3, Cell 1 bottom liner system to allow the collection of groundwater levels and establish elevations over time. The piezometer locations are presented on survey figure **Drawing C-101**.

Well installation activities were conducted on September 4-5, 2024. The borings were advanced to depths ranging from approximately 23 to 32 feet below ground surface (bgs) under the supervision of a Terracon geologist. The borings were advanced using air rotary drilling by an Arkansas registered drilling company.

2.1.1 Site Lithology

The general soil lithology encountered during sample collection consisted of weathered to hard shale from 0 to 32 feet bgs. Groundwater was encountered at approximately 14 feet bgs in PZ-3 and 19 feet bgs in PZ-2. Groundwater was not encountered during drilling activities in PZ-1, but subsequently entered into the boring over time. Detailed lithologic descriptions are presented in the soil boring logs included in **Appendix A**.

2.2 Piezometer Installation

The three (3) piezometers were installed in accordance with Rule 22.1103 and ASTM D 5092-90 (*Standard Practice for Design and Installation of Groundwater Monitoring Wells in Aquifers*). The piezometers will be constructed using the following methodology:

- Installation of 10 feet of 2-inch diameter, 0.010-inch machine slotted PVC well screen with a threaded bottom cap;
- Installation of 2-inch diameter, threaded, flush joint PVC riser pipe to approximately 3 feet above ground surface;
- Addition of a pre-sieved 16-30 grade annular silica sand pack from the bottom of the boring to approximately 2 feet above the top of the well screen;
- Addition of bentonite chip seal above the sand pack filter zone to near surface; and,
- Installation of a steel protective collar with a hinged lockable cover. The protective casing will extend a minimum of 3-feet above the ground surface. A 3-foot by 3-foot concrete pad was constructed around each piezometer.

Piezometer Construction Diagrams are presented in **Appendix B**.

2.3 Fluid Levels

Upon completion of the piezometers, water levels were collected on a monthly basis to establish groundwater elevations. The groundwater elevations are presented in the tables below.

PZ-1, WATER LEVEL MEASUREMENTS			
DATE	**DTW BELOW TOC (ft)**	**WATER ELEVATION (ft)**	**TOC ELEVATION**
9/20/2024	23.15	498.95	522.10
10/21/2024	23.48	498.62	522.10
11/22/2024	22.40	499.70	522.10
12/20/2024	21.85	500.25	522.10
1/24/2025	22.47	499.63	522.10
2/20/2025	21.87	500.23	522.10
3/20/2025	22.56	499.54	522.10
4/17/2025	22.47	499.63	522.10
5/21/2025	21.44	500.66	522.10
6/23/2025	22.26	499.84	522.10
7/18/2025	22.72	499.38	522.10
8/20/2025	22.90	499.20	522.10

PZ-2, WATER LEVEL MEASUREMENTS			
DATE	**DTW BELOW TOC (ft)**	**WATER ELEVATION (ft)**	**TOC ELEVATION**
9/20/2024	19.29	519.19	538.48
10/21/2024	19.76	518.72	538.48
11/22/2024	19.13	519.35	538.48
12/20/2024	17.82	520.66	538.48
1/24/2025	17.26	521.22	538.48
2/20/2025	15.51	522.97	538.48
3/20/2025	17.62	520.86	538.48
5/21/2025	16.74	521.74	538.48
6/23/2025	16.27	522.21	538.48
7/18/2025	18.19	520.29	538.48
8/20/2025	18.65	519.83	538.48

PZ-3, WATER LEVEL MEASUREMENTS			
DATE	**DTW BELOW TOC (ft)**	**WATER ELEVATION (ft)**	**TOC ELEVATION**
9/20/2024	12.94	525.80	538.74
10/21/2024	14.01	524.73	538.74
11/22/2024	12.34	526.40	538.74
12/20/2024	12.40	526.34	538.74
1/24/2025	9.50	529.24	538.74
2/20/2025	7.36	531.38	538.74
3/20/2025	8.35	530.39	538.74
5/21/2025	7.86	530.88	538.74
6/23/2025	7.59	531.15	538.74
7/18/2025	9.46	529.28	538.74
8/20/2025	11.95	526.79	538.74

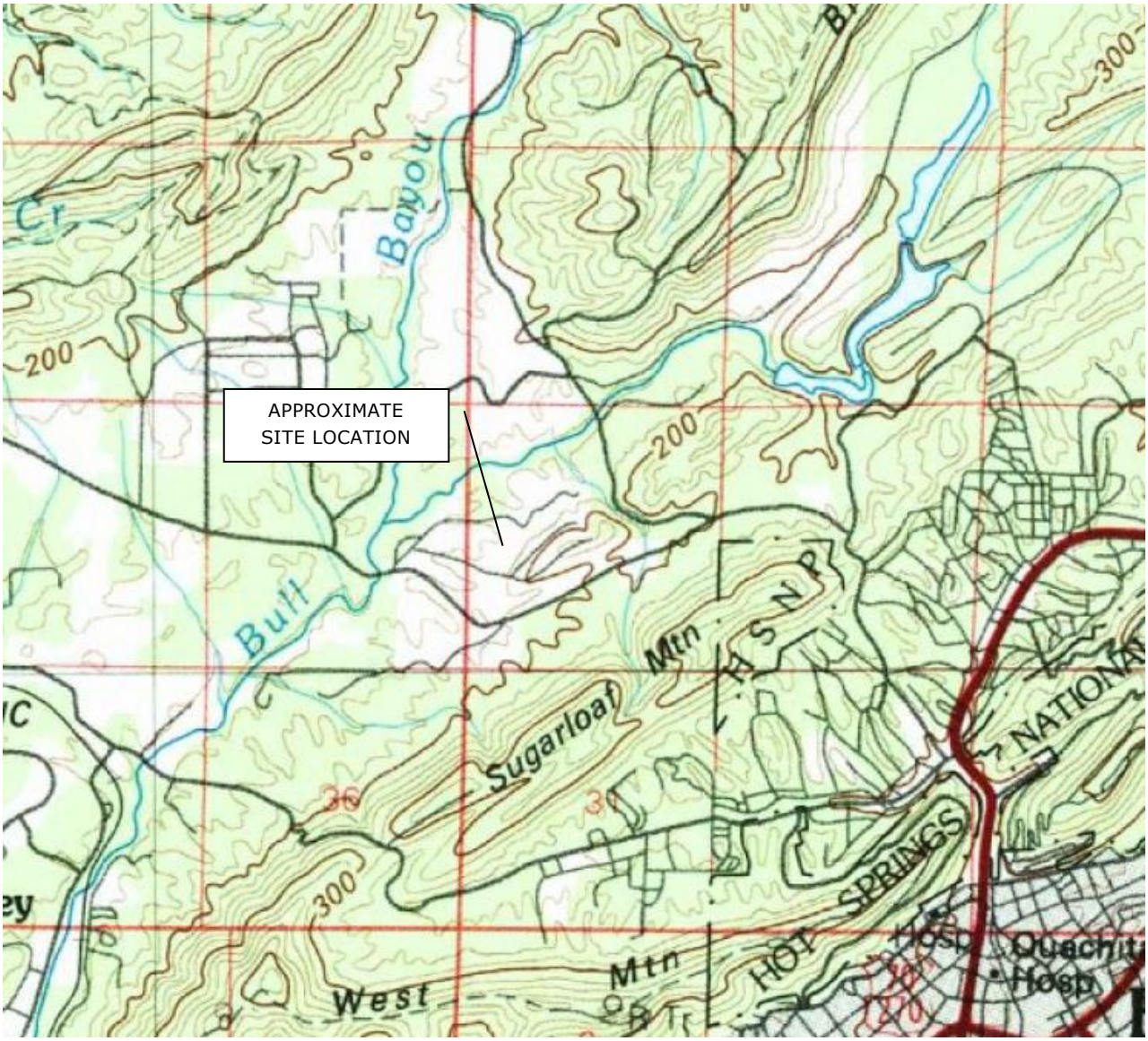
Seasonal high groundwater elevations were used to construct a piezometric surface map based on the maximum groundwater elevations in the three piezometers. The potentiometric surface reflects site topographic features as illustrated in **Appendix C**. No groundwater is present in the valley east of and adjacent to PZ-1.

