CHAPTER 4: PROPOSED PROJECT

Cause No. 46171

4.1 General

This study identifies the need to address aged infrastructure and water supply, treatment and distribution. Chapter 3 provides alternative solutions to the identified needs.

The recommended drinking water projects are proposed to be accomplished in two phases as identified below:

Phase I Proposed Projects

- **Alternative 2:** Cross Street Water Transmission Main & Service Line Replacement
- **Alternative 3:** 8th Street Water Main & Service Line Replacement
- **Alternative 4:** North Anderson Cross A Water Main & Service Line Replacement
- **Alternative 5:** North Anderson Cross B Water Main & Service Line Replacement
- **Alternative 6:** West Central Water Main & Service Line Replacement
- **Alternative 7:** Park Place Water Main & Service Line Replacement
- **Alternative 8:** Belmont Water Main & Service Line Replacement
- **Alternative 9:** Brentwood Water Main & Service Line Replacement
- **Alternative 10:** Indian Meadows Water Main & Service Line Replacement
- **Alternative 11:** Historic District Water Main & Service Line Replacement

Phase II Proposed Project

- **Alternative 1:** South Side Water Treatment Plant & Wells

4.2 Recommended Phase I Alternatives

Alternatives 2 – 11 are recommended Phase I drinking water projects. **These projects all meet current and future needs by replacing galvanized steel service lines with lead connectors that are a public health concern and reduce water loss due to leaking.** Implementation of the project shall incorporate protection of public health with service line replacement with customer education, required flushing protocols during construction and provision of filtration pitchers where requested.

The combined Alternatives 2 – 11 projects would replace approximately 3,333 galvanized service lines from main to meter, and an estimated 2,656 service lines from meter to premise plumbing. These projects would eliminate a combined 80,587+/- linear feet of 2" galvanized water mains, and replace approximately 106,085 L.F. of water main. These projects are needed to protect public health, replace aging infrastructure, and combat water loss.

4.2.1 Alternative 1: Not Recommended in Phase I

4.2.2 Alternative 2: Cross Street Water Transmission Main & Service Line Replacement

- Replace approximately 9,500 LF 16" water main with new 24" water transmission main on Cross Street between Broadway and CR 200 West. All associated hydrants, valves and service lines along that portion of the distribution system line would be replaced as well.
- Replace approximately 52 galvanized steel service lines with lead connectors from main to meter and replace an estimated 40 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.3 Alternative 3: 8th Street Water Main & Service Line Replacement

- Replace approximately 15,680 LF of water main along 8th Street between Raible Avenue and Brown-Delaware Street. All associated hydrants, valves and service lines along that portion of the distribution system line would be replaced as well.
- Project includes elimination of approximately 4,490 LF of existing 2" water mains
- Replace approximately 272 galvanized steel service lines with lead connectors from main to meter and replace an estimated 218 galvanized service lines from meter to premise plumbing.
- Replaces critical infrastructure water main that is approximately 100 years old.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.4 Alternative 4: North Anderson Cross A Water Main & Service Line Replacement

- Replace approximately 14,125 LF of water main in the area identified as North Cross A.
- Project includes elimination of approximately 10,127 LF of existing 2" water mains.
- Replace approximately 336 galvanized steel service lines with lead connectors from main to meter and replace an estimated 270 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.5 Alternative 5: North Anderson Cross B Water Main & Service Line Replacement

- Replace approximately 12,295 LF of water main in the area identified as North Cross B.

- Project includes elimination of approximately 5,245 LF of 2" water mains
- Replace approximately 378 galvanized steel service lines with lead connectors from main to meter and replace an estimated 300 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.6 Alternative 6: West Central Area Water Main & Service Line Replacement

- Replace approximately 27,080 LF of water main in the area identified as West Central.
- Project includes elimination of approximately 11,085 LF of existing 2" water mains.
- Replace approximately 643 galvanized steel service lines with lead connectors from main to meter and replace an estimated 510 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.7 Alternative 7: Park Place Water Main & Service Line Replacement

- Replace approximately 9,530 LF of water main in the area identified as Park Place.
- Project includes elimination of approximately 12,995 LF of existing 2" water mains.
- Replace approximately 667 galvanized steel service lines with lead connectors from main to meter and replace an estimated 530 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.8 4.2.8 Alternative 8: Belmont Water Main & Service Line Replacement

- Replace approximately 14,885 LF of water main in the area identified as Belmont.
- Project includes elimination of approximately 10,980 LF of existing 2" water mains.
- Replace approximately 234 galvanized steel service lines with lead connectors from main to meter and replace an estimated 187 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.9 Alternative 9: Brentwood Water Mains & Service Line Replacement

- Replace approximately 2,610 LF of 6" transite water mains with a history of leaks.
- Replace approximately 118 galvanized steel service lines with lead connectors from main to meter and replace an estimated 187 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.10 Alternative 10: Indian Meadows Water Main & Service Line Replacement

- Replace approximately 5,860 LF of water main in the identified Indian Meadows Area.
- Project includes elimination of approximately 5,860 LF of existing 2" water mains.

- Replace approximately 370 galvanized steel service lines with lead connectors from main to meter and replace an estimated 296 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.2.11 Alternative 11: Historic District Water Mains & Service Line Replacement

- Replace approximately 4,020 LF of water main in the area identified as the Historic District.
- Project includes elimination of approximately 2,120 LF of existing 2" water main.
- Replace approximately 315 galvanized steel service lines with lead connectors from main to meter and replace an estimated 250 galvanized service lines from meter to premise plumbing.
- Cost estimates for the proposed project are detailed in Appendix B.

4.3 Recommended Phase II Alternatives

Alternative 1 is recommended to be constructed as a Phase II Project. The proposed schedule for Phase II is recommended to be approximately 12 months later than Phase I. This should allow time for verification of water resources and acquisition of property, along with design and bidding of proposed improvements.

4.3.1 Alternative 1: South Side Water Treatment Plant & Wells

- This project consists of a new 6 MGD water treatment plant and 4 new wells proposed on the south side of Anderson.
- This project Alternative is critical to replace the Wheeler WTP and water supply wells. **This is an urgent current and long-term need for Anderson**.
    - The final project site selections are currently in progress and supplemental information shall be prepared and submitted.
    - Land acquisition is required, but not yet complete.
    - Raw water analysis to be performed for proposed well sites in order to verify treatment requirements.
    - Wastewater discharges will go to the City of Anderson Sanitary Sewer.
    - Backwash water shall be recycled.
- Completion of the proposed 6 MGD South Side WTP and well field will allow for the subsequent decommissioning of the aging Wheeler WTP and wells.
- Cost estimates for the proposed project are detailed in Appendix B.

4.4 Project Schedule

A preliminary project schedule is provided in Table 4.4.1.

Table 4.4.1 - Project Schedule

Project Component	Phase I Anticipated Date	Phase II Anticipated Date
Submit Preliminary Engineering Report	March 2024	Updates November 2024
Public Hearing	May 2024	May 2024
IURC Filing	May 2024	May 2024
Archaeological/Wetlands Investigations Complete	N/A	September 2024
Land and Easement Acquisition Complete	September 2024	October 2024
Anticipated PER Approval	November 2024	November 2024
IDEM Permit Submittal	December 2024	July 2025
IDEM Construction Permit Approval	January 2025	October 2025
Front End Document Certification Submittal to SRF	January 2025	November 2025
Bid Opening	February 2025	December 2025
IURC Approval	February 2025	*February 2025*
Loan Closing	March 2025	January 2026
Sign Contracts	May 2025	February 2026
Begin Construction	June 2025	March 2026
Complete Construction	July 2026	August 2027

4.5 Permit Requirements

The proposed project will require a construction permit from the IDEM Drinking Water Branch. An IDEM Rule 5 permit will additionally be required for soil erosion control. A railroad right-of-way permit from CSX will be needed for Cross Street and 8th Street Projects.

4.6 Sustainability Considerations

4.6.1 Water and Energy Efficiency

The proposed water system improvements will serve to better serve customers, reduce lost water, and provide for long-term maintenance needs of the water system. These efforts serve to improve water efficiency, reduce maintenance costs, and improve water quality.

Energy efficiency will be gained by reducing water loss, which in turn reduces the pumping of water from the wells, through treatment and in the distribution system. The proposed Alt. 1 Water

Treatment Plant Project will have new and more efficient equipment than the old Wheeler WTP and Wells, and will be more energy efficient.

4.6.2 Green Infrastructure

The proposed project will include variable frequency drives on well pump and high service pump motors in the Phase II Project. The Phase I projects do not include any green infrastructure initiatives at this time.

4.7 Total Project Cost Estimate

The proposed improvements are recommended to be completed in two (2) phases. Phase I consists of the water distribution system improvements projects and the estimate includes all of the non-construction costs associated with the IURC Rate Case. Phase II is proposed to include the new south side water treatment plant and wells. The City of Anderson proposes to seek approval for both Phases I and II from the IURC in a single rate case. Tables 4.7.1 and 4.7.2 provide the **preliminary opinion of probable total project costs for these projects. The combined total for Phase I and II is estimated to be $108,969,336.00.** This includes construction contingency funds and non-construction costs.

Table 4.7.1 - Preliminary Opinion of Probable Project Costs – Phase I Projects

Alt.	Phase I Water Utility Improvements	Cost	*Service Line Only*
2	Cross Street Water Transmission Main Replacement (CR 200 W to Broadway)	$5,077,900.00	$415,235.00
3	8th Street Water Main and Service Lines, Raible to John St	$7,139,470.00	$2,254,956.00
4	North Anderson Cross A - Water Mains & Service Lines	$5,789,560.00	$2,984,265.00
5	North Anderson Cross B - Water Mains & Service Lines	$6,126,532.00	$3,750,395.00
6	West Central (Madison-Sycamore) Water Mains & Service Lines	$10,149,718.00	$5,232,580.00
7	Park Place Water Mains & Service Lines	$8,722,620.00	$4,527,350.00
8	Belmont Water Mains & Service Lines	$5,045,384.00	$1,623,301.60
9	Brentwood Service Line Replacements	$1,633,240.00	$813,988.00
10	Indian Meadows Service Line Replacements	$4,873,912.00	$2,501,688.00
11	Historic District Service Line Replacement	$4,429,000.00	$2,124,416.00
	Estimated Construction Cost for Phase I	**$58,987,336.00**	**$26,228,174.60**
	Design Contingency (20%)	***$11,798,000.00***	***$5,245,634.92***
	Total Estimated Construction Cost with Contingency	***$70,785,336.00***	**$31,473,809.52**
	Non-Construction Costs – Phase I		
	Engineering Design & Bidding	$5,090,000.00	
	Engineering Contract Admin & Post Con.	$1,980,000.00	
	Construction Observation (3%)	$2,120,000.00	
	Legal (local)	$70,000.00	
	Legal - Bond Counsel	$200,000.00	
	Rate Consultant	$250,000.00	
	Archaeology and Wetland Investigation	$0.00	
	Rate Case Professional Fees	$200,000.00	
	Labor Standards	$50,000.00	
	SRF Financing Fees	$50,000.00	
	Total Estimated Non-Construction Costs	**$10,010,000.00**	
	Preliminary Opinion of Probable Total Project Cost	**$80,795,336.00**	

Table 4.7.2 - Preliminary Opinion of Probable Project Costs – Phase II Projects

Phase II Water Utility Improvements	Cost
Alt. 1 Replacement Water Treatment Plant South Side	$18,820,000.00
Estimated Construction Cost	**$18,820,000.00**
Design Contingency (30%)	***$5,764,000.00***
Total Estimated Construction Cost with Contingency	***$24,584,000.00***
Non-Construction Costs	
WTP & Well Project - Engineering Design & Bidding	$1,900,000.00
WTP & Well Project - Engineering Contract Admin & Post Construction	$740,000.00
Construction Observation (3%)	$750,000.00
Legal (local)	$25,000.00
Legal - Bond Counsel	$50,000.00
Rate Consultant	$50,000.00
Archaeology and Wetland Investigation	$25,000.00
Rate Case Professional Fees	$0.00
Labor Standards	$25,000.00
SRF Financing Fees	$25,000.00
Total Estimated Non-Construction Costs	**$3,590,000.00**
Preliminary Opinion of Probable Total Project Cost Phase II	**$28,174,000.00**

CHAPTER 5: EVALUATION OF ENVIRONMENTAL IMPACTS

5.1 GENERAL

Evaluation of the environmental impacts of the proposed construction project is an important step in identifying impacts on the surrounding community. The purpose of this chapter is to evaluate potential negative impacts induced by the proposed waterworks improvements project.

Table 5.1 Identifies the USGS Topography Map and location information and Environmental Figures for each project.

5.1.1 DISTURBED/UNDISTURBED LAND

No Formally Classified Lands are present in the project areas and therefore none will be impacted by this project.

Phase I: Alternatives 2-11 Water Main and Service Line Replacements

The water main and service line replacement project will take place on land already disturbed by installation of existing water lines and other utilities.

An overall map of Water Main and Service Line Alternative Project Areas is included in Appendix B Figure 5.0.

Phase II: Alternative 1 South Side Water Treatment Plant & Wells

Location TBD. Construction may take place on undisturbed land. An archaeological investigation will be conducted should this project impact undisturbed land.

Table 5.1 Summary of Proposed Project Locations

Figure	Description	County	Civil Township & County	Township, Range & Section	USGS Quad Map Name(s)
5.0	Overall Map of Water Main and Service Line Project Areas	Madison	Varies	Varies	Anderson – North & Anderson South
Pending	Replacement Water Treatment Plant & Well Field	Pending Site Identification and Well Testing Currently Underway			
5.2a-e	Cross Street Water Main	Madison	Anderson, Lafayette	T19N R7E, Sec. 1-3; T20N R7E Sec. 34-36	Anderson North
5.3a-e	8th Street Water Main & Service Lines	Madison	Anderson	T19N R7E, Sec. 11-12	Anderson South
5.4a-e	N. Cross A Neighborhood	Madison	Lafayette, Richland	T20N R7E, Sec. 36; T20N R8E Sec. 31	Anderson North
5.5a-e	N. Cross B Neighborhood	Madison	Anderson	T19N R7E, Sec. 1	Anderson North
5.6a-e	West Central	Madison	Anderson	T19N R7E, Sec. 11-12	Anderson South
5.7a-f	Park Place	Madison	Anderson	T19N R8E, Sec. 7 & 18	Anderson South
5.8a-e	Belmont Service Line Replacements	Madison	Anderson	T19N R7E, Sec. 23	Anderson South
5.9a-e	Brentwood Service Line Replacements	Madison	Anderson	T19N R7E, Sec. 15	Anderson South
5.10a-e	Indian Meadows	Madison	Lafayette, Richland	T19N R7E, Sec. 36; T20N R7E, Sec. 25; T20N R8E, Sec. 30-31	Anderson North
5.11a-e	Historic District Service Line Replacements	Madison	Anderson	T19N R7E, Sec. 12-13	Anderson South

5.1.2 HISTORICAL AND ARCHITECTURAL RESOURCES

The Indiana Historic Buildings, Bridges, and Cemeteries Map was reviewed to determine potential impacts to historical and architectural sites. Maps in Appendix B show the proposed alternatives in relation to historic structures. There are historic resources near project locations; however, no impacts are anticipated. All work is proposed to take place within the footprint of existing utilities and in easement and road right-of-way areas. Right of entry will be granted by property owners for the service line replacement which will take place primarily in yard areas and connect to premise plumbing. No permanent impacts to historic resources will take place.

Three alternatives, the 8th Street Water Main and Service Line Replacement Project, the West Central Water Main and Service Line Replacement Project and the Historic District Water Main and Service Line Replacement will take place in parts of the:

- West Eighth Street Historic District, NR- 0073.

Additionally, the Historic District Water Main and Service Line Replacement Project will take place in parts of the:

- West Eighth Street Historic District, NR- 0073.

Two (2) brick streets appear to be on the proposed route, a section of approximately 200 linear feet on 7th street just west of Madison Avenue and a section of 200 linear feet on Chase Street just south of 10th Street. The water line will be installed via horizontal directional drilling or moved out of the right-of-way in order to avoid impacts to historic brick streets. A combination of concrete and possibly older curbing also exists. Water mains and service lines will be installed via horizontal directional drilling where necessary to avoid impacts to historic resources, including brick streets.

The Anderson Downtown Historic District, NR-0794 will not be impacted.

Summit View Cemetery is along E. 7th Street in the Park Place Water Main and Service Line Replacement project area. The cemetery fence appears to start approximately 65 feet off the edge of pavement. The cemetery is shown in Figure 5.7f. Improvements will remain in the right-of-way or easement area in or near the roadway. Trench impact area is anticipated to be less than five-ten feet wide. If necessary, water main will be installed via horizontal directional drilling to avoid impacts.

There will be no impacts to historic properties or cemeteries, including fences surrounding cemeteries. When boring is needed, the depth will be approximately 6-10 feet.

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.3 WETLANDS

Maps in Appendix B show the proposed alternatives in relation to wetlands. Any construction near wetlands will be conducted via horizontal directional drilling. Measures such as silt fencing and straw wattles will be utilized to avoid impacts to wetlands if deemed necessary. Mitigation measures to lessen and compensate for wetland impacts cited in comment letters from the Indiana Department of Natural Resources (IDNR) and the U.S. Fish and Wildlife Service (USFWS) will be implemented.

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.4 SURFACE WATERS

The proposed projects are shown with floodplains, wetlands, and streams in Appendix B. No stream crossings are anticipated. If there are any waterways encountered, construction will be conducted via horizontal directional drilling. All comments from the USFWS and IDNR regarding these stream crossings will be incorporated into the construction plans.

The construction of these proposed projects will not adversely affect waters of Limited Use or Outstanding State Resource Waters listed in 327 IAC 2-1.5-19, Limited or Exceptional Use Waters listed in 327 IAC 2-1-11, Natural, Scenic and Recreational Rivers and Streams listed in 312 IAC 7-2, Salmonid Waters listed in 327 IAC 2-1.5-5(a)(3), or the Natural Resource Commission's Outstanding Rivers List for Indiana per Information Bulletin #4 (16 IR 1677).

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.5 100-YEAR FLOODPLAIN AND FLOODWAY

The proposed projects are shown with floodplains, wetlands, and streams in Appendix B. The proposed project will not involve dredging or filling and will not adversely affect floodplain and floodway areas. Construction in a Floodway permits will be obtained, if required.

The loan applicant is aware of the hazards of locating structures in areas subject to the base flood. Location of the proposed project outside the 100-year flood plain is not deemed to be a feasible or reasonable alternative because replacing water mains where they currently exist is necessary to adequately serve customers. The applicant, through local building codes, the authority of its council or planning commission, or other means, will ensure that the SRF-funded facilities will be protected from the 500-year flood to two feet above the base flood elevation for non-critical infrastructure, or to three feet above the base flood elevation for critical infrastructure, in accordance with Executive Order 14030.

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.6 GROUNDWATER

The proposed project will not affect groundwater. Dewatering is not expected. The project will not impact a sole source aquifer.

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.7 PLANTS AND ANIMALS

Tree removal is not expected. The project will be implemented to minimize impact to non-endangered species and their habitat. The USFWS IPaC official species list and letter identifying no impact to the northern long eared bat is included in Appendix B.