As indicated on Drawing 2 in **Appendix C**, the proposed top of bottom liner system for landfill Phase 3, Cell 1 maintains at least five (5) feet of vertical separation above the seasonal high groundwater surface.

3.0 SURVEY

Following installation, a licensed professional surveyor provided a survey of each newly installed piezometer for latitude, longitude, surface elevation and top of casing elevation. The elevations were surveyed to the nearest 0.01-foot. A copy of the piezometer survey is presented in **Appendix D**.

FIGURES



USGS 7.5 MINUTE SERIES TOPOGRAPHIC MAP

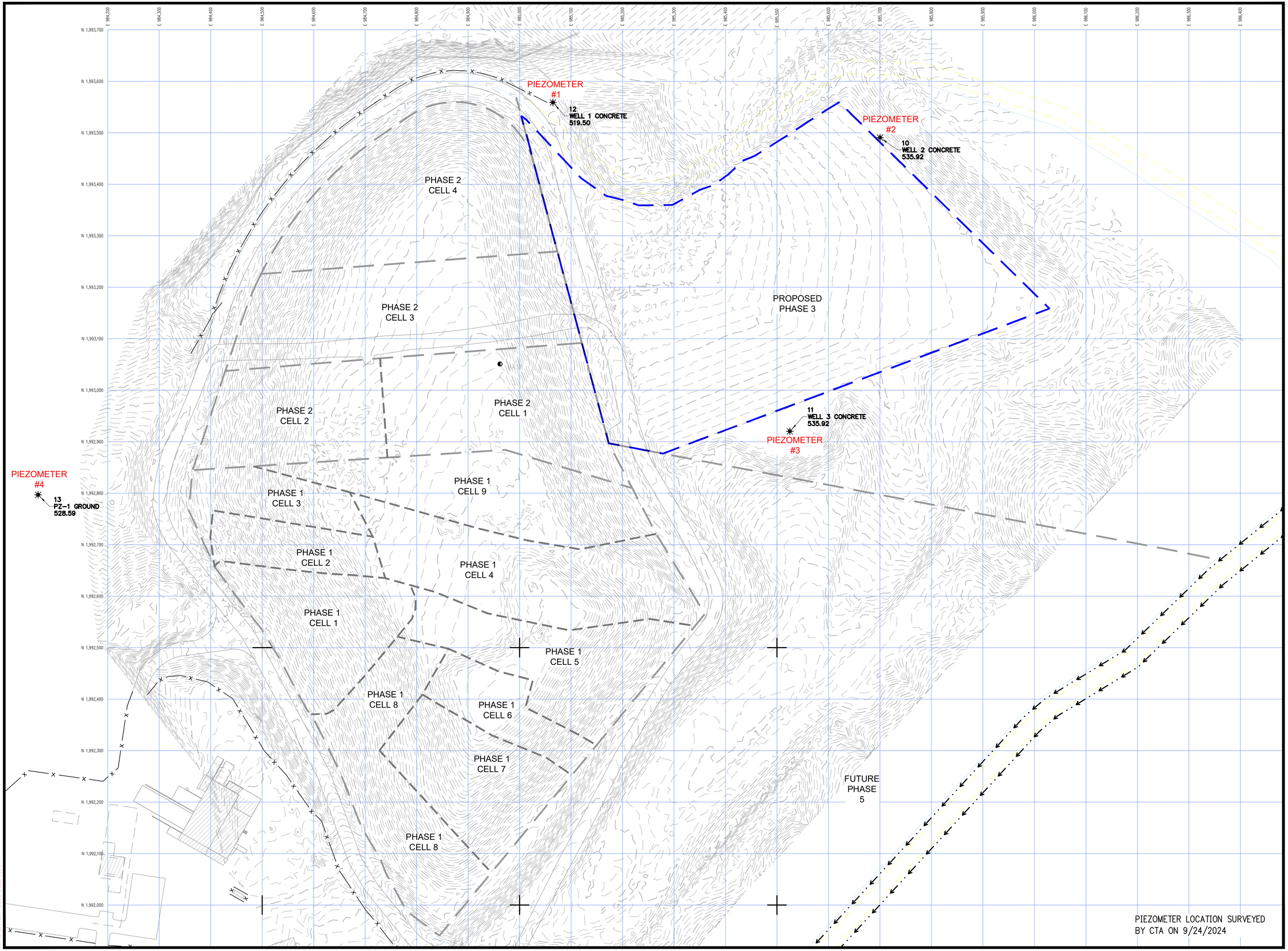
STATE OF AR QUADRANGLES

(LAKE OUACHITA QUADRANGLE)

Project Mgr	MR	Project No	35237033	Terracon	TOPOGRAPHIC MAP
Approved by	OC	Scale	NTS		Garland County Class 4 Landfill
Checked by	OC	Date		25809 I 30 Bryant, AR 72022-9313	1040 Cedar Glades Road
Drawn by	MR	File No.		Ph: 501-847-9292 Fax: 501-847-9210	Hot Springs, AR

EXHIBIT

1



928 AIRPORT ROAD
HOT SPRINGS, AR 71913

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CERTIFICATE OF AUTHORIZATION
CRAFTON, TULL & ASSOCIATES, INC.
No. 109
ARKANSAS ENGINEER

GRAPHIC SCALE IN FEET
80' 0 80'

GARLAND COUNTY CLASS 4 LANDFILL

1040 CEDARGLADES ROAD
HOT SPRINGS, AR 71901

Key Plan

No.	Description	Date

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PROJECT NO: 22402400
ISSUE DATE: 09/19/2024
CONTACT: J. ROGERS
QC by:
QC Date:

PRELIMINARY PLANS

NOT FOR CONSTRUCTION - REVIEW SET - NOT FOR CONSTRUCTION

THIS DOCUMENT IS PRELIMINARY IN NATURE AND IS NOT A FINAL, SIGNED AND SEALED DOCUMENT

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PIEZOMETER LOCATIONS

C-101

DRAWING: G:\224024\00_CGS LANDFILL\WMS\SECTOR_FILLS\DWG\PIEZOMETER LOCATIONS.DWG
LAST PLOTTED BY: JOHN ROGERS, 10/2/2024 9:05:12 AM

APPENDIX A
FIELD BORING LOGS

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Consulting Engineers and Scientists
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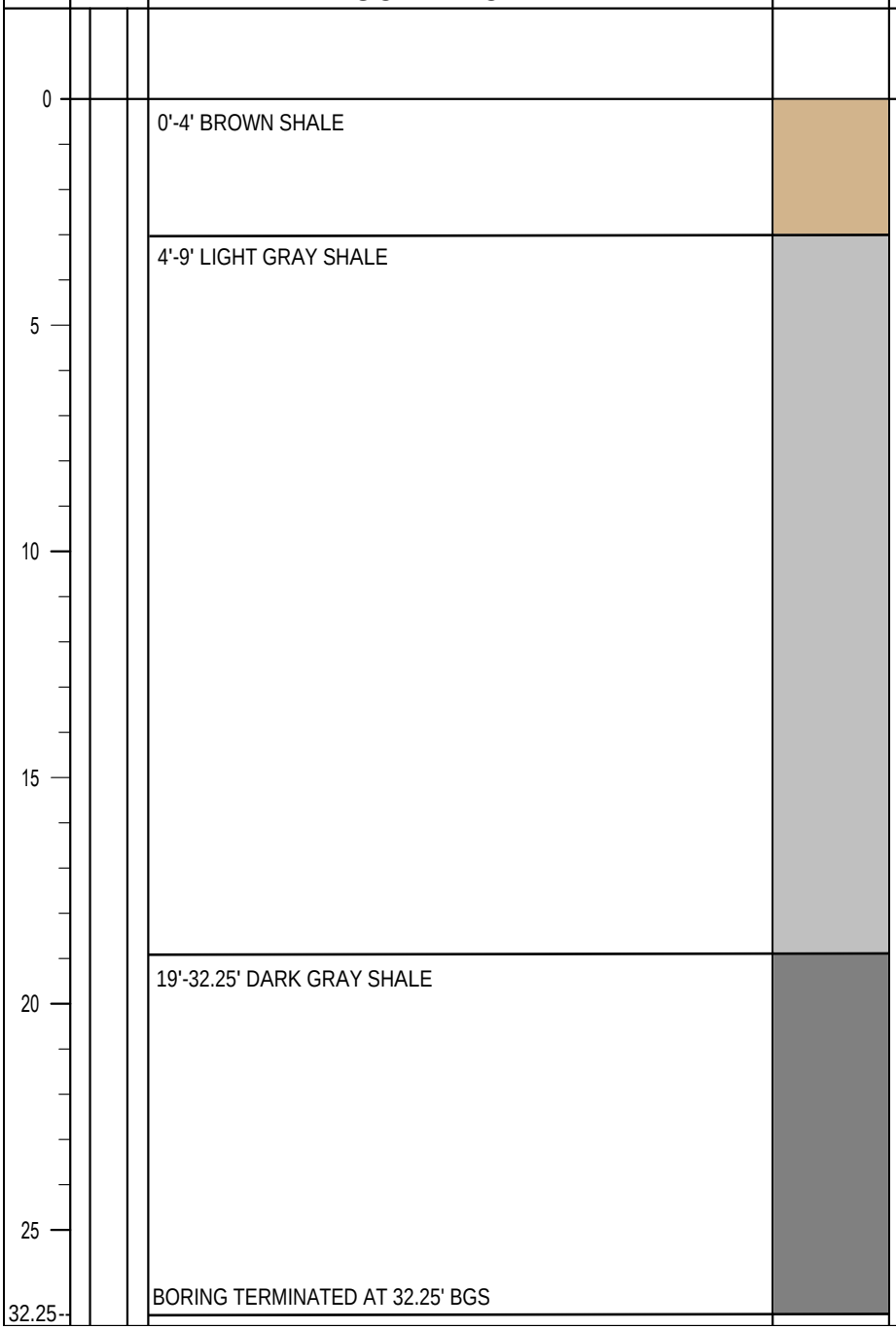
FIELD BORING LOG

BORING NO.: PZ-1 PAGE: 1 OF 3

TOTAL DEPTH: 27.85' FEET BELOW GROUND SURFACE (BGS)

CLIENT: GARLAND COUNTY LANDFILL	PROJECT: PIEZOMETER INSTALLATION
JOB NO.: 35237066	DRILLING CO.: TERRACON
LOGGED BY: MA	DRILLER: ANDERSON
DATE DRILLED: SEPTEMBER 5, 2024	RIG TYPE: CME 75
DRILLING METHOD: AIR HAMMER	
SAMPLING METHOD: CUTTINGS	

Depth BGS	Sample Interval	N: E: TOC: DESCRIPTION	Litho. Symbol	P.I.D. (ppm)	Comments
0		0'-4' BROWN SHALE			
		4'-9' LIGHT GRAY SHALE			
5					
10					
15					
20		19'-32.25' DARK GRAY SHALE			
25					
32.25		BORING TERMINATED AT 32.25' BGS			



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FIELD BORING LOG

BORING NO.: PZ-2 PAGE: 2 OF 3

TOTAL DEPTH: 27.85' FEET BELOW GROUND SURFACE (BGS)