Mitigation measures cited in comment letters from the IDNR and USFWS will be implemented.

This section will be amended pending the final location of the proposed Phase II Alternate 1 South Side Water Treatment Plant and Wells.

5.1.8 PRIME FARMLAND AND GEOLOGY

The USDA Rural Development Natural Resource Conservation Service will be contacted to evaluate Prime Farmland. Erosion control mitigation measures will be implemented as required by necessary permits. The response from USDA will be provided in Appendix B when available.

5.1.9 AIR QUALITY

Mitigation measures to reduce noise, dust, and airborne contaminants will be implemented as required by necessary permits.

5.1.10 OPEN SPACE AND RECREATION OPPORTUNITIES

The construction and operation of the proposed project will neither create nor destroy open space or recreational opportunities.

5.1.11 LAKE MICHIGAN COASTAL PROGRAM

The proposed project will not affect the Lake Michigan Coastal Zone.

5.1.12 NATIONAL NATURAL LANDMARKS

The construction and operation of the proposed project will not affect National Natural Landmarks.

5.1.13 SECONDARY IMPACTS

The City of Anderson, through local zoning laws, the authority of its council or planning commission, or other means, will ensure that future development and utility projects connecting to SRF-funded facilities will not adversely affect wetlands, wooded areas, steep slopes, archaeological/historical/structural resources, or other sensitive environmental resources. The City of Anderson will require new development and utility projects to be constructed within the guidelines of the US Fish and Wildlife Service, Indiana Department of Natural Resources, Indiana Department of Environmental Management, and other environmental review authorities.

5.1.14 MITIGATION MEASURES

Precautions shall be taken during construction to prevent erosion and sediment transport. Project plans shall include requirements for construction sequencing and both temporary and permanent erosion control measures. All disturbed areas shall be restored to their pre-construction condition. All vegetated land shall be permanently seeded and maintained as necessary until vegetation growth is established.

A Rule 5 permit is required through IDEM for Construction/Stormwater Pollution Prevention. This plan shall be approved by the Madison County Soil and Water Conservation District and recommend for approval to IDEM. The county SWCD will routinely inspect the construction area to ensure that appropriate measures are taken to minimize erosion and sediment transport off-site. All mitigating measures recommended by reviewing authorities shall be implemented for this project.

This chapter will be revised once additional details are available regarding Phase II Projects, in particular as a Replacement/South Side Water Treatment Plant and Well Sites are determined in the upcoming months.

CHAPTER 6: PUBLIC PARTICIPATION AND LEGAL, FINANCIAL, AND MANAGERIAL CAPABILITY

6.1 PUBLIC PARTICIPATION

The City of Anderson will hold a public hearing to discuss the project in May 28, 2024. The PER will be available for public review 10 days prior to the hearing. Comments will be accepted at the hearing and for five (5) days afterward.

The following items will be included in Appendix C:

- Sign-in sheet from hearing, including email addresses.
- Public hearing meeting minutes.
- Written comments.
- Email addresses for other local interested parties and local media outlets.

The following resolutions will be included at the end of this chapter following the public hearing to be held for this project:

- PER Acceptance Resolution.
- Signatory Authorization Resolution.

6.2 SRF FINANCING FORM

Included in Appendix C.

6.3 INTERLOCAL AGREEMENTS

There are no interlocal agreements with other utilities for water sale or purchase.

6.4 IURC PARTICIPATION

The City does belong to the Indiana Utility Regulatory Commission (IURC). The City is currently working on its filing for IURC approval. Approval is anticipated per the project schedule in Ch. 4.

6.5 REGIONAL MEETING PARTICIPATION

The City of Anderson last participated in a utility regional planning meeting on November 2, 2023 and will continue to attend regional planning meetings on an annual basis, pursuant to IC 5-1.2-11.5-6.

6.6 ASSET MANAGEMENT PLAN

The loan applicant's existing Asset Management Program (AMP) meets the requirements defined by the State Revolving Fund's AMP Guidelines, pursuant to IC 5-1.2-10-16. The completed AMP Certification form is included in Appendix C.

6.7 WATER LOSS AUDIT

The City's 2024 water loss audit of 2023 data is currently in progress and will be submitted this Spring. The City's water loss audits for previous years were already submitted.

6.8 LAND ACQUISITION

Easements may be required for the proposed projects. Evaluation of potential properties for a proposed package water treatment plant is currently underway.

6.9 DISADVANTAGED COMMUNITIES (DAC) MEMO

The City of Anderson DAC Memo is included in Appendix C.

Appendix A

https://www.heraldbulletin.com/news/local_news/anderson-well-field-could-become-superfund-site-city-idem-say-drinking-water-is-safe/article_ae5d3f9a-f586-11e7-b5d9-1f426d573461.html

TOPICAL

Anderson well field could become Superfund site; city, IDEM say drinking water is safe

Federal agencies might help with cleanup of well field

By Ken de la Bastide | The Herald Bulletin
Jan 9, 2018

The U.S. Environmental Protection Agency announced Tuesday it's considering the Wheeler well field near Broadway and Grand Avenue be included on the federally funded Superfund cleanup list.

Don Knight | The Herald Bulletin

ANDERSON – State and federal environmental agencies are recommending the Wheeler well field in Anderson be considered as a possible Superfund site, but officials are stressing the city's drinking water is safe.

The U.S. Environmental Protection Agency announced Tuesday it's considering the Wheeler well field near Broadway and Grand Avenue be included on the federally funded Superfund cleanup list.

It is being proposed for the EPA National Priorities List. Before the site can be included, there is a 60-day period for public comment.

Testing by the Indiana Department of Environmental Management in 2011 reported trace concentrations of volatile organic compounds including trichloroethene (industrial solvent), tetrachloroethene (dry cleaning of fabrics) and dichloroethene (byproduct of vinyl chloride) in the finished water at the Wheeler Avenue treatment plant. In 2013, vinyl chloride was found in raw water.

Despite several investigations, the origin of the contaminants is unknown.

The EPA site summary states the contamination has been found in three of the eight wells in the area, providing water to 13,000 Anderson residents.

IDEM referred the site to the EPA because the site requires further investigation and long-term cleanup.

Neal McKee, director of the Anderson Water Department, said in 2000 the city installed air strippers at the Wheeler Avenue treatment plant, which has been efficiently removing the volatile organic compounds.

McKee said the city's water is tested quarterly.

He said it's not uncommon to find contaminants in well water.

"Water produced by the city of Anderson's Water Department meets all state and federal safety standards and the environmental work provided through the Superfund program will help ensure continued water safety and quality," Bruno Pigott, IDEM commissioner, said in the press release.

Anderson Mayor Thomas Broderick Jr. said the IDEM and EPA investigation is pointing out information that has been known for years.

"We have been working on the problem," he said. "We installed air strippers. The contaminants are in the raw water and there are no problems with the city's drinking water."

Broderick said EPA and IDEM will continue to monitor the area around the Wheeler well field that extends along Killbuck Creek to the north of Grand Avenue.

"That was a heavily industrialized area," he said. "The likelihood of locating the source will be difficult."

McKee said the city will continue to use the Wheeler well field as a water source until the city completes work on additional wells in the Lafayette well field and the construction of the new 10-million-gallon-per-day treatment plant.

He said the transition should be completed within the next 18 months.

Last February the city began a study to identify a future source of supply to the Wheeler Avenue treatment plant and two areas have been identified for test drilling.

Broderick said regardless of the outcome of the Superfund site decision, the city will continue to work to ensure residents have a safe drinking water supply.

Follow Ken de la Bastide on Twitter @KendelaBastide, or call 765-640-4863.

Follow Ken de la Bastide on Twitter @KendelaBastide, or call 640-4863.

Trending Video

Ken de la Bastide

Senior Reporter covering Anderson and Madison County government, politics and auto racing for The Herald Bulletin. Has been working as a journalist in central Indiana since 1977.

https://www.heraldbulletin.com/news/local_news/keeping-the-water-safe/article_0300a171-2aff-558b-a641-71b771632664.html

TOPICAL

Keeping the water safe

City anticipates decision on Wheeler well field

By Ken de la Bastide | The Herald Bulletin
Mar 4, 2018

ANDERSON – Steps taken by the Anderson Water Department in 2000 by installing air strippers are keeping water from the Wheeler well field safe for the use by city residents.

Earlier this year, state and federal environmental agencies recommended the well field be considered as a possible Superfund site.

The U.S. Environmental Protection Agency announced it's considering the well field, located near Broadway and Grand Avenue, for inclusion on the federally funded Superfund cleanup list.

The Anderson site is being proposed for the EPA National Priorities List. Before it can be included on the national Superfund site, there is a 60-day period for public comment, which is currently taking place.

Neal McKee, superintendent of the Anderson Water Department, said the city agency is required to do quarterly sampling for volatile organic compounds (VOC) based on a schedule established by the Indiana Department of Environmental Management (IDEM).

"We've never even gotten close to exceeding the maximum allowable level," he said. "The standard is 11 parts per billion and we're in the .5 parts per billon range."

McKee said the water from the wells goes to the top of a tank and is dropped through a series of trays, which breaks the water into smaller droplets. He said that allows gases to form from the VOCs and is then distributed into the atmosphere by a blower.

The air strippers can treat 10,000 gallons of water per minute, and the Wheeler Avenue plant provides five million gallons per day.

"It was not a surprise," he said of the recommendation to include the well field as a candidate for the Superfund list. "Anderson has a rich history of manufacturing. The problem was first known in the late 1980s or early 1990s.

"We knew the VOCs were there," McKee added, "but we don't know where they are coming from. It's difficult to pinpoint the source."

The water from the wells is tested daily, he said.

Anthony Wilkerson is a certified operator working in the control room of the Wheeler Avenue plant to monitor conditions.

“We can check the chloride and fluoride going into the water,” he said. “We can check our wells and the water tanks from the control room.”

Wilkerson has been working for the Water Department for 14 years.

“We know how much water is flowing through the plant,” he said. “We know when a well or pump has a problem because it is displayed on our monitor.

“There is a lot of responsibility,” Wilkerson said. “It looks like an easy job, but it's very important to the city.”

Currently, the city of Anderson is constructing a new water treatment plant to replace the existing Lafayette treatment plant to the west of the city and establishing a new well field.

“Right now we’re doing a hydrological study,” McKee said. “We have chosen seven locations for testing. The plan is to demolish this (Wheeler) plant.”

McKee said the city will continue to use the Wheeler well field as a water source until the work is completed on additional wells in the Lafayette well field and the construction of the new 10-million-gallon-per-day treatment plant.

He said the transition should be completed within the next 18 months.

Testing by IDEM in 2011 reported trace concentrations of volatile organic compounds including trichloroethane (an industrial solvent), tetrachloroethene (used in dry cleaning of fabrics) and dichloroethene (a byproduct of vinyl chloride) in the finished water at the Wheeler Avenue treatment plant. In 2013, vinyl chloride was found in raw water.

Despite several investigations the origin of the contaminants is unknown.

The EPA site summary states contamination has been found in three of the eight wells in the area, providing water to 13,000 residents.

“Water produced by the city of Anderson’s Water Department meets all state and federal safety standards, and the environmental work provided through the Superfund program will help ensure continued water safety and quality,” IDEM commissioner Bruno Pigott said.

Follow Ken de la Bastide on Twitter @KendelaBastide, or call 765-640-4863.

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We Protect Hoosiers and Our Environment.
100 N. Senate Avenue • Indianapolis, IN 46204
(800) 451-6027 • (317) 232-8603 • www.idem.IN.gov

Eric J. Holcomb
Governor

Brian C. Rockensuess
Commissioner

9/12/2023

Mr. Neal McKee
Anderson Water Department
550 Dale Keith Jones Road
Anderson, IN 46011

Re: PFAS Sampling Initiative Results
PWSID # IN5248002

Dear Neal McKee,

The Indiana Department of Environmental Management (IDEM) Drinking Water Branch, in collaboration with Pace Analytical, has received Per- and polyfluoroalkyl substances (PFAS) results for Anderson Water Department. The samples were collected by the system operator/staff to assist in completing the PFAS Sampling Initiative. Attached are the PFAS results for Anderson Water Department.

Entry points to the distribution system and/or source water locations were sampled on 8/2/2023 to assess the potential impact from PFAS. The samples were analyzed for 18 common PFAS compounds, which are listed in the attached analytical report. In June 2022, the U.S. EPA published an updated list with interim Lifetime Health Advisory Levels (HALs) for PFOA and PFOS, and established HALs for GenX and PFBS. The new HALs from the EPA are listed below, along with IDEM action levels for PFHxS and PFNA.

Chemical	Lifetime Health Advisory Level/Value (parts per trillion or ppt)	*Minimum Reporting Level (ppt)
PFOA	0.004 (Interim)	2
PFOS	0.02 (Interim)	2
GenX Chemicals	10 (Final)	2
PFBS	2,000 (Final)	2

**The Minimum Reporting Level is the smallest measured concentration of a substance that can be reliably measured by using a given laboratory analytical method.*

Chemical	IDEM Action Level (parts per trillion or ppt)
PFHxS	>140
PFNA	>21

For the samples collected on 8/2/2023, the drinking water samples that represented the finished treated water supplied to customers and residents reported detections of PFAS compounds at concentrations that are above the U.S. EPA's Health Advisory Level or IDEM Action Level. Resampling is needed to verify the results before action is needed. IDEM will contact you in the upcoming months to arrange resampling. Please see below for the specific detections.

Location	Analyte	Acronym	Results (ppt)	Exceeds HAL or Action Level?
GW003	Perfluorohexanesulfonic acid	PFHxS	2.2	No
GW004	Perfluorooctanesulfonic acid	PFOS	2.6	Yes
EP001	Perfluorooctanesulfonic acid	PFOS	3.5	Yes
TOCRAW-TP01	Perfluorooctanesulfonic acid	PFOS	3.7	Yes
GW003	Perfluorooctanesulfonic acid	PFOS	35.8	Yes

RANNEY 4
RANNY 5
WHEELER
RANNY 1
RANNEY 4

Please see the laboratory report that was included with this letter as a PDF for additional details. For more information regarding PFAS and results reporting, please refer to https://www.in.gov/idem/pfas.

The Indiana State Revolving Fund (SRF) provides low-interest loans to Indiana communities for projects that improve drinking water infrastructure. Communities impacted by PFAS contaminated drinking water may qualify for grant funding through the Bipartisan Infrastructure Law (BIL) designed specifically for PFAS mitigation efforts. To find out how to access SRF funds, please visit in.gov/ifa/srf.

Thank you for your attention to this matter. If you have any questions regarding the PFAS Sampling Initiative, please contact Trisha Williams (twilliam@idem.in.gov).

Sincerely,

Matt Prater, Branch Chief
Drinking Water Branch
Office of Water Quality

ecc: Christian Walker, IDEM

PROJECT MEMORANDUM

TO: Neal McKee **DATE:** March 27, 2024
(Update to 9/30/2022 Memo)

FROM: Steve Champa and Chris Gordon, Eagon & Associates, Inc.

SUBJECT: Anderson, Indiana Groundwater Exploration Summary

In 2017, Eagon & Associates, Inc. (Eagon) was contracted by the City of Anderson (City) to assist with hydrogeologic investigations and well and well-field evaluations to identify and explore possibilities for expansion of the groundwater source-of-supply to meet the increasing water demand. Activities performed between 2017 and 2022 as part of these investigations are summarized in the following sections of this memo.

A March 2024 update has been added to the September 30, 2022 memo to document the status of work performed at the properties recommended in the 2022 memo. Locations of additional properties that went up for sale in 2023 and early 2024 were sent by the City of Anderson to Eagon for evaluation and test drilling recommendations. The additional properties were all relatively close to the properties identified in the 2022 memo. Evaluations of the additional properties have been added to this memo including recommendations for test drilling. Plate 2 has been updated with the 2023 properties and drilling logs completed in 2023 have been attached. The text from the September 2022 memo remains largely unchanged for posterity but updated as necessary.

Work Performed (September 2022)

In March 2017, a series of maps were prepared and presented to the City. The maps included well locations (residential, commercial/industrial and municipal), locations of significant water withdrawal facilities, the extent of unconsolidated (sand and gravel) aquifers, drift thickness, bedrock topography and the locations of known potential contamination sources. Hydrogeologic cross sections depicting aquifer extent and thickness were also prepared. During this time, a sand and gravel thickness map has been developed in ArcGIS. The map is based on a map from the Indiana Geological Survey (Bleuer & Zlotin, 2002). Using ArcGIS, we have been able to update the map with more recent data and are able to edit the map and add new test boring data as it becomes available.

The maps and cross sections have been the basis for recommendations of areas and specific properties for field exploration (i.e., test drilling). The attached Plate 1 shows the mapped aquifer extents, the locations of the cross-section traces, public water supply and other significant water withdrawal facility wells. The locations of wells and test borings completed as part of this investigation and the locations of specific properties that have been examined are shown on Plate 2. Over 70 properties have been evaluated as part of these investigations.

Based on these recommendations, access agreements were obtained and test borings were completed at the Beerbower and Anderson Innovation properties in 2019 and 2020. The property

locations are shown on the attached map. Test borings at the Beerbower property indicated some favorable aquifer material, however the property owner declined to allow any further investigations. Test borings at the Anderson innovation property did not indicate favorable aquifer thickness or extent and no additional testing was performed at that site. No access could be obtained at the Shelton property west of the Beerbower Property. The logs of the Beerbower and Anderson Innovation test borings are attached.

Two test borings were completed at the Fuller site in 2022. The property is owned by the City of Anderson. The well logs and grain-size data (attached) indicate that the extent and thickness of the aquifer are suitable for development of water supply wells at the property and a test/production well is being installed. An aquifer test is planned to be completed in 2022.

New supply wells have been installed and tested at the Tucker and Hanna sites. These are the second wells at these sites and will provide redundancy and increased groundwater supply capacity. Door-to-door residential well surveys were conducted around the Tucker and Hanna well sites to gather data on water levels, well depths and the performance (pumping rate and drawdown) of the residential wells. The well survey data were evaluated to determine the potential for adverse impacts to the residential wells that could occur from the additional drawdown in the area due to increased pumping. The well survey data also serve as a baseline for evaluation of any potential future residential well impacts. A second well at the Jarrett site has also been discussed, but additional property will need to be obtained and test drilling will need to be performed to verify that suitable aquifer materials are present to support a second well at the site.

The wellhead protection area (WHPA) delineation and potential contamination source inventory (PCSI) have been revised in 2022. Revision of the WHPA delineation included development of a new groundwater flow model based on the sand and gravel thickness map that was discussed previously. The model allows us to simulate pumping at any location to help understand the potential capacity that can be developed and the resulting capture area and drawdown. Work on the WHP Management Plan is ongoing.

Recommendations for Further Exploration (September 2022)

In 2013, Layne recommended exploration of three areas west of Anderson along the White River. These areas are shown as areas L-1, L-2 and L-3 on Plate 1. A 1956 report by Shaeffer and Walton documents the results of test drilling in the eastern half of area L-1. Twenty test borings were completed to investigate potential radial collector well locations. The investigation did not identify suitable collector well locations west of Jackson Street. The borings were less than about 45 feet deep and do not define subsurface materials to depths necessary to evaluate the potential for vertical wells. However, drift thickness and sand and gravel thickness maps do not indicate that deeper aquifer materials are present in area L-1.