CLIENT: GARLAND COUNTY LANDFILL	PROJECT: PIEZOMETER INSTALLATION
JOB NO.: 35237066	DRILLING CO.: TERRACON
LOGGED BY: MA	DRILLER: ANDERSON
DATE DRILLED: SEPTEMBER 5, 2024	RIG TYPE: CME 75
DRILLING METHOD: AIR HAMMER	
SAMPLING METHOD: CUTTINGS	

N: E: TOC:

Depth BGS	Sample Interval	DESCRIPTION	Litho. Symbol	P.I.D. (ppm)	Comments
0		0'-4' GRAY TO RED TO BROWN SHALE			
5		4'-9' BROWN SHALE			
10		9'-17' GRAY SHALE			
15		17'-27.85' DARK GRAY SHALE			
20					WATER AT 19' BGS
25		BORING TERMINATED AT 27.85' BGS			
30					

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FIELD BORING LOG

BORING NO.: PZ-3 PAGE: 3 OF 3

TOTAL DEPTH: 23.30' FEET BELOW GROUND SURFACE (BGS)

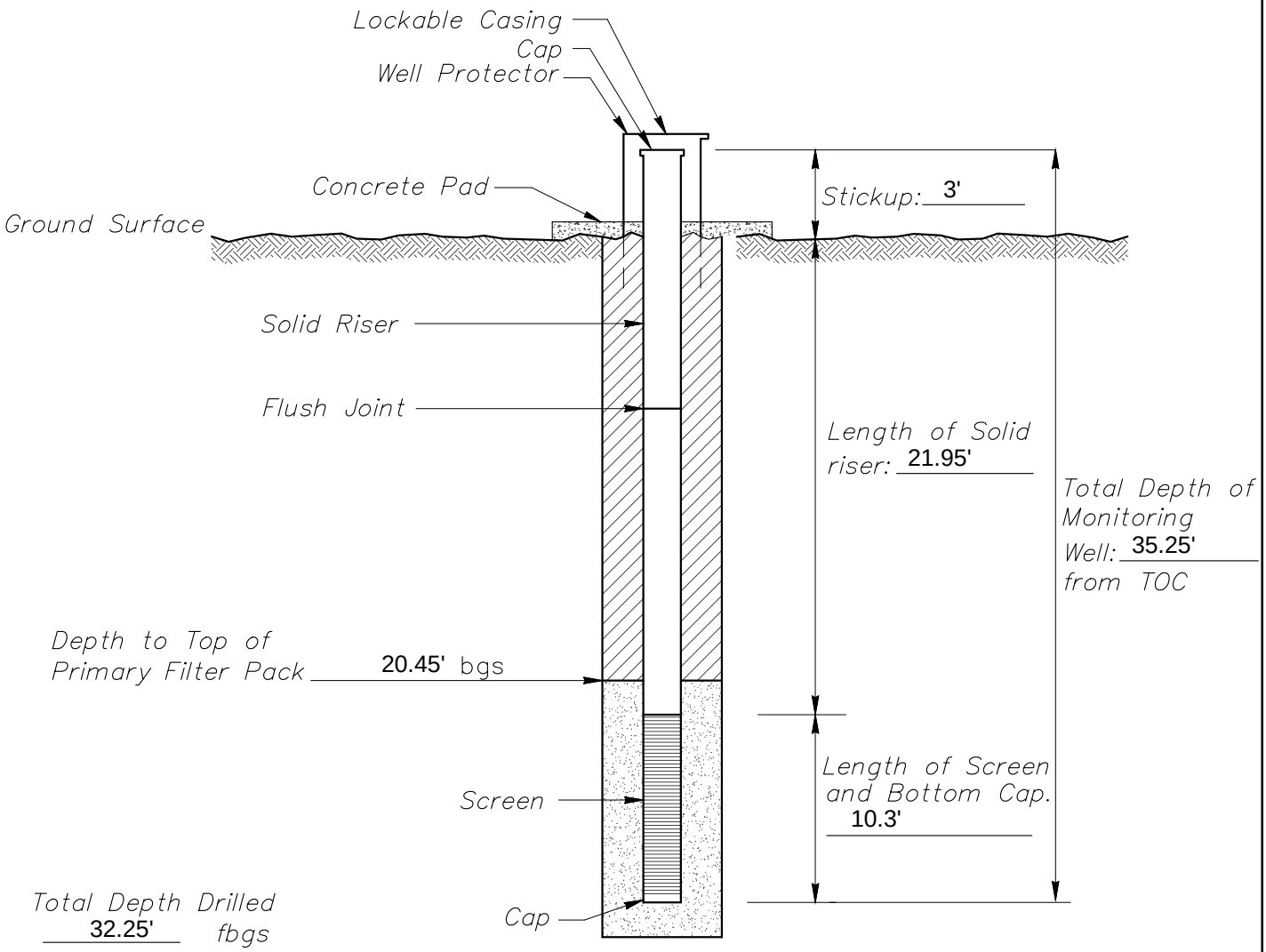
CLIENT: GARLAND COUNTY LANDFILL	PROJECT: PIEZOMETER INSTALLATION
JOB NO.: 35237066	DRILLING CO.: TERRACON
LOGGED BY: MA	DRILLER: ANDERSON
DATE DRILLED: SEPTEMBER 4, 2024	RIG TYPE: CME 75
DRILLING METHOD: AIR HAMMER	
SAMPLING METHOD: CUTTINGS	

Depth BGS	Sample Interval	N: E: TOC: DESCRIPTION	Litho. Symbol	P.I.D. (ppm)	Comments
0		0'-23.30' DARK GRAY SHALE			
5					
10					
15					WATER AT 14' BGS
20					
25		BORING TERMINATED AT 23.30' BGS			
30					

APPENDIX B
PIEZOMETER CONSTRUCTION RECORDS

MONITORING WELL INSTALLATION RECORD

Job Name: B&F GARLAND COUNTY PIEZOMETERS
Well Number: PZ-1
Job Number: 35237033
Installation Date: 9/05/2024
Location: HOT SPRINGS, AR
Datum Elevation: 522.10
Surface Elevation:
Datum for Water Level Measurement: T.O.C.
Screen Diameter & Material: 2" PVC
Slot Size: 0.010
Riser Diameter & Material: 2" PVC
Borehole Diameter: 6.25"
Granular Backfill Material: 16-30 SAND
Terracon Representative: MA
Drilling Method: AIR HAMMER
Drilling Contractor: ANDERSON

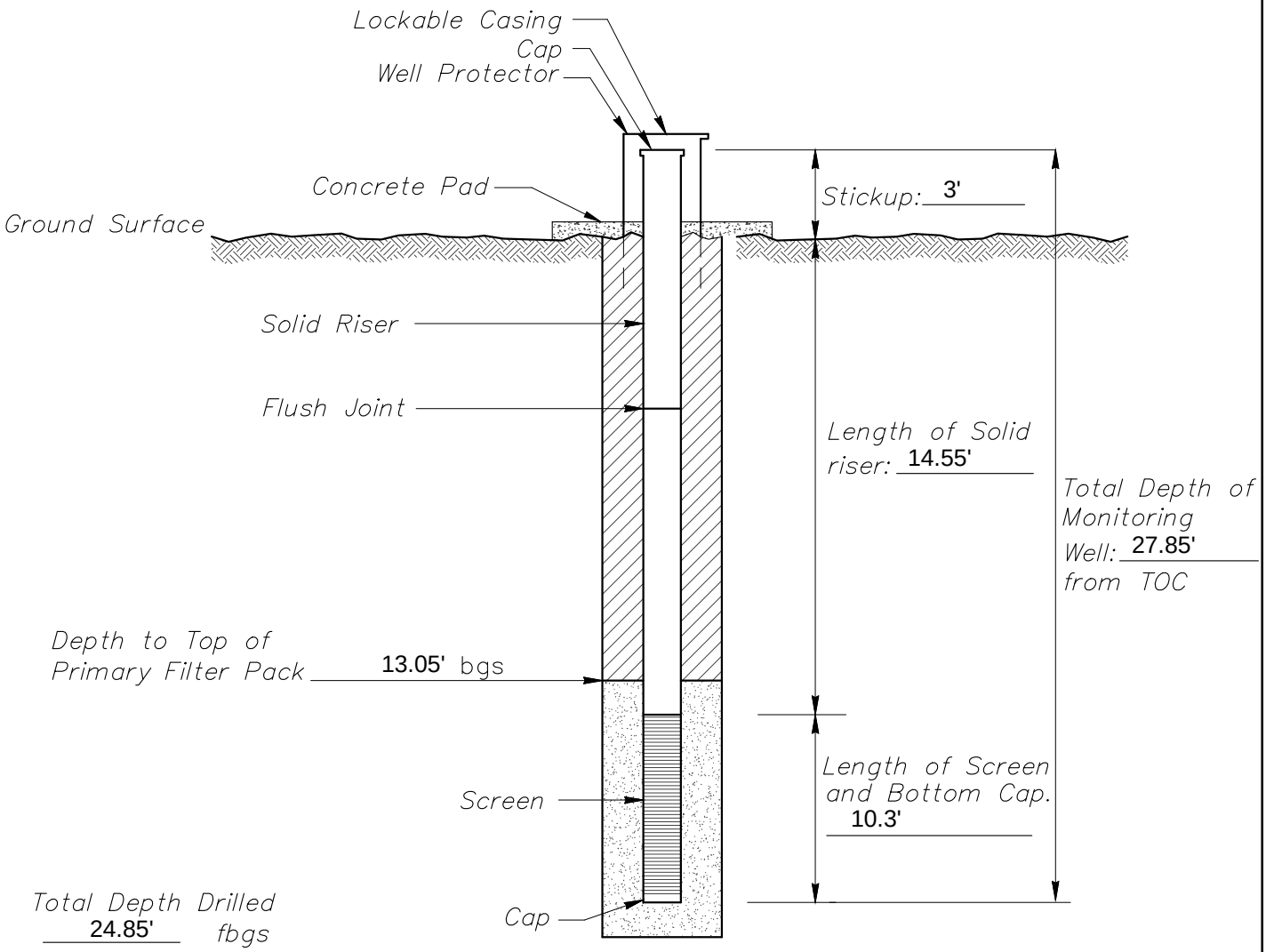


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25809 I-30 South BRYANT, AR. 72022
PH. (501) 847-9292 FAX. (501) 847-9210

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 35237033
WELL NUMBER: PZ-1
DRAWING NUMBER:
CHECKED BY:

MONITORING WELL INSTALLATION RECORD

Job Name: B&F GARLAND COUNTY PIEZOMETERS
Well Number: PZ-2
Job Number: 35237033
Installation Date: 9/05/2024
Location: HOT SPRINGS, AR
Datum Elevation: 538.48
Surface Elevation:
Datum for Water Level Measurement: T.O.C.
Screen Diameter & Material: 2" PVC
Slot Size: 0.010
Riser Diameter & Material: 2" PVC
Borehole Diameter: 6.25"
Granular Backfill Material: 16-30 SAND
Terracon Representative: MA
Drilling Method: AIR HAMMER
Drilling Contractor: ANDERSON