A 1957 report by Shaeffer and Walton documents the results of test drilling in the eastern half of area L-2. Twenty test borings were completed in the area of investigation. Boring depths ranged from 24 to 98 feet, below ground level (bgl). The boring logs indicate that the character of subsurface materials is highly variable throughout the area. Only two locations were identified as being worth additional investigation. The bottom of the sand and gravel aquifer at these

locations was at 50 and 62.5 feet, which is less than ideal for construction of high-capacity vertical tubular wells. Bedrock was encountered at six of the test boring locations at depths ranging from 24 to 56 feet, bgl. The area north of Layton Road and 8th Street could be worth additional exploration. The depth to bedrock is greater in this area and the logs of residential wells indicate sand and gravel thicknesses of over 30 feet at depths that would be favorable for installation of high-capacity vertical wells.

Area L-3 has not previously been explored. Residential well logs indicate stratification of aquifer materials, but zones of sand and gravel with adequate thickness and depth may be present, particularly in the area northeast of the intersection of County Road 600 West and 8th Street.

Prioritization of Sites for Exploration (September 2022)

In 2022, well construction and aquifer testing at the Fuller site should be completed. The site has the potential for a capacity of two to three million gallons per day or more depending on well performance and aquifer testing results.

If access agreements can be obtained, test borings at the Despar and Hall (west of the Welborn well) properties in the Lafayette Well Field area should be completed. These sites are close to existing raw water mains, which will simplify connection to the system if testing results are favorable.

Access agreements should be pursued for test drilling at the following properties:

- PAC Development, Cooper and Shank properties near the intersection of East 67th Street and S.R. 109.
- The western part of Area L-2
- Area L-3
- Doerr
- Biddle, Edge and Midwest Farms
- Colson
- Hill Top and surrounding parcels
- Moore/Flory/Graham property

Site-specific data on aquifer thickness and grain-sizes are lacking for these properties/areas. Investigation of these sites should be prioritized based on access, ease of connection to existing infrastructure and location relative to known future development plans.

Work Performed on Properties Recommended in 2022 (March 2024)

Below is a March 2024 update on the status of test drilling the properties recommended in the 2022 memo.

North of Anderson

Aquifer testing at the Fuller site has been completed. Well 1 was installed and tested on the Fuller property in October 2022 with a capacity of 2 MGD. A second well could be installed on the

Fuller property that could bring the capacity up to 4 MGD. The well print and well performance graph of Well 1 have been added to this memo.

Access has not been obtained to test drill the western part of L-2, L-3, or the Despar or Hall properties (west of Welborn well). If access agreements can be obtained for these properties or properties in the L-2, L-3 areas, test drilling is recommended.

South of Anderson

Test drilling of the area near PAC and Cooper properties is underway. Access was granted to three properties in the area and three test borings have been completed. Plate 2 has been updated with the completed test boring locations and the fourth location that has not yet been drilled. The two test borings at the PAC Development property did not identify sufficient aquifer material to warrant further testing. The well logs are attached. The proposed test boring on the northeastern Cooper property showed good formation from 55 to 80 feet. Formation samples were collected from this interval and sieve analysis results are pending as of this memo.

The remaining properties identified for further exploration in the 2022 memo listed above are located south of Anderson near cross-sections C-C', D-D', and E-E' as shown on Plate 2. To date, test drilling to the south of Anderson has been completed at the PAC Development, Cooper, and Beerbower properties, but no aquifer testing has been completed. If access agreements can be obtained for the additional properties, test drilling should be completed. Aquifer testing will be necessary to determine the potential yields from each area.

Recommendations for Additional Properties Evaluated In 2023/2024 (March 2024)

The properties identified for exploration in 2022 are located to the south of Anderson, or near existing infrastructure to the north. Fourteen additional properties/areas were identified by the City in 2023 and early 2024 and locations were forwarded to Eagon for evaluation. The properties have been added to Plate 2.

North of Anderson

- Miller,
- Smith/Anderson Parks,
- Selah,
- Swindell (near Tuxford),
- Denney (near Despar), and
- Hartman.

South of Anderson

- Bronnenberg,
- Anderson Aviation,
- Paintball/Whittaker,
- Conservation Club,
- Long and Adams,
- Cameron,

- Hisle, and
- Dream Bigger LLC.

North of Anderson

The Miller property is located within the mapped outwash aquifer system along the White River between Layne areas L-1 and L-2. Aquifer materials have been noted in the area to depths of 150 feet, bgl. Two test boring locations have been recommended on the Miller property. The two locations shown are toward the eastern side of the property (which is further away from the mapped bedrock high) and as close to White River as can be accessed.

The Smith/Anderson Parks properties are located west of the Miller property over a mapped bedrock topographic high and have some lower than ideal static water levels. Test drilling of the Smith/Anderson Parks properties is only recommended if test drilling on the Miller property indicates potential for either of these properties at shallower depths.

The Selah property is located approximately 0.5 miles east of the Miller property on the north side of the White River. An IDNR well on the Selah property shows 62 feet of sand and gravel from 28-90 feet, bgl (Well 316080). The golf course well to the east of this property shows 50 feet of gravel from 28-78 feet, bgl and was tested at 320 gpm. Other wells located nearby indicate depths to bedrock around 35 feet. This area has high bedrock topographic relief as indicated by the range in depths to bedrock (including near the Miller property further to the west). Test drilling is recommended due to the well on the property showing 62 feet of aquifer.

The Swindell property is adjacent to the Tuxford well. Rotary test holes completed on the property indicate relatively thick sand and gravel at sufficient depths for installation of production wells. A cable tool hole should be drilled on the Swindell property to confirm formation thickness and grain size. If access cannot be obtained to drill cable tool holes on the Swindell property, properties adjacent to the Swindell property should be tested.

A property immediately east of the Despar property, the Denney property, came up for sale in December 2023. The Denney/Despar properties are located north of the Jarrett well (Well 8) and both properties are recommended for test drilling.

Two Hartman properties are located on Route 9 directly east of the Hall property recommended for test drilling. The Hartman properties are east of the mapped aquifer in the area and located on a bedrock high. Test drilling is not recommended on the Hartman properties.

South of Anderson

The Bronnenberg property is located east of the Midwest Farms property. Cross-section C-C' goes through the Bronnenberg property. The residential well from the Bronnenberg property is a bedrock well that logged only clay from 20 feet to bedrock. Test drilling is not recommended on the Bronnenberg property.

The Anderson Aviation property is located along the White River to the east of Anderson. South of the Aviation property is Mounds State Park which has a well that reportedly operates continuously. The Anderson Aviation property is a good location for potential supply and is recommended for test drilling. However, due to potential contamination from the airport, water quality samples should be taken before pursuing a large-scale supply well.

The Paintball/Whittaker properties are located south of Anderson between the PAC Development and Shelton properties. The Paintball/Whittaker properties are located further west than the properties identified for exploration and, due to the lack of good formation at the PAC Development property, are not recommended for test drilling.

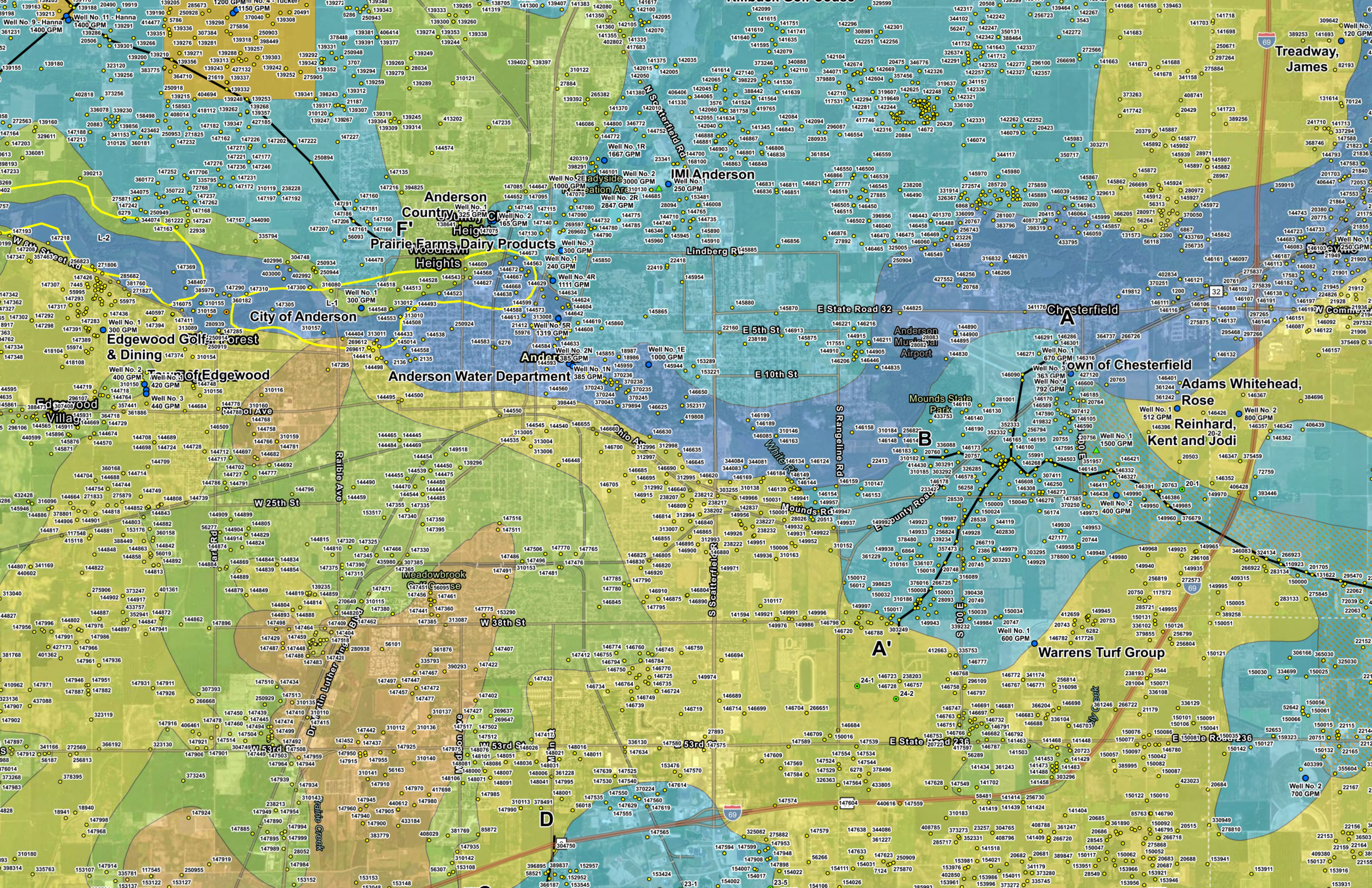
The Conservation Club (CC) property is located just south of the Beerbower property that was test drilled in 2019. Beerbower test borings 19-1 and 19-3 were located further east and showed more formation than 19-2. 19-3 is located approximately 200 feet north of the CC property line and showed a total of 20 feet of good formation. Test drilling is recommended for the CC property.

The Long and Adams properties are located to the east of the Conservation Club Property along the floodplain of Fall Creek. These properties are likely to exhibit the same artesian conditions as the CC/Beerbower properties if formation is present. If suitable formation is present on the CC property and a test/production well confirms sufficient yield from the aquifer, test drilling should progress easterly onto the Long and Adams properties.

The Cameron property is located approximately two miles east of the northernmost Cooper property outside of the mapped aquifer system. Well logs around the Cameron property do not show a significant thickness of sand and gravel. The Cameron property is not recommended for test drilling.

The Hisle property is about one mile east of the southernmost Cooper property. Well logs around the Hisle property do not show a significant thickness of sand and gravel. The Hisle property is not recommended for test drilling.

The Dream Bigger LLC property is located between cross-sections A-A’ and E-E’ to the southeast of the City. The sand and gravel deposits in this area are composed of regionally discontinuous intertill sands and a basal (on top of bedrock) sand. Two rotary test holes were completed on this property in 2024 and identified shallow and deep intertill sand and gravels and a basal sand and gravel. The basal sand is too thin (6 feet) to warrant additional exploration, but the upper and lower intertill sands were up to 18 feet and 33 feet thick, respectively. As of this memo, a cable tool hole is to be drilled at the property in order to confirm formation depths and to collect formation samples for grain-size analysis.


Well No. 11 - Hanna
1400 GPM
Well No. 9 - Hanna
1400 GPM
Well No. 4 - Tucker
1150 GPM
Well No. 1R
1667 GPM
Well No. 2E
1000 GPM
Well No. 2
3000 GPM
Well No. 2R
2847 GPM
Well No. 1
250 GPM
IMI Anderson
Anderson Country Club
Well No. 1
325 GPM
Well No. 2
165 GPM
Well No. 3
300 GPM
Well No. 1
240 GPM
Well No. 4R
1111 GPM
Well No. 1
300 GPM
Well No. 5R
1319 GPM
Well No. 2N
385 GPM
Well No. 1N
385 GPM
Well No. 1E
1000 GPM
Anderson Water Department
Prairie Farms Dairy Products
Woodlawn Heights
City of Anderson
Edgewood Golf Forest & Dining
Town of Edgewood
Well No. 2
400 GPM
Well No. 1
420 GPM
Well No. 3
440 GPM
Edgewood Village
Lindberg Rd
E State Road 32
E 5th St
E 10th St
Anderson Municipal Airport
Mounds State Park
Mounds Rd
Chesterfield
Well No. 1
670 GPM
Well No. 3
363 GPM
Well No. 4
792 GPM
Town of Chesterfield
Adams Whitehead, Rose
Well No. 1
512 GPM
Well No. 2
800 GPM
Reinhard, Kent and Jodi
Well No. 2
400 GPM
Well No. 1
1500 GPM
Well No. 1
600 GPM
Warrens Turf Group
Well No. 2
700 GPM
Treadway, James
N Scatterfield Rd
S Scatterfield Rd
S Rangeline Rd
E County Road 236
W 38th St
W 53rd St
W 25th St
Raible Ave
Meadowbrook Dr
Dr Martin Luther King Jr Blvd
Prairie Creek
Pipe Creek
Ohio Ave
White River
A
A'
B
C
C'
D
F
F'
L-1
L-2
69
32
20-1
20-2
23-1
23-5
24-1
24-2

Well No. 9 - Hanna
1400 GPM
Well No. 11 - Hanna
1400 GPM
Well No. 10 - Tucker
1200 GPM
Treadway, James
Well No. 1
120 GPM
Well No. 1R
1667 GPM
Well No. 2E
1000 GPM
Well No. 2
3000 GPM
Well No. 1
250 GPM
Well No. 2R
2847 GPM
IMI Anderson
Well No. 1
325 GPM
Well No. 2
165 GPM
F'
Anderson Country Club
Prairie Farms Dairy Products
Well No. 1
240 GPM
Well No. 3
300 GPM
Well No. 4R
1111 GPM
Well No. 5R
1319 GPM
Rosen
L-2
Smith, Stephen R. and Barbara Jean
City of Anderson Park Department
Miller, Anthony D.
SELAH PROPERTIES LLC
City Property near WTP
L-1
Well No. 1
300 GPM
City Property near WTP
City Property near WTP
City Property near WTP
City of Anderson
Carter
Edgewood Golf & Dining
Well No. 1
300 GPM
Anderson Water Department
Well No. 1N
385 GPM
Well No. 2N
385 GPM
Well No. 1E
1000 GPM
City of Anderson Aviation Division
A
Well No. 4
792 GPM
Well No. 1
670 GPM
Well No. 3
363 GPM
Town of Chesterfield
Town of Edgewood
Well No. 1
420 GPM
Well No. 2
400 GPM
Well No. 3
440 GPM
Well No. 1
512 GPM
Well No. 2
800 GPM
Anderson Innovations Center
Reinhard, Kent and
Warrens Turf Group
Well No. 1
1500 GPM
20-2
Jackson/Caron
20-1
B
Adams Whitehead, Rose
Well No. 2
400 GPM
IOUE Local #1
Houchins
Indiana Municipal Power
A'
DREAM BIGGER LLC
24-1
24-2
Well No. 1
600 GPM
Warrens Turf Group
Well No. 2
700 GPM
Orebaugh
Anderson Land Venture
Orebaugh
D Q Rentals
Saur
Anderson Land Venture
Canada
Dale
Dale
McGinnis
D
PAC Development
23-1
Cooper
Main Corp
Cooper
CAMERON ROBERT D

BASTIN LOGAN WATER SERVICES INC.

1010 HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Beerbower Test Well 19-3

X	TEST	DATE	2-19-19	State	Indiana	Project	4497-F
		Well No	19-3	City	Anderson	Section	7
	PERMANENT	UTM 16T	0615254	County	Madison	Township	18N
		UTM	4430758	Civil Twsp		Range	8E

OWNER	City of Anderson
LAND DESCRIPTION	105' north of CR600S
Street or Road	120' south of Fish Creek

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top soil	0	1	1	
Brown clay	1	4	3	
Soft brown clay	4	9	5	
Brown clay	9	12	3	17'6" above
Sand and gravel w/clay	12	19	7	
Gray clay w/gravel	19	72	53	
Hard brown clay	72	75	3	
Soft brown clay w/gravel	75	77	2	
Fine medium coarse sand & gravel	77	82	5	
Fine medium coarse sand & gravel-lg rocks 2-3"	82	87	5	
Fine medium coarse sand & gravel	87	91	4	
Gravel w/gray clay	91	94	3	
Gray clay w/gravel	94	99	5	
Gray clay w/gravel	99	101	2	
Fine medium coarse sand & gravel-lg rocks 2-3"	101	106	5	
Limestone	106	108	2	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing 6 5/8" OD from 5' above grade to 100' below grade.

Screen 5" set from 96' to 106' feet Weight

Make Shop Type PVC Slot .030

Pumping test GPM drawdown to feet after hours pumping.

Driller Rex Bussinger
License #768 WD PI

BASTIN LOGAN WATER SERVICES INC.

1010 HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Beerbower Test Well 19-1

X	TEST	DATE	3-6-19	State	Indiana	Project	4497-F
		Well No	19-1	City	Anderson	Section	7
	PERMANENT	UTM 16T	0615352	County	Madison	Township	18N
		UTM	4430911	Civil Twsp		Range	8E
OWNER		City of Anderson					
LAND DESCRIPTION		160' west of east property line - 381' north of Fall Creek					
Street or Road		1137' west of S.R. 109					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top soil	0	1	1	
Brown clay	1	6	5	
Brown clay w/boulders	6	9	3	
Brown clay w/ gravel	9	11	2	
Hard gray clay w/gravel	11	52	41	22'6"
Gray clay w/ gravel	52	71	19	Above Grade
Fine medium coarse sand-fine gravel-				
traces of clay	71	78	7	
Fine medium coarse sand & gravel-boulders	78	83	5	
Fine medium coarse sand & gravel-lg rocks 1-2"	83	88	5	
Fine medium coarse sand & gravel-lg rocks 2-3"	88	93	5	
Fine medium coarse sand & gravel-				
large rocks 2-3"-traces of clay	93	98	5	
Fine mediium coarse sand & gravel-lg rocks-2-3"	98	103	5	
Fine medium coarse sand & gravel-lg rocks 2-3"	103	106	3	
Limestone	106	108	2	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing 6 5/8" OD from 5' above grade to 99' below grade.