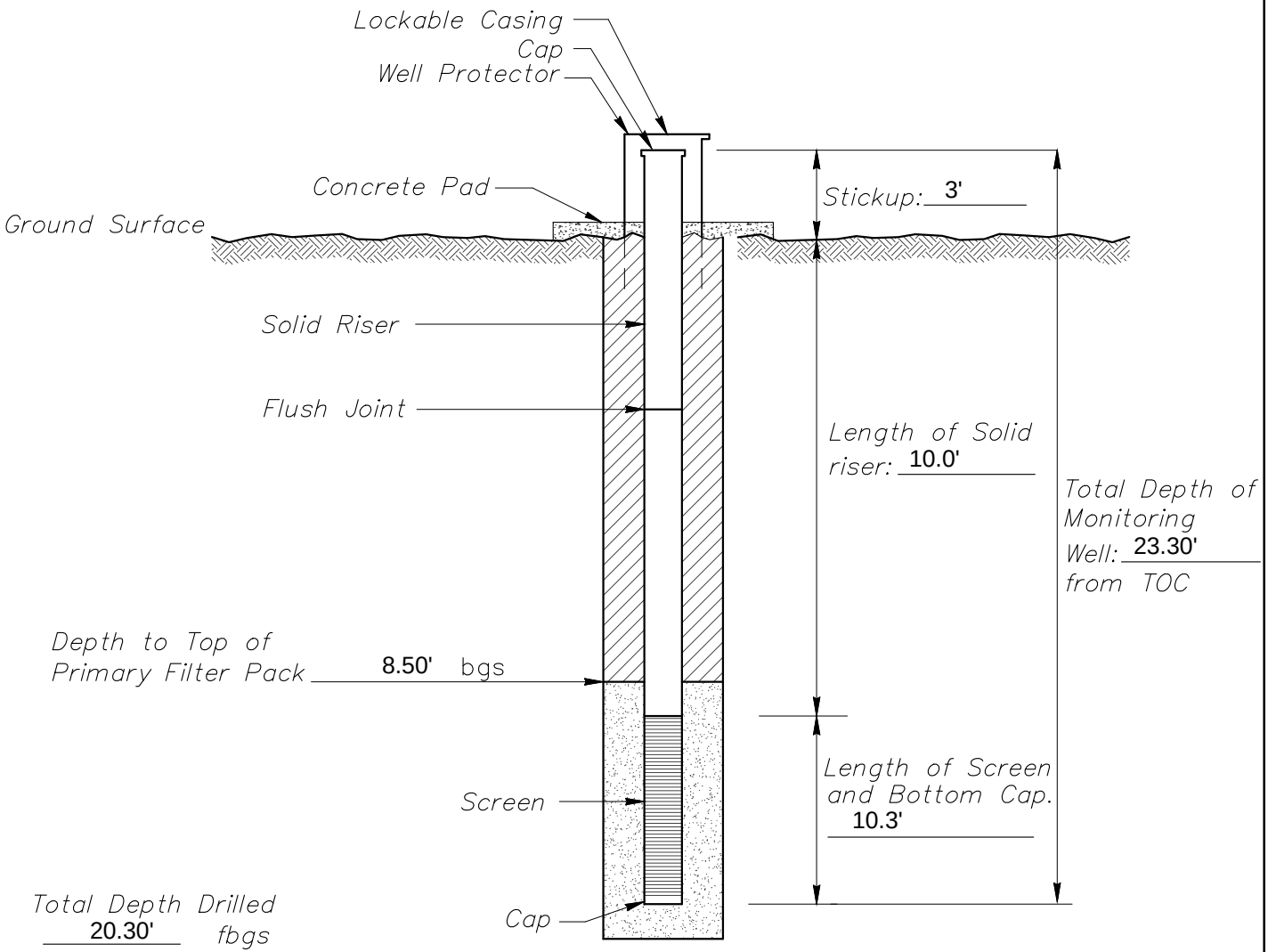


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MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 35237033
WELL NUMBER: PZ-2
DRAWING NUMBER:
CHECKED BY:

MONITORING WELL INSTALLATION RECORD

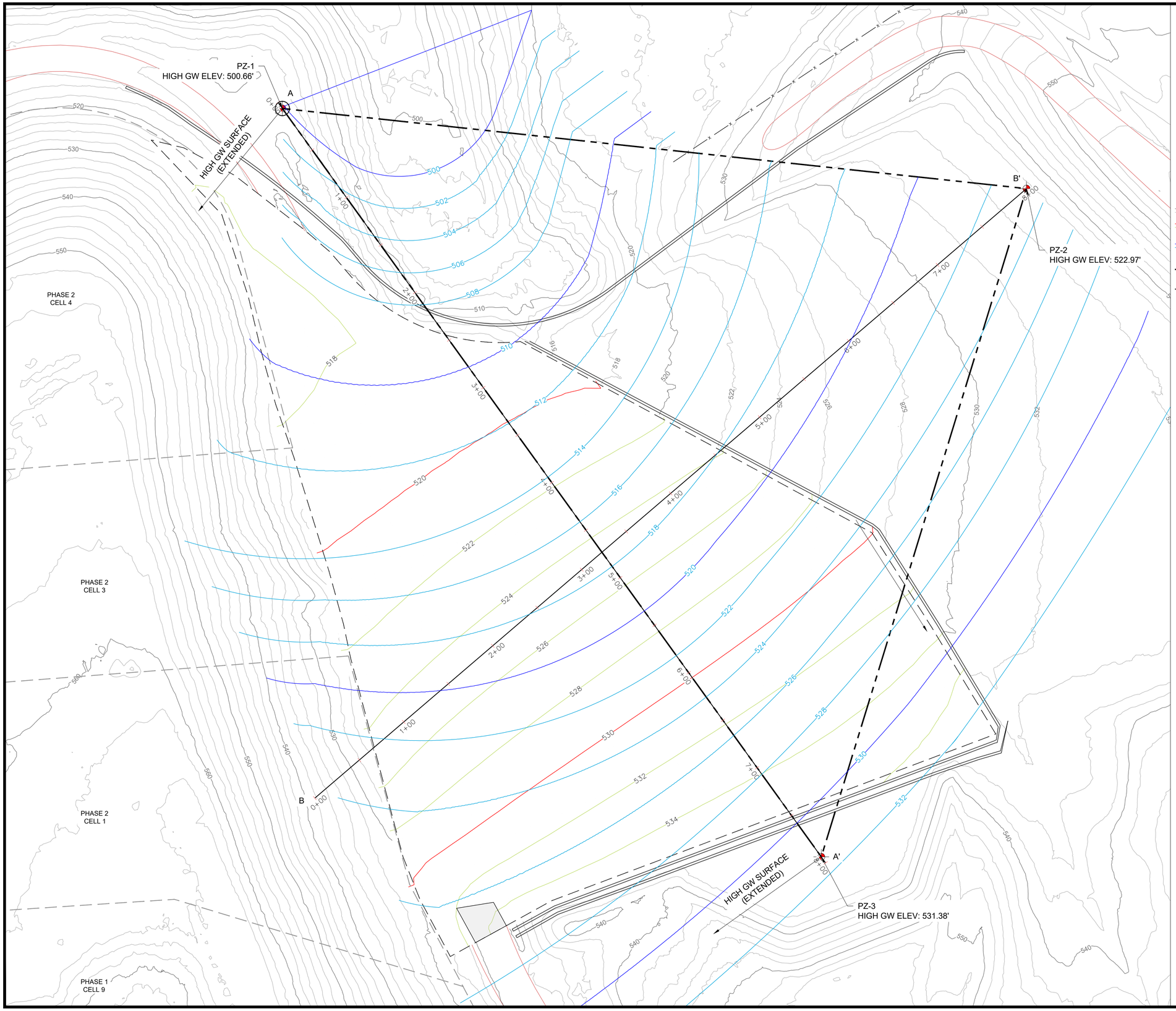
Job Name: B&F GARLAND COUNTY PIEZOMETERS
Well Number: PZ-3
Job Number: 35237033
Installation Date: 9/04/2024
Location: HOT SPRINGS, AR
Datum Elevation: 538.74
Surface Elevation:
Datum for Water Level Measurement: T.O.C.
Screen Diameter & Material: 2" PVC
Slot Size: 0.010
Riser Diameter & Material: 2" PVC
Borehole Diameter: 6.25"
Granular Backfill Material: 16-30 SAND
Terracon Representative: MA
Drilling Method: AIR HAMMER
Drilling Contractor: ANDERSON



Terracon
Consulting Engineers and Scientists
25809 I-30 South BRYANT, AR. 72022
PH. (501) 847-9292 FAX. (501) 847-9210

MONITORING WELL INSTALLATION RECORD
PROJECT NUMBER: 35237033
WELL NUMBER: PZ-3
DRAWING NUMBER:
CHECKED BY:

APPENDIX C
GROUNDWATER SEPARATION INFORMATION



N

SCALE: 1" = 40'

40' 0 20' 40'

LEGEND

- EXISTING TOPOGRAPHY (2' CONTOURS)
- PROPOSED CLAY LINER (2' CONTOURS)
- HIGH GROUNDWATER CONTOURS (2' CONTOURS)
- HIGH GW SURFACE BOUNDARY (WITHIN PIEZOMETER LIMITS)
- CELL 1 BOUNDARY
- EXISTING PIEZOMETERS (TO REMAIN IN PLACE AND UNDAMAGED)

928 AIRPORT ROAD
HOT SPRINGS, AR 71913
Crafton Tull
EST. 1963
50 YEARS
t 501.767.2366 f 501.767.6859
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PHASE 3 - CELL 1 CONSTRUCTION

1040 CEDAR GLADES ROAD
HOT SPRINGS, ARKANSAS

Key Plan

PHASE 3, CELL 1 GROUNDWATER SEPARATION

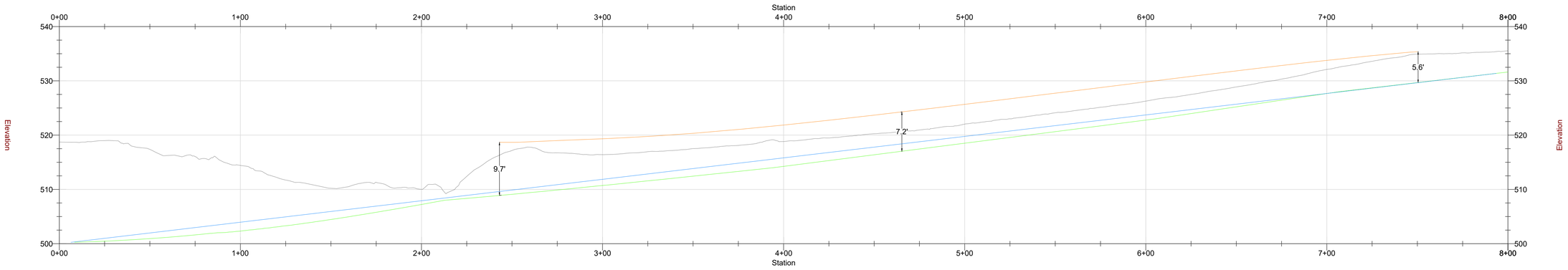
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DRAWING 1



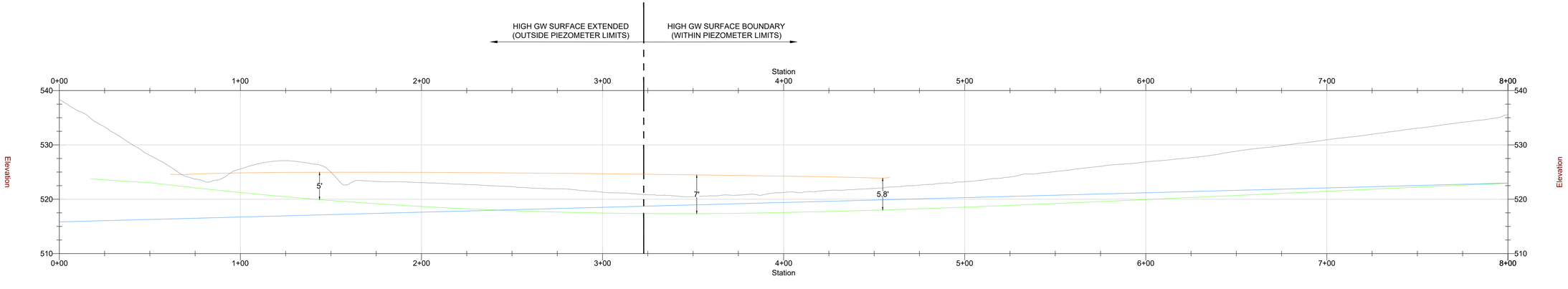
LEGEND

- EXISTING TOPOGRAPHY
- TOP OF PROPOSED CLAY LINER
- HIGH GROUNDWATER CONTOURS
- HIGH GROUNDWATER CONTOURS (REVISED)

ALIGNMENT A-A'

SCALE

HORIZONTAL: 1" = 30'
VERTICAL: 1" = 10'
VERTICAL EXAGGERATION: x3



LEGEND

- EXISTING TOPOGRAPHY
- TOP OF PROPOSED CLAY LINER
- HIGH GROUNDWATER CONTOURS
- HIGH GROUNDWATER CONTOURS (REVISED)
- HIGH GW SURFACE BOUNDARY (WITHIN PIEZOMETER LIMITS)

ALIGNMENT B-B'

SCALE

HORIZONTAL: 1" = 30'
VERTICAL: 1" = 10'
VERTICAL EXAGGERATION: x3

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61 YEARS
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STATE OF ARKANSAS
LICENSED PROFESSIONAL ENGINEER
No. 11260
JOHN W. ROGERS