Screen 5" set from 94' to 104' feet Weight 18-97

Make Shop Type PVC Slot .030

Pumping test GPM drawdown to _____ feet after _____ hours pumping.

Driller: Rex Bussinger
License #768 WD PI

BASTIN LOGAN WATER SERVICES INC.

1010 HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson Test well 19-2

X	TEST	DATE	3-19-19	State	Indiana	Project	
		Well No	19-2	City		Section	
	PERMANENT	UTM 16T	0615124	County		Township	
		UTM	4430937	Civil Twsp		Range	
OWNER		City of Anderson					
LAND DESCRIPTION		251' North of Fall Creek 1791' West of SR109					
Street or Road		735' North of E 600S. 714' West of TH 19-1					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top Soil	0	1	1	
Brown Clay	1	8	7	
Brown clay with boulders	8	11	3	
Brown clay with gravel	11	13	2	22'6"
Gravel (sharp)	13	17	4	above
Gray clay with gravel	17	79	62	grade
Hard gray clay	79	87	8	
Fine coarse sand & gravel	87	89	2	
Gray clay	89	92	3	
Gray clay with gravel	92	99	7	
Gray clay, boulders	99	101	2	
Fine coarse sand & gravel ,boulders	101	105	4	
Gray clay	105	107	2	
limestone	107	109	2	

Hole 6 dia Drilled by Cable tool

Rotary Hole Grouted with

Casing 6 5/8 OD from 5' above grade to 99' below grade.

Screen 5" set from 96' 106' feet Weight 18.97

Make Shop Type PVC Slot 1030

Pumping test _____ GPM drawdown to _____ feet after _____ hours pumping.

Driller Rex Bussinger

BASTIN LOGAN WATER SERVICES INC.

1010 HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Bitar Property - Test Well 20-1 (Anderson Innovations)

X	TEST	DATE	1-28-20	State	Indiana	Project	4670-F
		Well No	20-1	City	Anderson	Section	14
	PERMANENT	UTM 16T	0621348	County	Madison	Township	19N
		UTM	4439672	Civil Twsp		Range	8E
OWNER		City of Anderson					
LAND DESCRIPTION		304' south of north property line					
Street or Road		186' west of C.R. 1000W					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Black clay	0	7	7	
Rocks and boulders	7	10	3	
Sand & gravel w/clay	10	17	7	
Gray clay	17	23	6	
Fine medium coarse sand & gravel	23	25	2	
Gray clay w/gravel	25	32	7	
Fine medium coarse sand & gravel	32	34	2	
Gray clay w/ gravel	34	78	44	
Sandy gray clay w/ gravel	78	87	9	
Soft sandy gray clay	87	100	13	
Soft silty gray clay	100	104	4	
Fine medium coarse sand & gravel w/clay	104	108	4	
Brown clay	108	111	3	
Fine medium coarse sand & gravel-boulders	111	116	5	
Fine medium coarse sand & gravel	116	121	5	
Brown clay	121	125	4	
Shale	125	127	2	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing _____ OD from _____ above grade to _____ below grade.

Screen _____ set from _____ to _____ feet Weight _____

Make _____ Type _____ Slot _____

Pumping test GPM drawdown to _____ feet after _____ hours pumping.

Driller REX BUSSINGER
LICENSE # 768 WD PI

BASTIN LOGAN WATER SERVICES INC.

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(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Bitar Property - Test Well 20-2 (Anderson Innovations)

X	TEST	DATE	3-13-20	State	Indiana	Project	4670-F
		Well No	20-2	City	Anderson	Section	14
	PERMANENT	UTM 16T	0621021	County	Madison	Township	19N
		UTM	4439035	Civil Twsp		Range	8E
OWNER		City of Anderson					
LAND DESCRIPTION		119' east of west property line					
Street or Road		326' north of CR E100S					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Soft black clay	0	5	5	
Soft sandy gray clay w/gravel	5	11	6	
Gray clay w/gravel	11	14	3	
Fine medium coarse sand & gravel-lg rocks 2-3"	14	17	3	
Hard packed gravel	17	22	5	
Gray clay w/gravel	22	28	6	
Fine medium coarse sand & gravel	28	30	2	
Gray clay w/gravel	30	49	19	
Brown clay w/ gravel	49	74	25	
Hard gray clay w/gravel	74	78	4	
Brown clay w/ gravel	78	91	13	
Hard brown clay w/ boulders	91	96	5	
Brown clay w/ gravel	96	105	9	
Hard brown clay	105	108	3	
Hard brown clay w/gravel	108	124	16	
Soft sandy brown clay	124	152	28	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing _____ OD from _____ above grade to _____ below grade.

Screen _____ set from _____ to _____ feet Weight _____

Make _____ Type _____ Slot _____

Pumping test GPM drawdown to _____ feet after _____ hours pumping.

Driller: Rex Bussinger
License # 768 WD PI

BASTIN LOGAN WATER SERVICES INC.

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FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Bitar Property - Test Well 20-2 (Anderson Innovations)

X TEST	DATE	3-13-20	State	Indiana	Project	4670-F
	Well No	20-2	City	Anderson	Section	14
PERMANENT	UTM 16T	0621021	County	Madison	Township	19N
	UTM	4439035	Civil Twsp		Range	8E
OWNER	City of Anderson					
LAND DESCRIPTION	119' east of west property line					
Street or Road	326' north of CR E100S					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Hard brown clay	152	172	20	
Hard gray clay	172	177	5	
Limestone	177	179	2	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing _____ OD from _____ above grade to _____ below grade.

Screen _____ set from _____ to _____ feet Weight _____

Make _____ Type _____ Slot _____

Pumping test GPM drawdown to _____ feet after _____ hours pumping.

Driller: Rex Bussinger
License # 768 WD PI

BASTIN LOGAN WATER SERVICES INC.

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FAX (317) 738-9295

Well Formation Log

City of Anderson - Test Well 22-1 (Fuller)

X	TEST	DATE	1-6-22	State	Indiana	Project	4971-F
		Well No	22-1	City	Anderson	Section	5
	PERMANENT	UTM 16T	0613914	County	Madison	Township	20N
		UTM	4452909	Civil Twsp		Range	8E
OWNER		City of Anderson					
LAND DESCRIPTION		200' S of CR800 W - 1,082' E of SR 9					
Street or Road		225' E of W Property Line					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top soil	0	1	1	
Gray clay w/ gravel	1	10	9	
Fine medium coarse sand & gravel	10	15	5	
Gray clay	15	16	1	
Fine medium coarse sand & gravel w/clay	16	19	3	1'6"
Sandy gray clay	19	61	42	Above Grade
Very sandy gray clay w/ gravel	61	68	7	
Fine medium coarse sand-fine to coarse gravel	68	75	7	
Fine medium coarse sand-fine to coarse gravel-				
large rocks - 2-3"	75	78	3	
Fine medium sand-trace of fine to med gravel-				
trace of clay	78	81	3	
Sandy gray clay w/ gravel	81	88	7	
Fine medium coarse sand-some fine to coarse				
gravel - boulders	88	92	4	
Boulders	92	98	6	

Hole	6"	dia	Drilled by	Cable Tool			
Rotary Hole Grouted with							
Casing	6 5/8"	OD from	3'	above grade to	130'	below grade.	
Screen	5"	set from	128'	to 133'	feet	Weight	18.97
Make	Shop	Type	PVC	Slot	.020		
Pumping test		GPM drawdown to		feet after		hours pumping.	

Driller

BASTIN LOGAN WATER SERVICES INC.

1010 N. HURRICANE ROAD
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FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - Test Well 22-1 (Fuller)

X	TEST	DATE	1-6-22	*State*	Indiana	*Project*	4971-F
		Well No	22-1	*City*	Anderson	*Section*	5
	PERMANENT	UTM 16T	0613914	*County*	Madison	*Township*	20N
		UTM	4452909	*Civil Twsp*		*Range*	8E

OWNER	City of Anderson
LAND DESCRIPTION	200' S of CR800 W - 1,082' E of SR 9
Street or Road	225' E of W Property Line

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Fine medium coarse sand & gravel	98	103	5	
Fine medium coarse sand-fine to coarse gravel	103	108	5	
Fine medium coarse sand - fine gravel	108	113	5	
Fine medium coarse sand-fine to coarse gravel-				
large rocks-boulders	113	119	6	
Fine medium coarse gravel-medium to coarse				
sand	119	124	5	
Fine medium coarse gravel-medium to coarse				
sand - large rocks 2-3"	124	129	5	
Fine medium coarse sand & gravel	129	133	4	
Sandy gray clay	133	134	1	
Limestone	134	136	2	

Hole 6" dia **Drilled by** Cable Tool

Rotary Hole Grouted with

Casing 6 5/8" **OD from** 3' **above grade to** 130' **below grade.**

Screen 5" **set from** 128' **to** 133' **feet** **Weight** 18.97

Make Shop **Type** PVC **Slot** .020

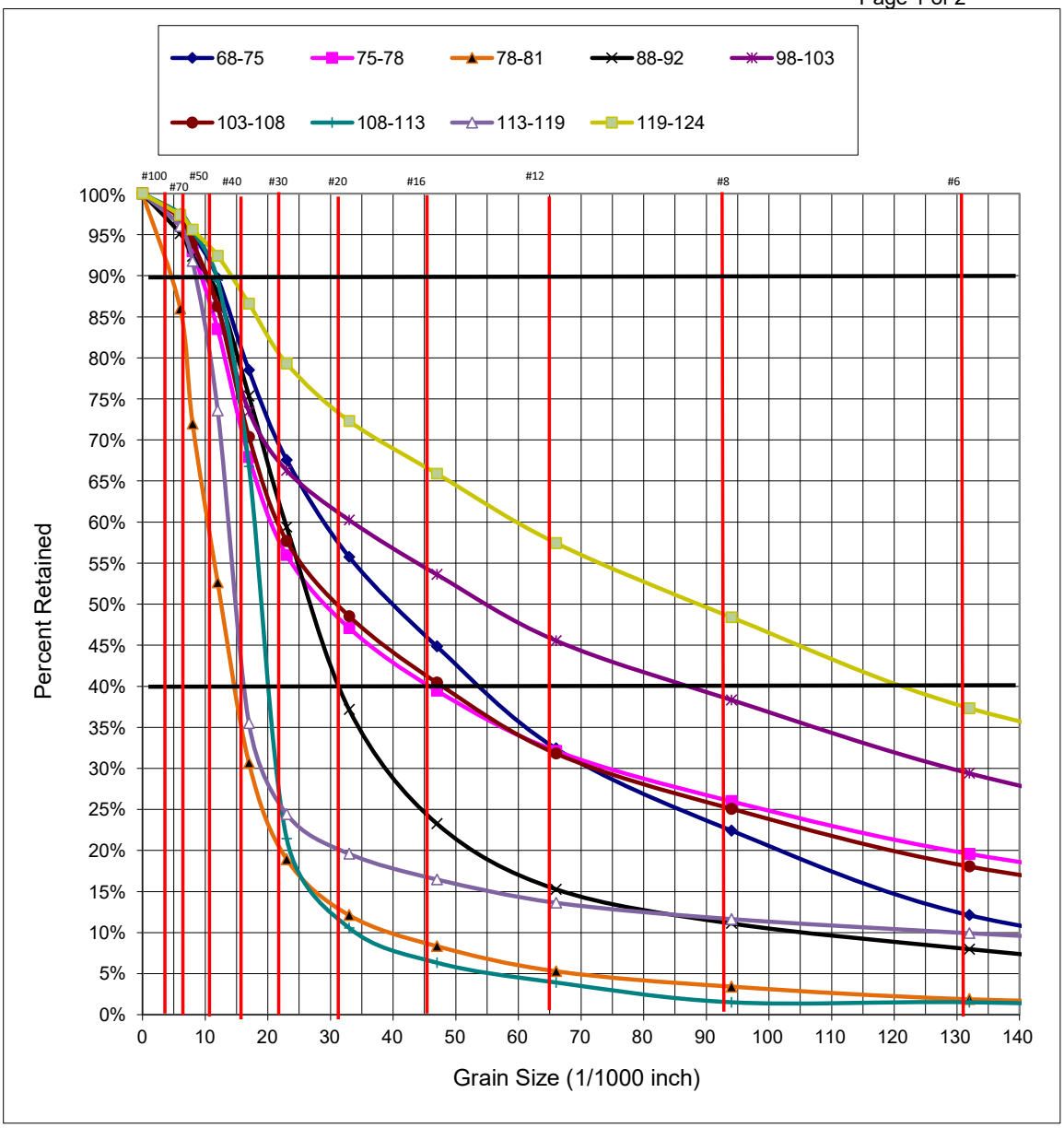
Pumping test _____ **GPM drawdown to** _____ **feet after** _____ **hours pumping.**

Driller Rex Bussinger
License #768 WD PI

Johnson Screens
651-636-3900

Johnson Screens

SAND ANALYSIS



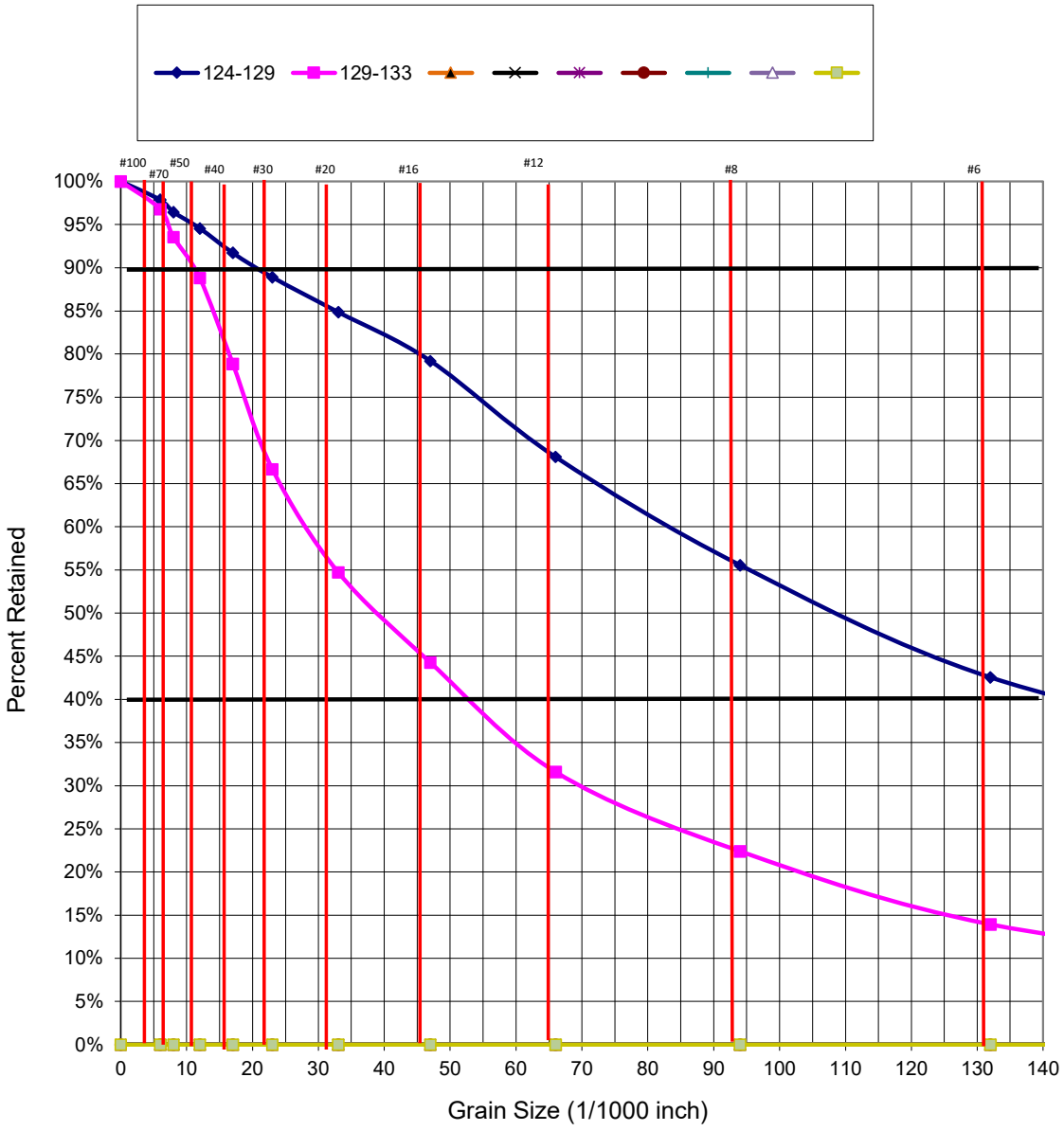
Job Name	City of Anderson TW22-1 (Fuller)	Sample ID	011122-11
Location	Anderson, IN	Analyzed by:	Duvall, Steven
Driller	Bastin Logan	Date:	1/11/2022
Casing ϕ	24 in	Desired Yield	1000+ GPM
Screen ϕ	24 TEL	SWL (ft)	1" to 6" above grade

Recommended Slot Size	50 slot (0.050") 71'-77' & 101'-107', 15 slot (0.015") 107'-122', 100 slot (0.100") 122'-128', 50 slot (0.050") 128'-133' bgs.
Recommended Gravel Pack	Natural Development

Based exclusively on the samples provided by the contractor, a sieve analysis graph and suggested screen slot size is provided as requested. Since numerous construction considerations and site circumstances influence successful well completion, Johnson Screens assumes no responsibility for final well performance nor awareness of local regulations pertaining to well installations.

Prepared by:Duvall, Steven

Send Samples to 1950 Old Highway 8, New Brighton, MN 55112



Job Name City of Anderson TW22-1 (Fuller)
Location Anderson, IN
Driller Bastin Logan

Sample ID 011122-11
Analyzed by: Duvall, Steven
Date: 1/11/2022

Casing ϕ 24 in
Screen ϕ 24 TEL

Desired Yield 1000+ GPM
SWL (ft) 1" to 6" above grade

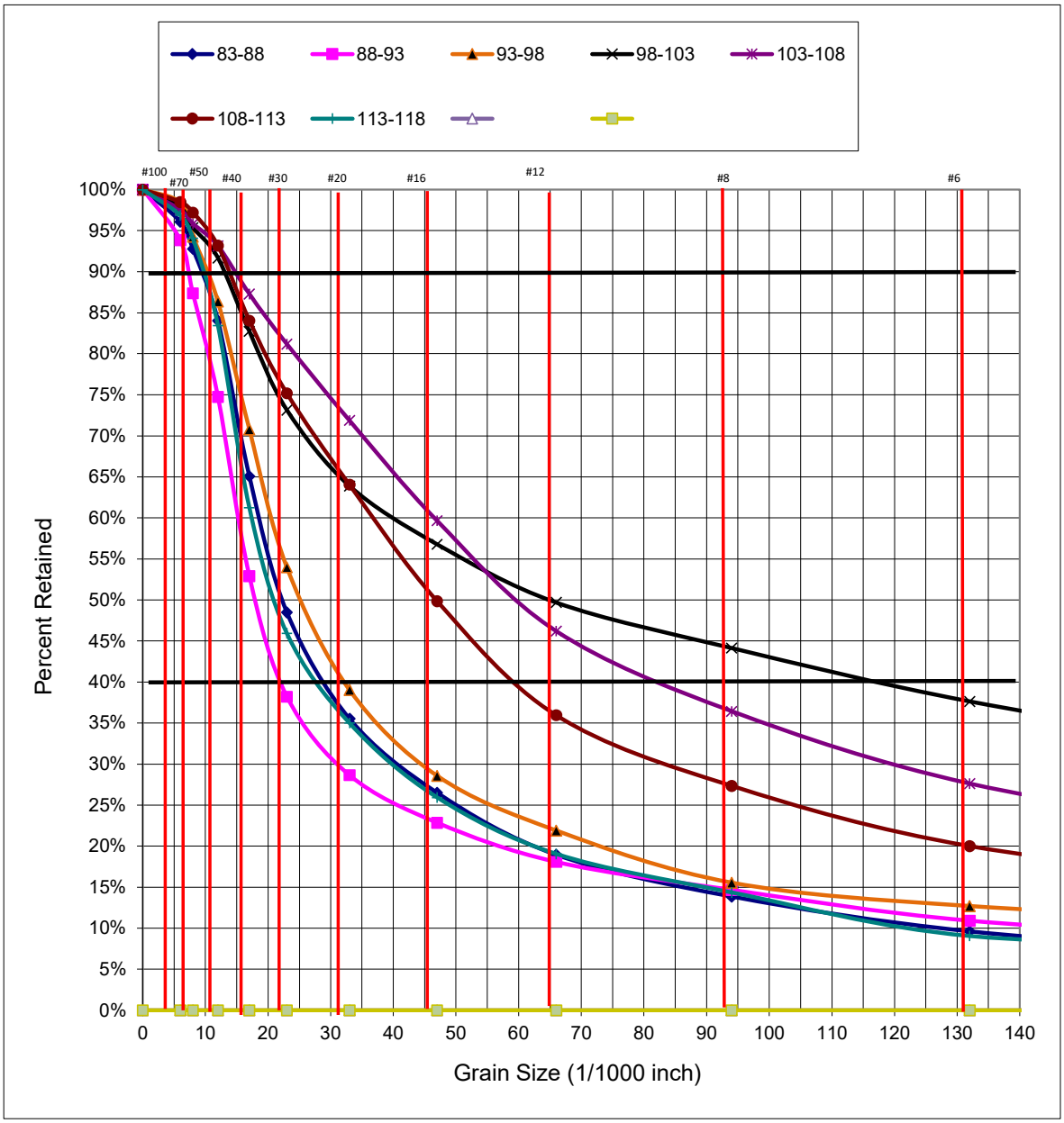
Recommended Slot Size See page 1 of 2.
Recommended Gravel Pack Natural Development

Based exclusively on the samples provided by the contractor, a sieve analysis graph and suggested screen slot size is provided as requested. Since numerous construction considerations and site circumstances influence successful well completion, Johnson Screens assumes no responsibility for final well performance nor awareness of local regulations pertaining to well installations.

Johnson Screens
651-636-3900

Johnson Screens

SAND ANALYSIS



Job Name City of Anderson TW22-2 (Fuller)
Location Anderson, IN
Driller Bastin Logan

Sample ID 012822-7
Analyzed by: Duvall, Steven
Date: 1/31/2022

Casing ϕ 16 in
Screen ϕ 16 in

Desired Yield 1000+ GPM
SWL (ft) 6

Recommended Slot Size 60 slot (0.060") 88'-118' bgs.
Recommended Gravel Pack Red Flint #60

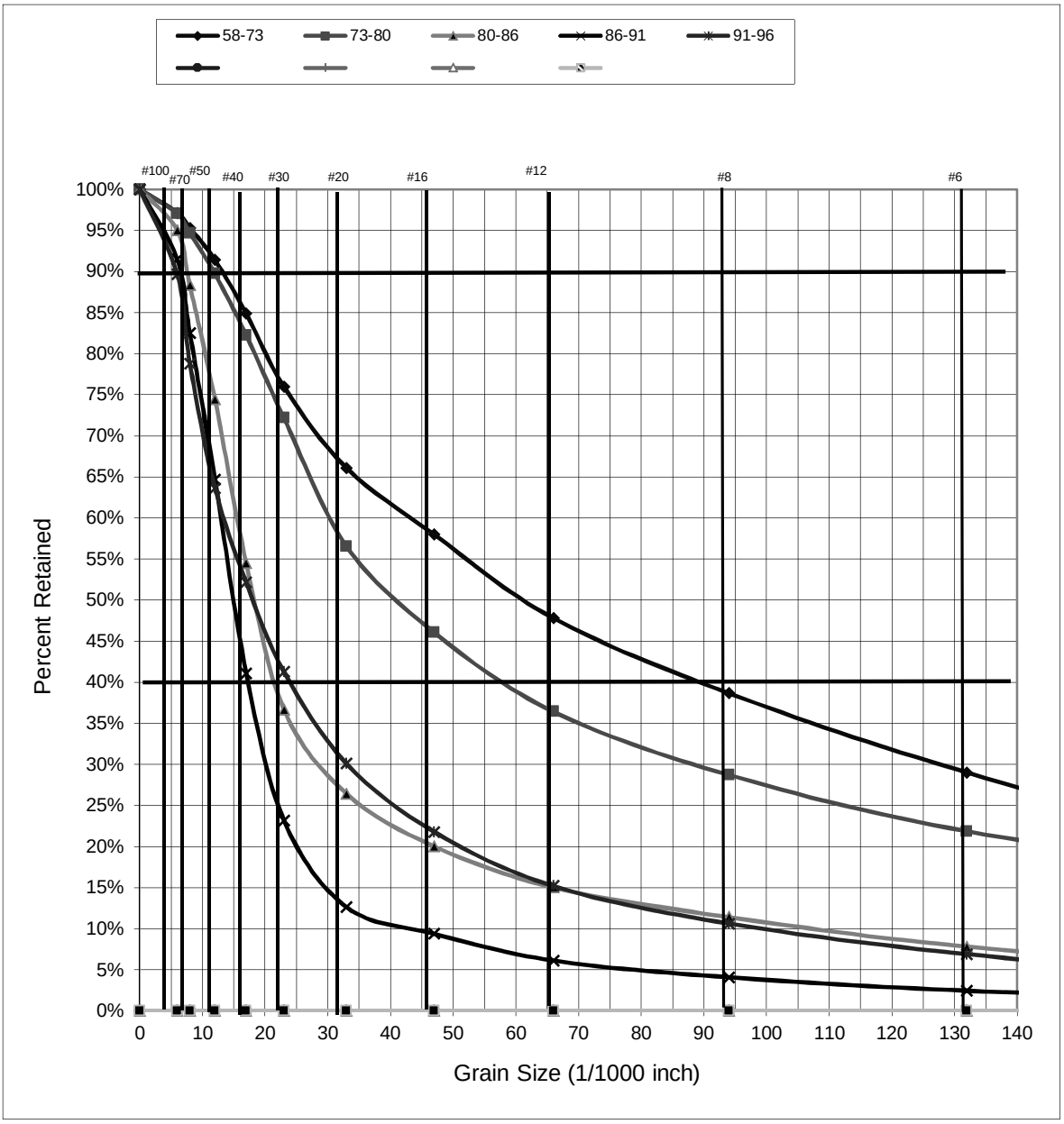
Based exclusively on the samples provided by the contractor, a sieve analysis graph and suggested screen slot size is provided as requested. Since numerous construction considerations and site circumstances influence successful well completion, Johnson Screens assumes no responsibility for final well performance nor awareness of local regulations pertaining to well installations.

Prepared by:Duvall, Steven

Send Samples to 1950 Old Highway 8, New Brighton, MN 55112

Johnson Screens
651-636-3900

SAND ANALYSIS



Job Name City of Anderson - TW 17-2 (Hanna Well 2) Sample ID 032317-3
Location Analyzed by: Al Smith, 651-638-3160
Driller BASTIN LOGAN Date: 3/23/2017
3/8" & Larger Removed
Casing ϕ Yield 1200 GPM
Screen ϕ SWL (ft)

Recommended Slot Size 50 Slot From 95' - 125'
Recommended Gravel Pack #60 Well Slot Red Flint Gravel Pack

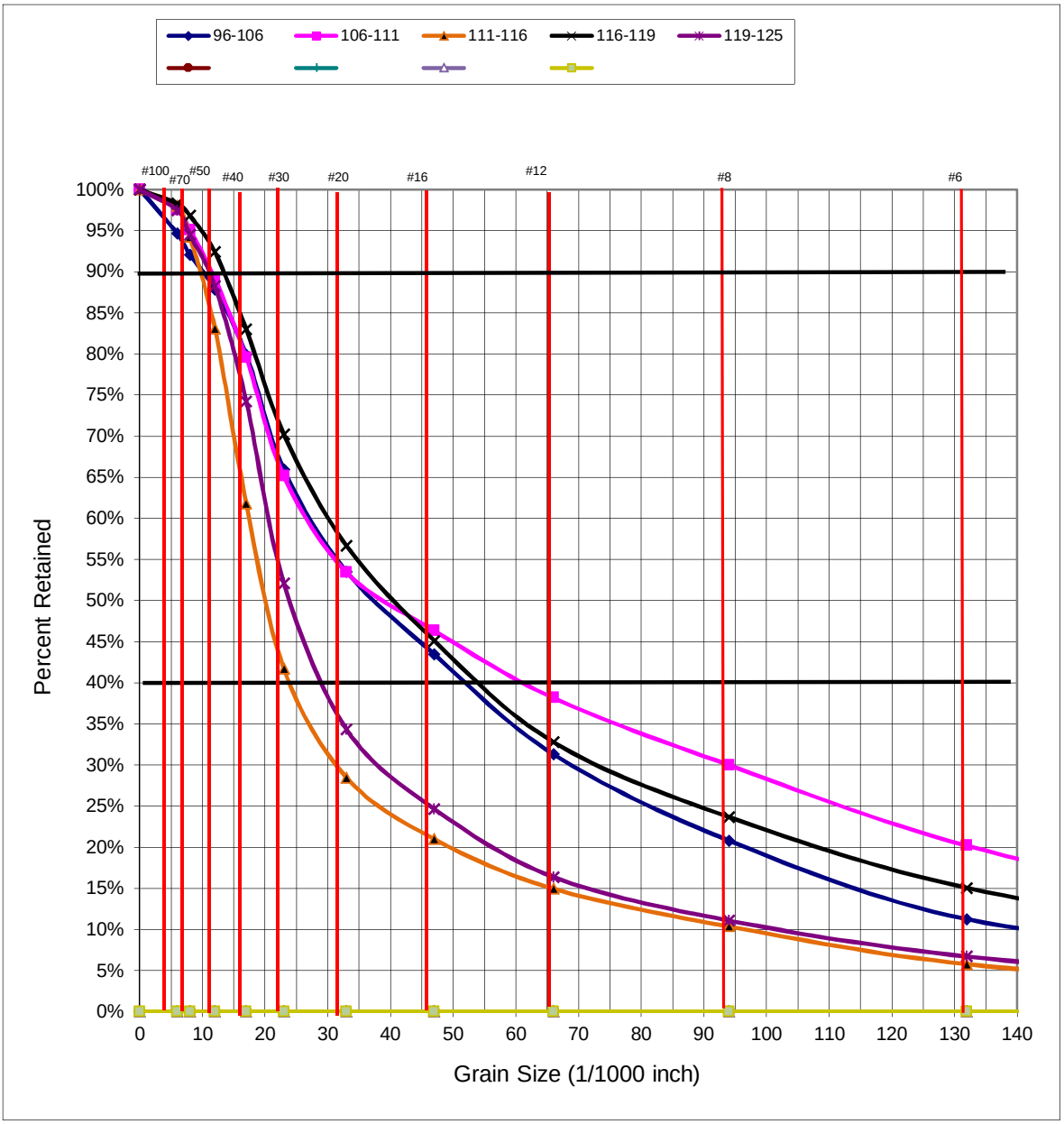
Based exclusively on the samples provided by the contractor, a sieve analysis graph and suggested screen slot size is provided as requested. Since numerous construction considerations and site circumstances influence successful well completion, Johnson Screens assumes no responsibility for final well performance nor awareness of local regulations pertaining to well installations.

Prepared by:Smith, Albert J

Send Samples to 1950 Old Highway 8, New Brighton, MN 55112

Johnson Screens
651-636-3900

SAND ANALYSIS



Job Name City of Anderson - TW 17-2 (Hanna Well 2) Sample ID 032317-3
Location Analyzed by: Al Smith, 651-638-3160
Driller BASTIN LOGAN Date: 3/23/2017
3/8" & Larger Removed
Casing ϕ Yield 1200 GPM
Screen ϕ SWL (ft)

Recommended Slot Size 50 Slot From 95' -125'
Recommended Gravel Pack #60 Well Slot Red Flint

Based exclusively on the samples provided by the contractor, a sieve analysis graph and suggested screen slot size is provided as requested. Since numerous construction considerations and site circumstances influence successful well completion, Johnson Screens assumes no responsibility for final well performance nor awareness of local regulations pertaining to well installations.

Prepared by:Smith, Albert J

Send Samples to 1950 Old Highway 8, New Brighton, MN 55112

BASTIN LOGAN WATER SERVICES INC.

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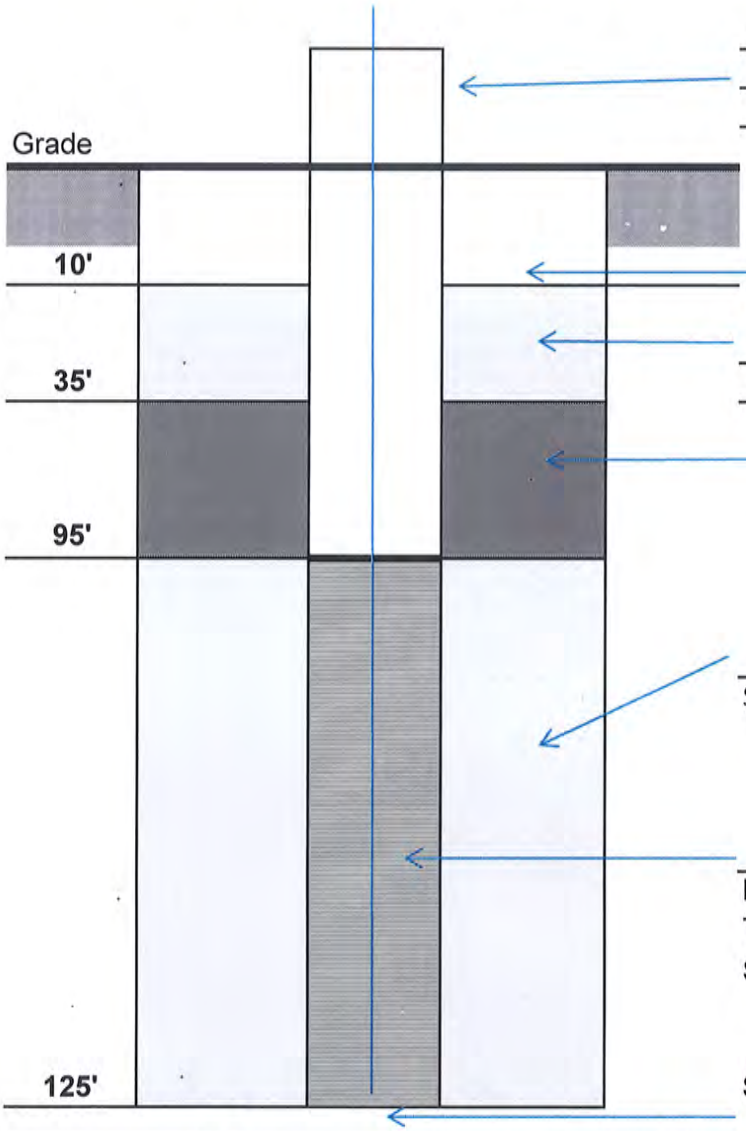
City of Anderson - Equestrian Well - Gravel Wall Well Print (Hanna Well 2)

Customer	City of Anderson	Gravel Wall Well #	Hanna/Equestrian
Date	8/10/2022	County	Madison
Job#	5038-F	Twsp	20N
Location	Equestrian Well Field	Section	29
Tower Height	520' S of CR300N 128' W of E property Line	Range State	7E Indiana



Steel Casing
.500" Wall Thickness
2'6" Above Grade

Pea Fill Backfill Material

Bentonite seal from
35' to 10'

Formation Stabilizer

50' ft of silica gravel
Size .060

30'- 0"
Make Johnson
Type SSWW
Slot .050"

Stainless steel bottom plate

Specific Capacity	60.5	Static level	54.98
Drawdown	28.57	pumped	1,731
GPM at a	83.55	pumping level for	
24 hours.			