PHASE 3 - CELL 1 CONSTRUCTION

1040 CEDAR GLADES ROAD
HOT SPRINGS, ARKANSAS

Key Plan

CROSS SECTIONS

No.	Description	Date

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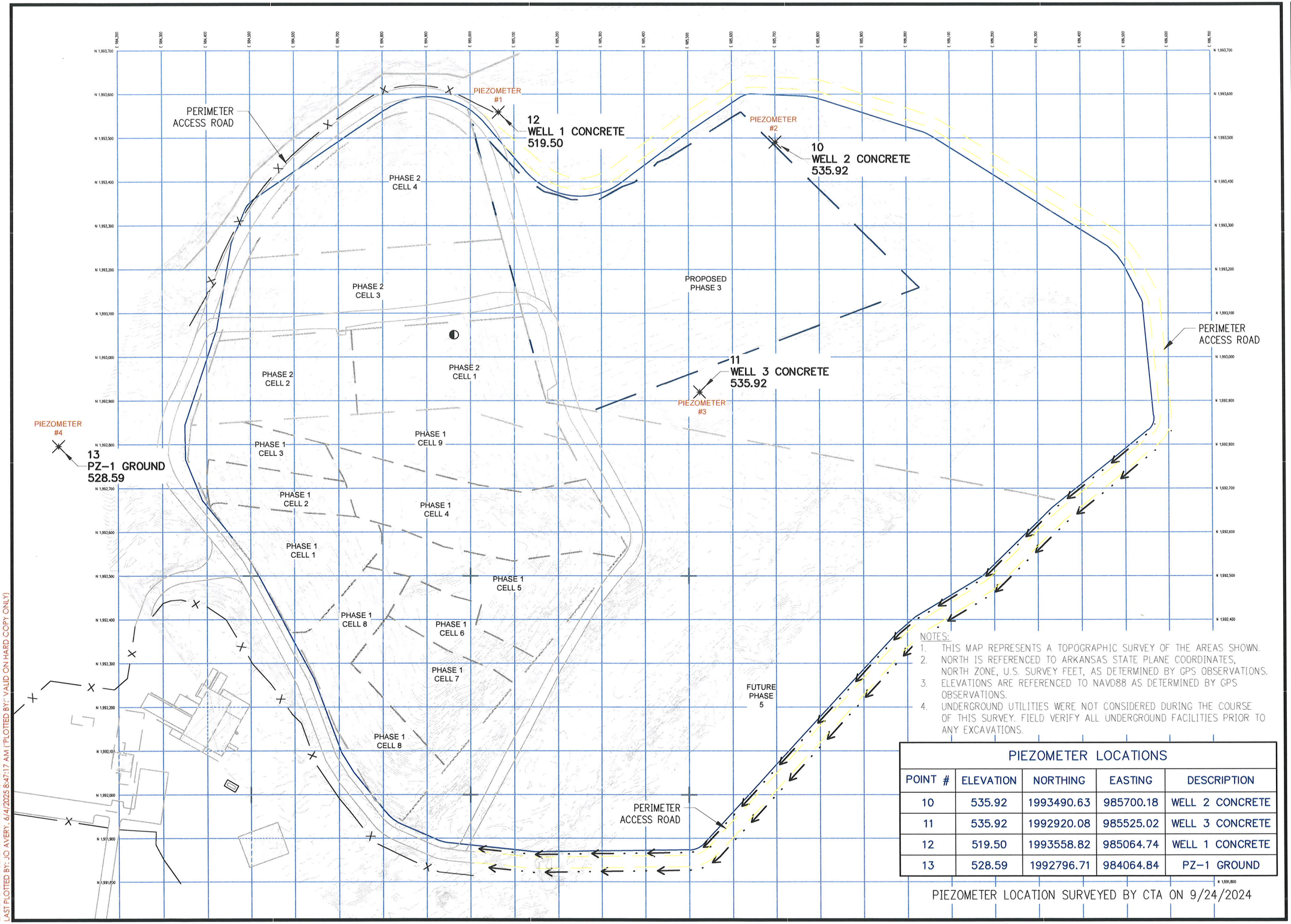
PROJECT NO: 35247264
ISSUE DATE: AUGUST 2025
CONTACT: J. ROGERS
QC by:
QC Date:

CERTIFICATE OF AUTHORIZATION
B & F ENGINEERING, INC.
No. 110
ARKANSAS

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DRAWING 2

APPENDIX D
PIEZOMETER SURVEY INFORMATION



NOTES:

1. THIS MAP REPRESENTS A TOPOGRAPHIC SURVEY OF THE AREAS SHOWN.
2. NORTH IS REFERENCED TO ARKANSAS STATE PLANE COORDINATES, NORTH ZONE, U.S. SURVEY FEET, AS DETERMINED BY GPS OBSERVATIONS.
3. ELEVATIONS ARE REFERENCED TO NAVD88 AS DETERMINED BY GPS OBSERVATIONS.
4. UNDERGROUND UTILITIES WERE NOT CONSIDERED DURING THE COURSE OF THIS SURVEY. FIELD VERIFY ALL UNDERGROUND FACILITIES PRIOR TO ANY EXCAVATIONS.

PIEZOMETER LOCATIONS

POINT #	ELEVATION	NORTHING	EASTING	DESCRIPTION
10	535.92	1993490.63	985700.18	WELL 2 CONCRETE
11	535.92	1992920.08	985525.02	WELL 3 CONCRETE
12	519.50	1993558.82	985064.74	WELL 1 CONCRETE
13	528.59	1992796.71	984064.84	PZ-1 GROUND

PIEZOMETER LOCATION SURVEYED BY CTA ON 9/24/2024

928 Airport Road
Hot Springs, Arkansas 71913
Crafton Tull
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CERTIFICATE OF AUTHORIZATION

CERTIFICATE OF AUTHORIZATION
B&C ENGINEERING, INC.
No. 110

GRAPHIC SCALE IN FEET
200' 0 200'

GARLAND COUNTY CLASS 4 LANDFILL

1040 CEDARGLADES ROAD
HOT SPRINGS, AR 71901

Key Plan

No.	Description	Date

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PROJECT NO: 22402401
ISSUE DATE: 05/30/2025
CONTACT: J. HAMNER
QC by:
QC Date:

LICENSED PROFESSIONAL ENGINEER
STATE OF ARKANSAS
NO. 15621
SIGNATURE
JONATHAN R. HAMNER

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PIEZOMETER LOCATION EXHIBIT

C-101

DRAWING: G:\22402401_GCLANDFILL\INFRASTRUCTURE\CIVIL\DWG\PIEZOMETER LOCATIONS.DWG
LAYOUT: C-101 LAST SAVED: EB8252 5/30/2025 10:59:45 AM
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PROFESSIONAL GEOLOGIST'S CERTIFICATION

As required by *8 CAR § 60-301.i* and the approved Proposed Piezometer Workplan, a geologist from Terracon Consultants, Inc. observed borings and piezometer installations at the Garland County Cedar Glades Class 4 Landfill. The Piezometer Installation Report was prepared under the direction of qualified, Arkansas licensed Professional Geologists, Mr. Merrick Rotenberry, P.G. and Mr. Owen Carpenter, P.E., P.G. of Terracon Consultants Inc.

"I certify to the best of my professional judgement that the attached Piezometer Installation Report document and all attachments properly adhere to established, sound geological and engineering practices and are suitable for use in determining seasonal high groundwater elevations in the vicinity of landfill Phase 3. This certification is contingent on the fact that all information supplied to the signatory authority, up to the date of this certification, is unquestionably accurate and was provided in good faith."



August 26, 2025

F. Owen Carpenter, P.E., P.G.
Arkansas Professional Geologist No. 1707
Arkansas Professional Engineer No. 8653

Date