Fill used from bottom up	
Silica gravel	125' - 74'
Fill from	
Form. Stabil.	74'-35'
Bentonite seal	35'-10'

Driller:	Jim Parsley - License # 2058 WD PI	Date:	8/10/2022

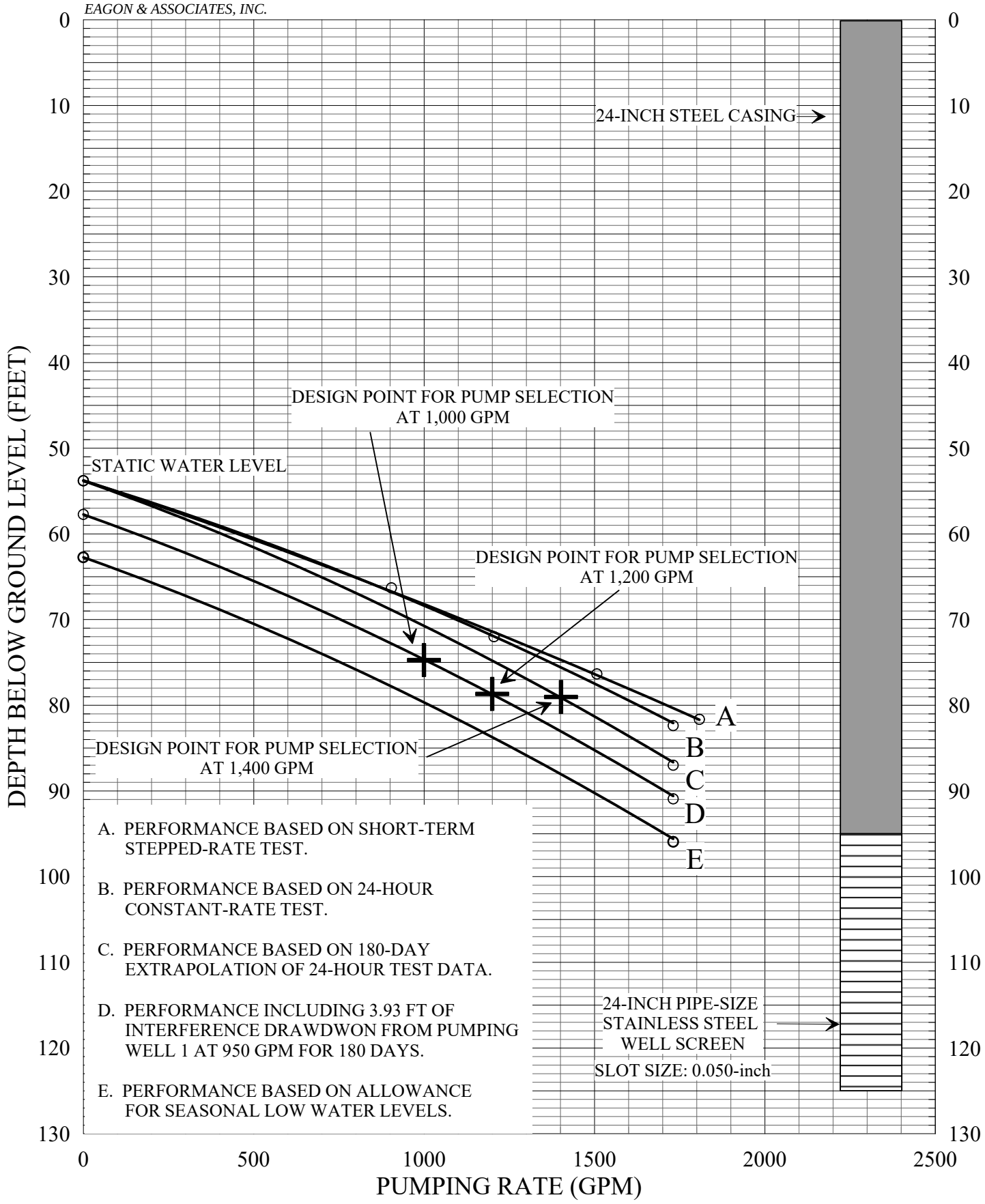


FIGURE 11. WELL PERFORMANCE CURVES FOR HANNA WELL 2
ANDERSON, INDIANA

Anderson\Hanna\Hanna 2 Perf.grf
9/22/22

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Well Formation Log

City of Anderson - Tucker #2

	TEST	DATE	5-12-22	State	Indiana	Project	5038-F
		Well No	Tucker #2	City	Anderson	Section	34
X	PERMANENT	UTM 16T	0608430	County	Madison	Township	20N
		UTM	4445127	Civil Twsp	Lafayette	Range	7E
OWNER		City of Anderson					
LAND DESCRIPTION		100' south of C.R. 300N					
Street or Road		100' west of east property line					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top soil	0	3	3	
Brown clay	3	14	11	
Gray clay with gravel	14	19	5	
Sand and gravel	19	21	2	
Gray clay w/gravel	21	29	8	
Gray clay	29	62	33	
Gray clay w/strips of gravel	62	71	9	
Fine medium coarse sand & gravel	71	76	5	
Gray clay with gravel	76	96	20	
Fine medium coarse sand w/fine to coarse gravel	96	101	5	
Fine medium coarse sand & gravel	101	106	5	
Fine medium coarse sand & gravel	106	111	5	
Fine medium coarse sand & gravel	111	114	3	
Gray clay w/gravel	114	118	4	
Fine medium coarse sand & gravel-lg rocks1-2"	118	125	7	

Hole	54" x 24"	dia	Drilled by	Reverse Circulation			
Rotary Hole Grouted with		Bentonite					
Casing	24"	OD from	3'	above grade to	97'	below grade.	
Screen	24" PS	set from	97'	to 125'	feet	Weight	125.61
Make	Johnson	Type	SSWW-Hi Flow	Slot	.080		
Pumping test	1623	GPM drawdown to	92.3	feet after	24	hours pumping.	

Driller	Rex Bussinger License # 768 WD PI

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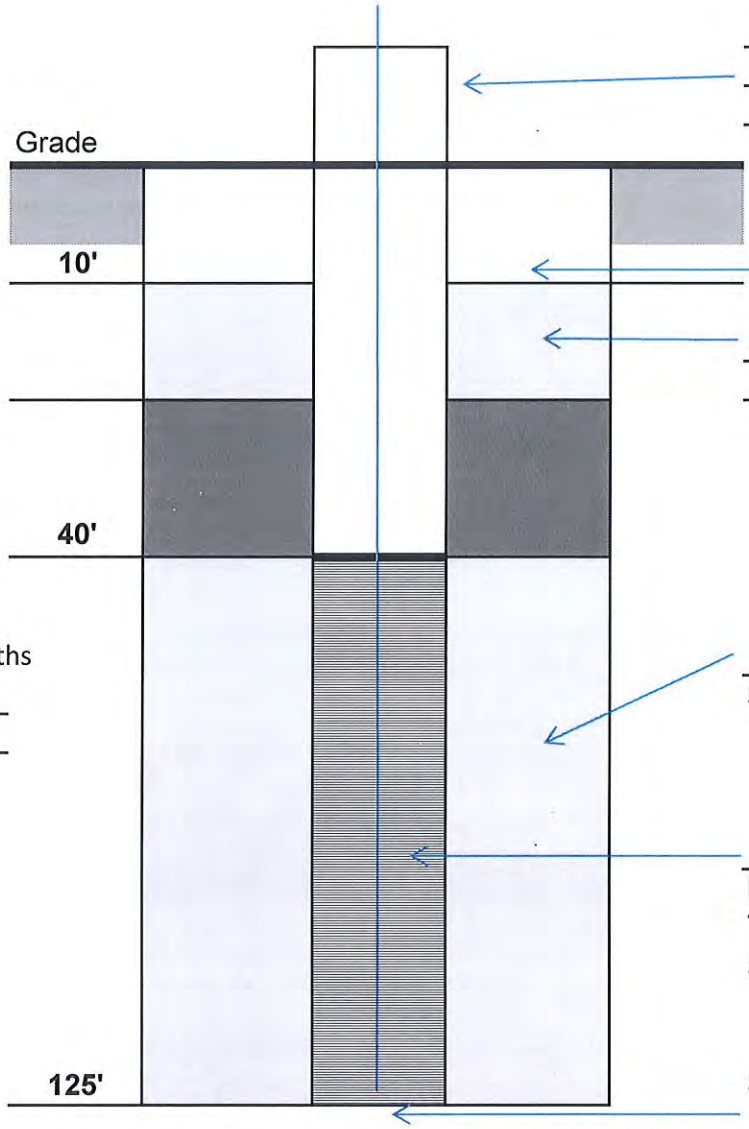
(317) 738-4577
FAX (317) 738-9295

City of Anderson - Tucker Well #2 - Gravel Wall Well Print

Customer	City of Anderson	Gravel Wall Well #	2
Date	4/21/2022	County	Madison
Job#	Tucker #2	Twsp	Lafayette
Location	100' W of E Property Line - 100' S of CR300N	Section	34
Tower Height	N/A	State	Indiana



24" Steel Casing
.50" Wall Thickness
2'6" Above Grade

Backfill Material

Bentonite seal from 40' to 10'

Pipe Lengths
1 - 5'
4 - 22'

85'
~~81'~~ ft of silica gravel
Size .090

28'
Make Johnson Screen
Type Stainless Steel
Slot .080

Stainless steel bottom plate

Specific Capacity	34.5	Static level	45.39
Drawdown	46.91	pumped	1,623
GPM at a	92.3	pumping level for	
24 hours.			

Fill used from bottom up	
Silica gravel	125' - 40'
Fill from	
Form. Stabil.	None
Bentonite seal	40' - 10'

Driller:	Jim Parsley - 2058 WD PI	Date:	4/21/2022

FIGURE 4.

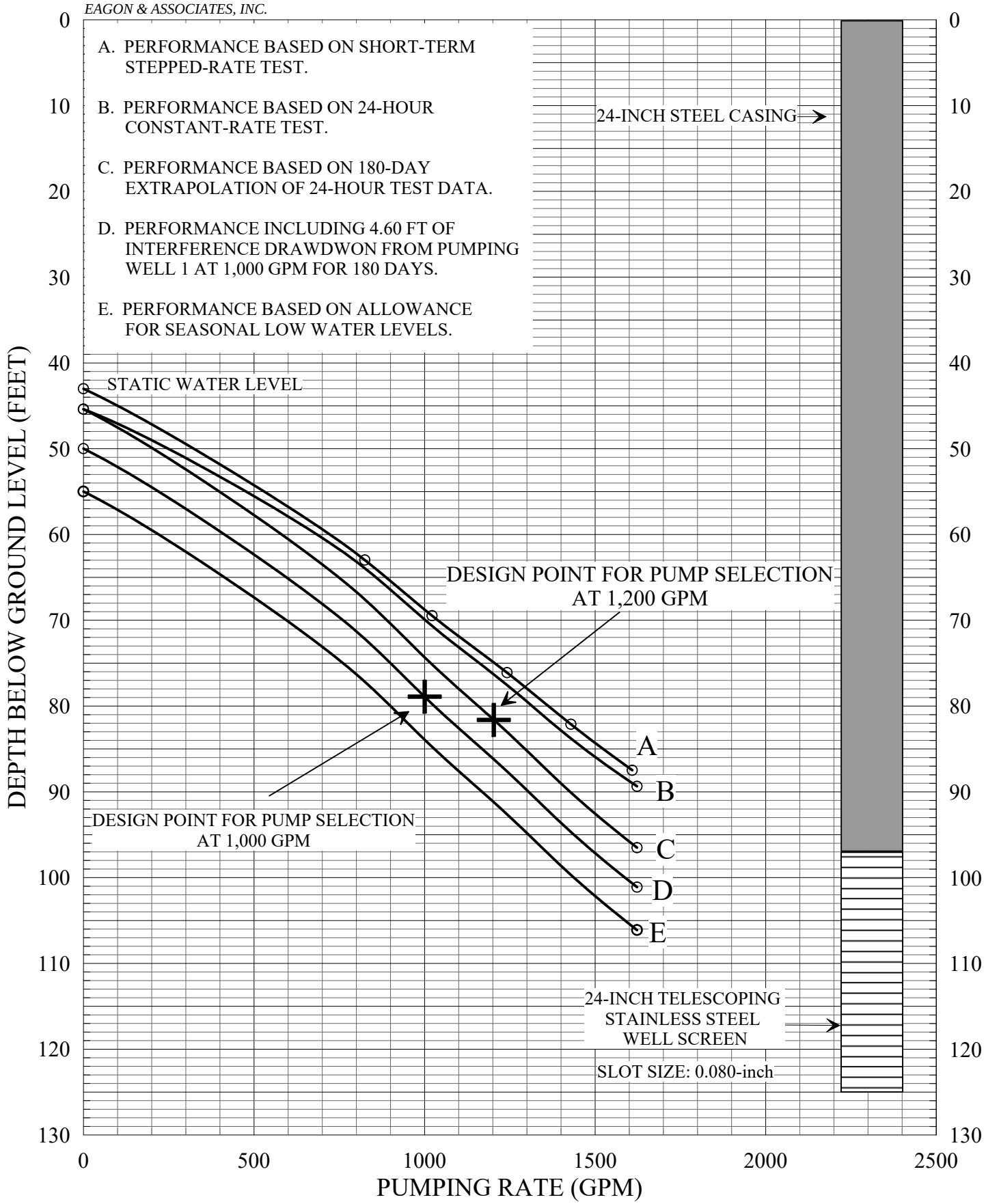


FIGURE 11. WELL PERFORMANCE CURVES FOR TUCKER WELL 2
ANDERSON, INDIANA

Andersn\Tucker\Well 2\Well 2 Perf.GRF
7/15/22

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FRANKLIN, INDIANA 46131
(317) 738-4577
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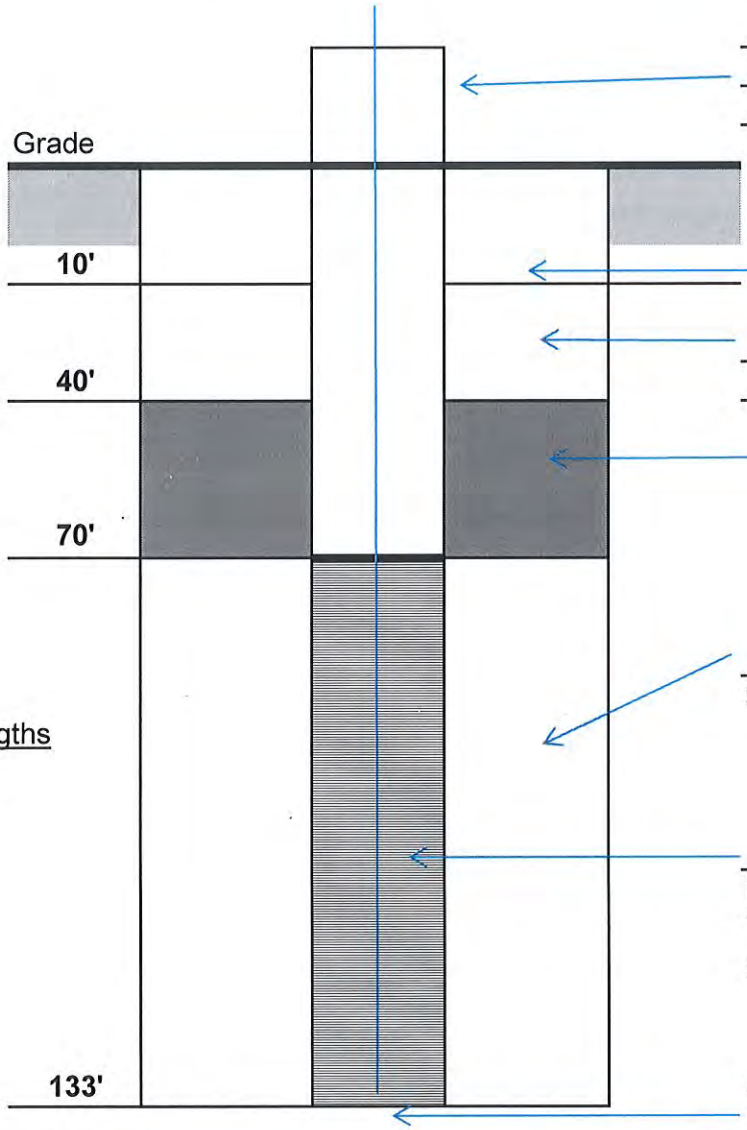
City of Anderson - Fuller - Well #1 - Gravel Wall Well Print

Customer	City of Anderson	Gravel Wall Well #	Fuller Well #1
Date	10/10/2022	County	Madison
Job#	5016-F	Twsp	20N
Location	Fuller Well Field	Section	5
Tower Height		State	8E



16" Steel Casing
.500" Wall Thickness
3' Above Grade

10' Backfill Material

30' Bentonite seal from **10'** to **40'**

30' Formation Stabilizer

63' ft of silica gravel
Size **Red Flint 60 Slot**

Pipe Lengths
1-9'
4-21'

43'
Make **Johnson Hi Flow**
Type **Stainless Steel**
Slot **.060**

Stainless steel bottom plate

Specific Capacity	**32.14**	Static level	**8.31**
Drawdown	**65.96**	pumped	**2120**
GPM at a	**74.27**	pumping level for	
72 hours.			

Fill used from bottom up	
Silica gravel	**133' - 70'**
Fill from	**70' - 40'**
Form. Stabil.	**40' - 10'**
Bentonite seal	

Driller:	**Jim Parsley - License #2058 WD PI**	**Date:**	10/10/2022

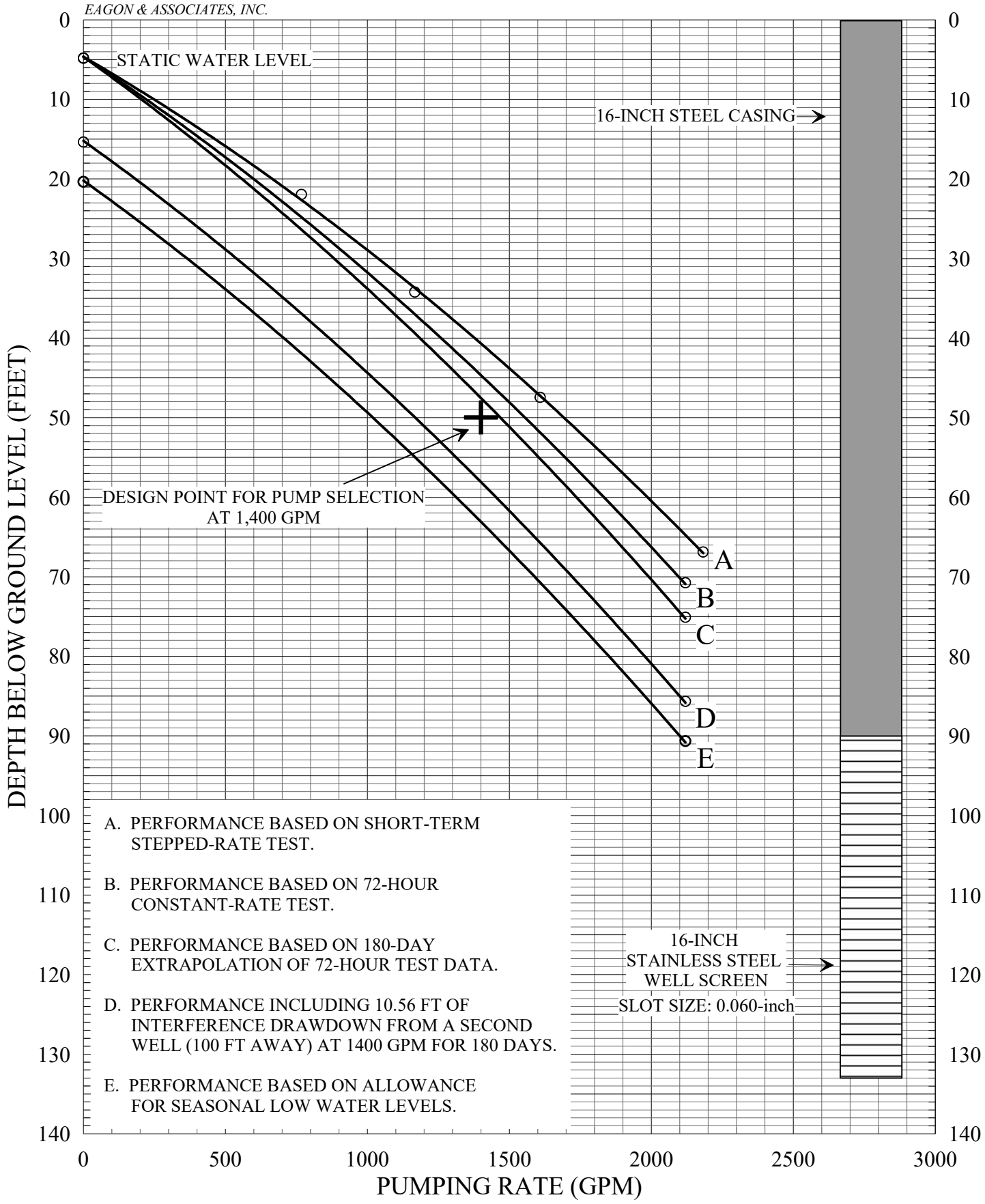


FIGURE 9. WELL PERFORMANCE CURVES FOR FULLER WELL 1
ANDERSON, INDIANA

Anderson\Fuller\Fuller 1 Perf.grf
12/6/22

BASTIN LOGAN WATER SERVICES INC.

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FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - PAC Property - Test Well 23-01

X	TEST	DATE	4-20-23	*State*	Indiana	*Project*	5233-F
		Well No	23-01	*City*	Anderson	*Section*	6
	PERMANENT	UTM 16T	614462M	*County*	Madison	*Township*	18N
		UTM	E4433558M1	*Civil Twsp*		*Range*	8E

OWNER	City of Anderson - PAC Property
LAND DESCRIPTION	946.8' S of E 400S/1248.3' E of West Rd (New Columbus Rd)
Street or Road	1419' W of 100E

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top soil	0	1	1	
Sandy brown clay	1	17	16	
Fine medium coarse sand & gravel in brown clay	17	27	10	
Sandy gray clay	27	41	14	
Fine medium coarse sand & gravel-1-2" rocks	41	43	2	
Sandy gray clay-small amounts of coarse gravel	43	54	11	
Sandy gray clay	54	103	49	
Fine medium coarse sand & gravel	103	104	1	
Soft clay w/ fine medium gravel	104	110	6	
Soft clay w/ fine gravel	110	113	3	
Fine medium coarse sand & gravel	113	116	3	
Fine medium coarse sand-fine coarse gravel	116	118	2	
Coarse sand in clay	118	123	5	
Sandy gray clay	123	150	27	
Fine coarse sand in clay	150	163	13	

Hole 6" **dia** **Drilled by** Cable Tool

Rotary Hole Grouted with _____

Casing _____ **OD from** _____ **above grade to** _____ **below grade.**

Screen _____ **set from** _____ **to** _____ **feet** **Weight** _____

Make _____ **Type** _____ **Slot** _____

Pumping test _____ **GPM drawdown to** _____ **feet after** _____ **hours pumping.**

Driller

BASTIN LOGAN WATER SERVICES INC.

1010 N. HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City of Anderson - PAC Property - Test Well 23-01

X	TEST	DATE	4-20-23	State	Indiana	Project	5233-F
		Well No	23-01	City	Anderson	Section	6
	PERMANENT	UTM 16T	614462M	County	Madison	Township	18N
		UTM	E4433558M1	Civil Twsp		Range	8E

OWNER	City of Anderson - PAC Property
LAND DESCRIPTION	946.8' S of E 400S/1248.3' E of West Rd (New Columbus Rd)
Street or Road	1419' W of 100E

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Sandy gray clay	163	165	2	
Sandy hard gray clay	165	168	3	
Shale	168	171	3	

Hole 6" dia Drilled by Cable Tool

Rotary Hole Grouted with

Casing _____ OD from _____ above grade to _____ below grade.

Screen _____ set from _____ to _____ feet Weight _____

Make _____ Type _____ Slot _____

Pumping test _____ GPM drawdown to _____ feet after _____ hours pumping.

Driller	Dakota Burton License #4440 WD PI

BASTIN LOGAN WATER SERVICES INC.

1010 N. HURRICANE ROAD
P.O. BOX 55
FRANKLIN, INDIANA 46131
(317) 738-4577
FAX (317) 738-9295

Well Formation Log

City Of Anderson-PAC Property- Test Well 23-02

X	TEST	DATE	5-12-23	State	Indiana	Project	
		Well No	23-02	City	Anderson	Section	6
	PERMANENT	UTM 16T	614227	County	Madison	Township	18N
		UTM	4433182	Civil Twsp		Range	8E
OWNER		PAC Property					
LAND DESCRIPTION		111' E or W Property Line, 152' N of S Property Line					
Street or Road		487' E of New Columbus RD					

FORMATION	From Natural Ground Level			
	Depth top of stratum (ft)	Depth bottom of stratum (ft)	Thickness of stratum	Static Water level
Top Soil	0	1	1	
Clay	1	44	43	
Sand Gravel	44	62	18	
Clay	62	130	68	
Limestone	130			

Hole 6 7/8" dia Drilled by Rotary

Rotary Hole Grouted with

Casing _____ OD from _____ above grade to _____ below grade.

Screen _____ set from _____ to _____ feet Weight _____

Make _____ Type _____ Slot _____

Pumping test _____ GPM drawdown to _____ feet after _____ hours pumping.

Driller: Micheal Grant
License #3026

PUMPING TEST ANALYSIS
FULLER WELL 1

ANDERSON, INDIANA
PWS ID# IN5248002

Prepared by:

EAGON & ASSOCIATES, INC.

January 24, 2023

Submitted by:

Stephen J. Champa, LPG
Associate Hydrogeologist
Indiana License No. 2247

EAGON & ASSOCIATES, INC.
100 Old Wilson Bridge Road, Suite 115
Worthington, Ohio 43085
(614) 888-5760

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INTRODUCTION

The purpose of this report is to present the results of pumping test of Fuller Well 1 in Anderson, Indiana. Test drilling was performed at the site in January 2022 and included the installation of test wells 22-1 and 22-2. The site of 22-1 was chosen as the location for Fuller Well 1 Well 1 was installed in July 2022. The well field location is shown on Figure 1.

Contained in this report are the well and well construction information for Fuller Well 1, pumping-test data from the stepped-rate and 72-hour constant-rate pumping tests and analyses of the pumping-test data. The pumping-test analyses are used as the basis for recommendations for operation of the new well. Recommendations for installation of a second well are provided, based on the test boring and pumping test data.

HYDROGEOLOGIC SETTING

The City of Anderson Lafayette Well Field is located north and west of the City of Anderson in Madison County. This area is within the White River Basin and is part of the Tipton Till Plain physiographic region (Fenelon et al., 1994). This region is characterized by thick glacial deposits with low surface relief overlying Silurian-age carbonate bedrock. Wells at the well field are completed in sand and gravel deposits of the Bluffton/New Castle/Tipton Complex Aquifer System (Scott, 2010) that exhibit considerable variability in both thickness and depth over relatively short distances. Well logs of Fuller Well 1 and the two test wells, 22-1 and 22-2, are included in Appendix A. Graphic logs of Fuller Well 1 and the two test borings are shown on Figure 2. The graphic logs illustrate the variability in subsurface stratigraphy across the site. Forty percent retained grain-sizes are shown next to the graphic logs of the test borings. Significant changes in aquifer thickness and grain-size distribution are typical of this aquifer system.

Recharge to the aquifer is by infiltration of precipitation through the overlying glacial till. The recharge rate in the Lafayette Well Field ranges from approximately four to six inches per year (Lettsinger, 2015).

WELL DESIGN AND CONSTRUCTION

Drilling and construction of Fuller Well 1 and the two test wells were performed by Bastin Logan Water Services. The well logs of Fuller Well 1 and the two test wells (22-1 and 22-2) are included in Appendix A. Also included in Appendix A are graphs of grain-size analyses of samples taken from the two test wells. The grain sizes show significant stratification of the aquifer with alternating fine and coarse zones. Based on the grain-size data from 22-1, it was decided to construct Fuller Well 1 as a gravel packed well.

Fuller Well 1 was installed using cable tool drilling equipment and methods. A 24-inch diameter borehole was drilled to 133 feet, below ground level (bgl). The well screen and casing were then installed inside of the 24-inch casing. The well screen is 16-inch diameter Johnson Hi-Flow stainless steel 0.060-inch slot pipe-size well screen, 600-foot construction, set between 90 and 133 feet, bgl. The well screen transmitting capacity is 2,559 gpm at the design entrance velocity of 0.1 feet per second or 1,280 gpm if 50 percent well screen blockage is assumed.

The screen and casing were assembled with welded joints. Each section was set in the casing and aligned with the previous section prior to welding to ensure proper vertical alignment of the entire string of casing and screen. After the last section of casing was welded on, the well was centered in the borehole and supported in place during the installation of the gravel pack and grout seal. The gravel pack used was Red Flint #60, placed from 133 to 70 feet, bgl. A formation stabilizer was placed from 70 to 40 feet, bgl. Benseal bentonite grout was installed to 10 feet, bgl in the annular space between the 16 and 24-inch diameter casings using a tremie pipe set to the top of the formation stabilizer. The borehole was then backfilled to surface with soil. After construction, the well was developed using a double disk surge block. Development was completed using the test pump.

PUMPING TEST PROCEDURES AND CONDITIONS

Stepped-rate and constant-rate pumping tests of Fuller Well 1 were performed in October 2022. During these tests, flow rates were measured in accordance with standard tables using a 10-

inch diameter orifice pipe and manometer equipped with an eight-inch diameter orifice plate. Flow was controlled using a gate valve at the wellhead. During the pumping tests, water was discharged to an old canal ditch approximately 200 feet west of Well 1. The stepped-rate pumping test was conducted on October 13, 2022 and the constant-rate pumping test was performed on October 17-20, 2022. Water levels in Well 1 were measured to the nearest 0.01 foot using a portable electric water-level meter. Water levels were measured using pressure transducers and dataloggers at test wells 22-1 and 22-2. The well locations are shown on Figure 1.

ANALYSIS OF TEST RESULTS

Stepped-Rate Test

The water-level data from the stepped-rate pumping test of Fuller Well 1 are shown on Figure 3. As indicated on Figure 3, steps of one hour duration were run at 768, 1167, 1609 and 2183 gpm on October 13, 2022. The specific capacity was 44.8 gpm/ft at the end of the first step and 35.2 gpm/ft at the end of the fourth step. The graph shows that water levels stabilized at each of the pumping rates.

The stepped-rate test data also were used to calculate well loss. Well loss is the portion of drawdown in a pumped well that results from the turbulent flow of water into the well. This analysis is done by plotting points which represent the value of drawdown (s) at the end of each step divided by the pumping rate (Q) during that step versus the pumping rate (Q) of the corresponding step on an arithmetic scale. The slope of a best-fit line to these points is the well-loss coefficient (C). The Y-axis intercept is the value of B. Well loss is determined using the formula $S_w = BQ + CQ^2$, where S_w is the total drawdown, BQ is the amount of drawdown due to laminar flow (formation drawdown) and CQ^2 (well loss) is the amount of drawdown induced by turbulent flow as water enters the well.

The well loss calculations for Fuller Well 1 are shown on Figure 4. A best-fit line to the data from the stepped-rate test were used to calculate well loss. At a pumping rate of 2,120 gpm (the rate used for the constant-rate pumping test), BQ = 45.79 feet and CQ^2 = 14.02 feet. Therefore, the total theoretical drawdown at 2,120 gpm is 59.81 feet, 23.4 percent of which is due to turbulent flow as

water enters the well. This turbulence can be due to several factors including stratification and grain-size variation within the aquifer and changes in the nature of groundwater flow at the aquifer/gravel pack and gravel pack/well screen interfaces.

Constant-Rate Test

Water-level data during the 72-hour constant-rate pumping test of Fuller Well 1 are shown on Figure 5. The water-level data collected during the Well 1 pumping test are included in Appendix B. Well 1 was turned on at 9:00 AM on October 17, 2022 at a rate of 2,120 gpm. The data on Figure 5 show that drawdown from pumping Well 1 was observed at both test wells 22-1 and 22-2. The pumping test was continued until 9:00 AM on October 20, 2022. The difference in depths to water at 22-1/Well 1 and 22-2 is primarily due to the ground elevation difference between the well sites.

Time-drawdown plots of the constant-rate pumping-test data are shown on Figures 6, 7, and 8 for Wells 1, 22-1, and 22-2, respectively. The time-drawdown data curves for the wells show a similar shape. The drawdown curves gradually transition to a consistent drawdown slope after approximately six minutes of pumping and continue on this slope until about 35 minutes. The drawdown curves for each of the wells then begin to flatten indicating the presence of a positive aquifer boundary. The positive boundary likely reflects leakage to the pumped aquifer from upper sand and gravel layers. No other obvious source of recharge is evident in the vicinity of the Fuller wells.

Aquifer transmissivities from the analyses of Well 1 and 22-2 test data are approximately 200,000 gpd/ft and 150,000 gpd/ft, respectively. The lower aquifer transmissivity calculated from the 22-1 test data is likely due to the proximity of 22-1 to Well 1 and partial penetration effects since the well screen at 22-1 is only five feet long and is set at the bottom of the aquifer. The storativity value calculated from the 22-2 analysis is 1.2×10^{-4} indicating semi-confined aquifer conditions.

Figure 9 is a semi-logarithmic plot of distance-drawdown data from the end of the constant-rate pumping test. The calculated value of transmissivity derived from this analysis is about

200,000 gpd/ft. The storativity value calculated from the distance-drawdown data is 2.4 x 10^{-4}, indicating semi-confined aquifer conditions. These values of transmissivity and storativity are consistent with those derived from the time-drawdown analyses of Well 1 and 22-2.

WELL PERFORMANCE

Figure 10 shows well performance curves for Fuller Well 1. The performance curves are based on the stepped-rate test data, constant-rate test data, and empirical projections of the constant-rate test data. A sketch of the general well construction is also shown on Figure 10.

On Figure 10 Curve A is based on water levels during the stepped-rate test and represents short-term pumping levels in the well. Water levels will fall below Curve A anytime that the well is pumped for more than an hour. Curve B is based on the constant-rate test data and represents 72-hour pumping levels in the well. Curve C is extrapolated from the constant-rate test data and represents pumping levels after six months of continuous pumping. It is normally assumed that after six months of pumping the cone of influence will have spread far enough to intercept enough recharge to balance pumping withdrawals and the system will be in equilibrium. During normal operation, Curve C would represent the lowest water levels expected. Curve D includes 10.56 feet of interference drawdown from operation of a second future water supply well located approximately 100 feet away pumping 1400 gpm for six months. Curve E allows for a five-foot drop in water levels to account for abnormally dry conditions when recharge is deficient. Under normal operating conditions, it is anticipated that pumping levels in Well 1 will be between Curves B and C without a second well and between Curves B and D with a second well.

A design point for pump selection is shown on the Figure 10. The 1,400 gpm design point is based on long-term operation of Well 1 and a second future water supply well located near 22-2 also at 1,400 gpm for a combined total of 2,800 gpm (4.0 MGD). The design point is at 50 feet below existing ground level. The total available drawdown (static depth to water minus the depth to the top of the well screen) is about 85 feet. A pumping level of 50 feet leaves about 50 percent of the available drawdown remaining. Our standard practice for a new well is to leave at least 30 percent of the available drawdown remaining to account for extreme low water levels and loss of well

efficiency over time. The interference drawdown from a second (future) water supply well operating at 1,400 gpm for 180 days is estimated to be about 10.5 feet which would make the pumping level in Well 1 approximately 60.5 feet leaving about 35 percent of the available drawdown remaining.

Based on experience with other wells in the Lafayette Well Field, pumping Fuller Well 1 at a lower rate when maximum withdrawal is not needed should be considered to increase the longevity of the well and reduce maintenance costs. Use of a variable frequency drive (VFD) would allow for control of the pumping rate.

WATER QUALITY

Water samples were collected at the end of the constant-rate pumping test. The samples were analyzed for inorganic compounds, volatile organic compounds (VOCs), synthetic organic compounds (SOCs), herbicides and PCBs. There were no detections of VOCs, SOCs, pesticides, herbicides or PCBs. No results exceeded U.S. EPA Primary Drinking Water Maximum Contaminant Levels (MCLs) or Secondary Drinking Water Standards (SDWSs). The laboratory analytical reports are included in Appendix C.

CONCLUSIONS AND RECOMMENDATIONS

1. Analysis of the time-drawdown data indicates that the aquifer in the vicinity of Fuller Well 1 has a transmissivity of about 200,000 gpd/ft. Storativity values indicate semi-confined aquifer conditions consistent with well log and water level data. Examination of the time-drawdown graphs from the pumping test of Fuller Well 1 indicates the presence of a positive aquifer boundary. The boundary most likely reflects leakage to the pumped aquifer from upper saturated zones.

2. A pump should be installed in Well 1 that is capable of producing 1,400 gpm with an in-the-well head of about 50 feet below ground level. The additional system head needs to be added to the in-the-well head to determine the total discharge head. Over-pumping of the well should be avoided as it can lead to rapid declines in well performance and the need for

more frequent well maintenance. Use of a VFD is recommended to facilitate adjustment of the pumping rate.

3. Based on the well log of Test Boring 22-2 and analysis of the pumping test data, installation of a second well at the Fuller site is feasible. Assuming that the well performance of a second well is similar to Well 1 a total capacity of 2,800 gpm (1,400 gpm per well) can be developed at the site.

4. Based on the well log and grain-size distribution data from Test Boring 22-2, as second well near 22-2 should be designed similar to Well 1. Specifically, Well 2 should be a 24-inch by 16-inch gravel packed well. Thirty-five feet of 16-inch diameter well screen should be installed from 85 to 120 feet, bgl. The well screen slot size should be 0.060 inch with Red Flint #60 gravel pack. The transmitting capacity for 35 feet of 16-inch diameter Johnson Hi-Flow stainless steel 0.060-inch slot pipe-size well screen, 600-foot construction, is 2,083 gpm at the design entrance velocity of 0.1 feet per second or 1,042 gpm if 50 percent well screen blockage is assumed. The actual capacity of a second well should be verified after analysis of data from pumping test pf the new well. If the second well is not installed near 22-2, well log and grain-size data from the new well should be used for design of the new well.

5. Water-level data from the well field should be evaluated on a regular basis. Pumping levels in the production wells should be measured to monitor well performance so that declines in well capacity can be identified and well maintenance can be performed before well performance deteriorates to unacceptable levels. A pressure transducer and datalogger could be installed at 22-1 or 22-2 for long-term monitoring of aquifer water levels. The data collected would be useful for well-field management and evaluation of well performance.

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Letsinger, Sally L., 2015, Groundwater Recharge Rates to Shallow Aquifers, Indiana, Indiana Geological Survey, Center for Geospatial Data Analysis.

Scott, Robert A., 2010, Unconsolidated Aquifer Systems of Madison County, Indiana, Indiana Department of Natural Resources, Division of Water, Resource Assessment Section.

FIGURES

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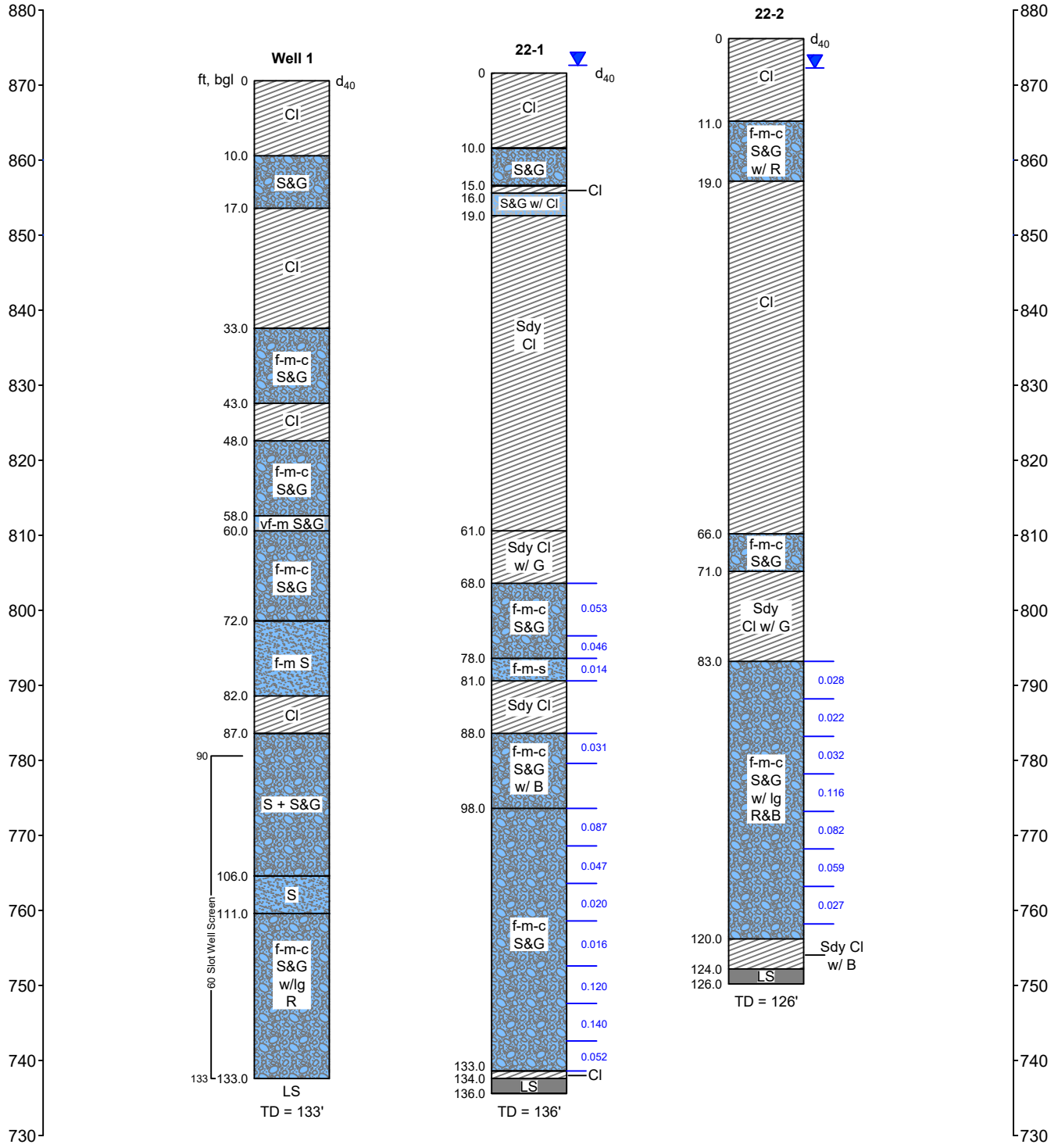
Created By: KJW	Project Title: ANDERSON, INDIANA	
Checked By: SJC	Prepared By: EAGON & ASSOCIATES, INC.	Figure Number: 1
Approved By: SJC		
Date: 12/9/2022		



LEGEND

Static Water Level

B = Boulders
Cl = Clay
LS = Limestone
S&G = Sand & Gravel
Slty = Silty
Sdy = Sandy
S = Sand
Si = Silt
G = Gravel
R = Rocks
f-m-c = Fine-Medium-Coarse

VERTICAL SCALE: 1" = 20'
NO HORIZONTAL SCALE
d40 = 40% Retained Grain Size (in.)

** Material descriptions based on drillers log (ODNR - 3003645)*

COMPILED BY: NTN	FIGURE TITLE: Graphic Logs - Fuller Site	
DRAFTED BY: MAM	PROJECT TITLE: Anderson, Indiana	
CHECKED BY: NTN	PREPARED BY: EAGON & ASSOCIATES, INC.	FIGURE NUMBER: 2
APPROVED BY: MTG		
DATE: 1/16/2023		

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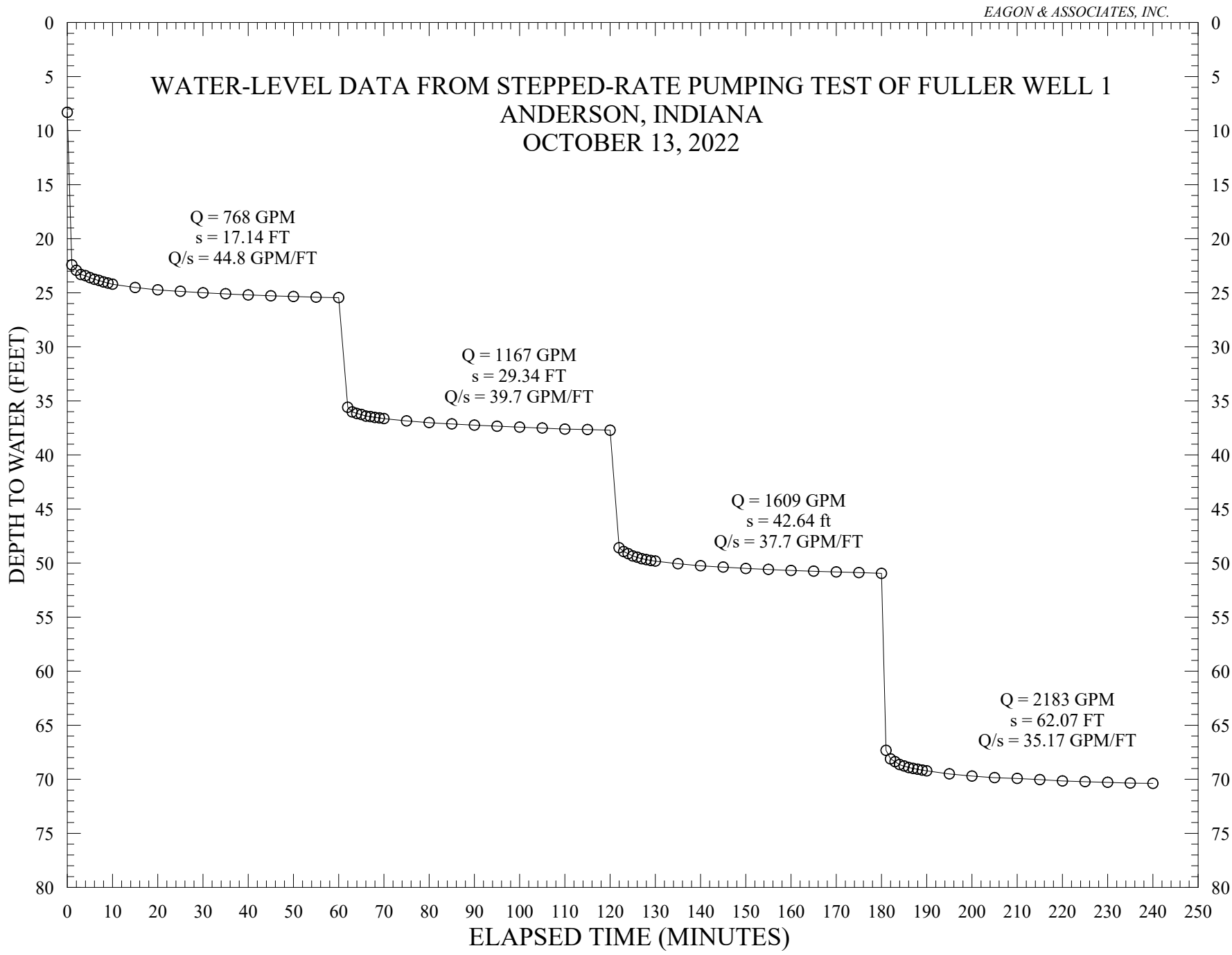

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10/13/2022

FIGURE 3.

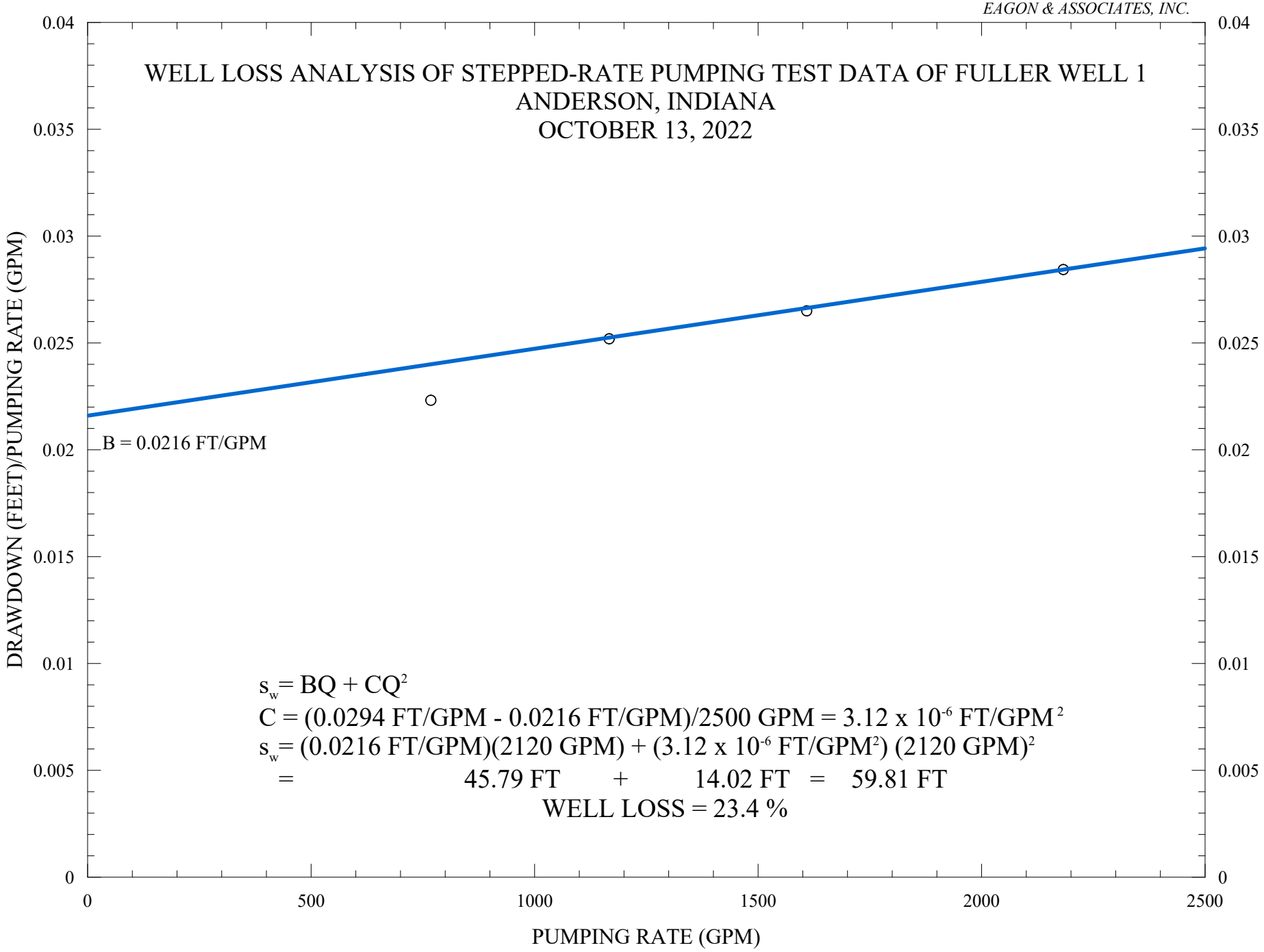

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FIGURE 4.

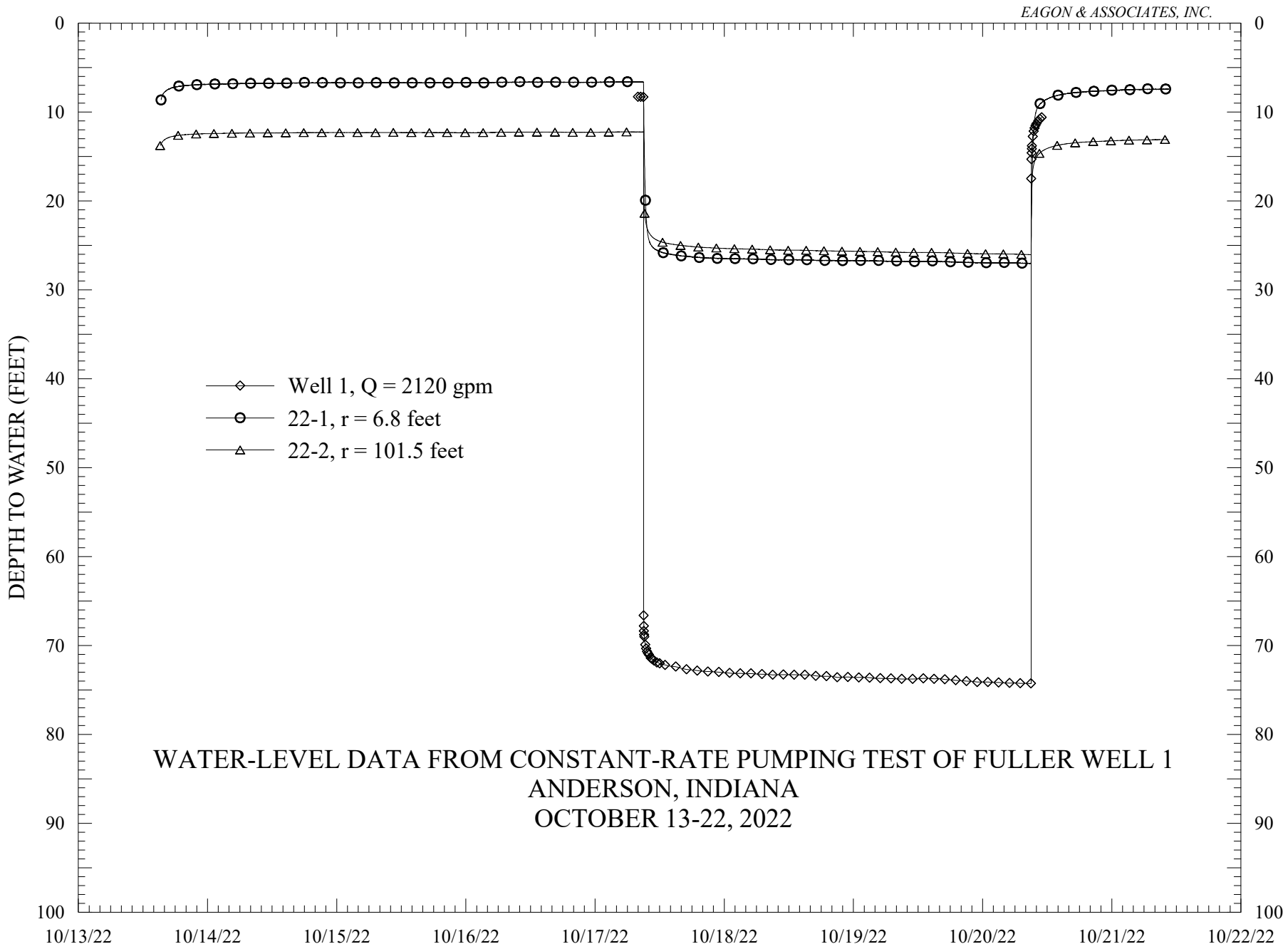

FIGURE 5.

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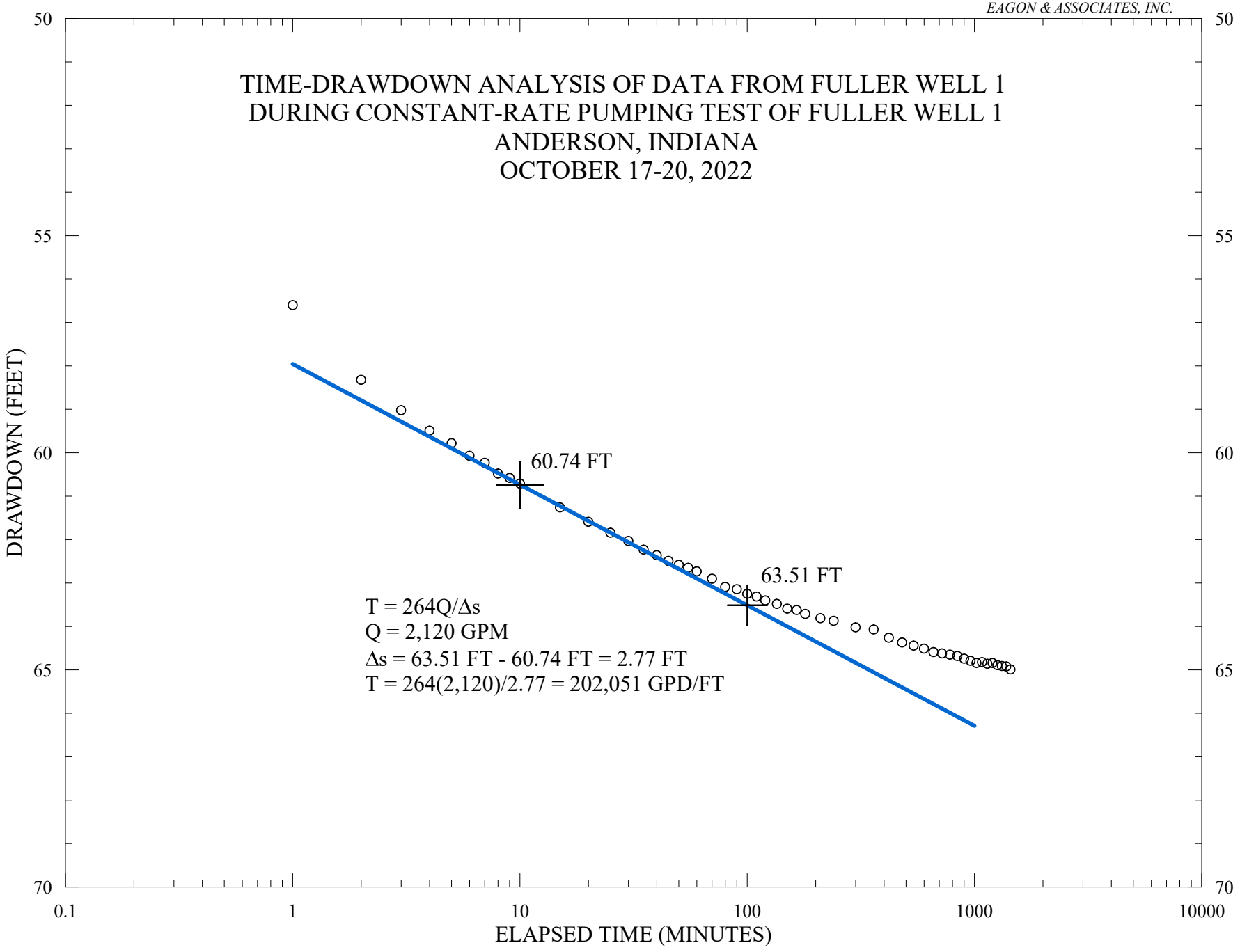

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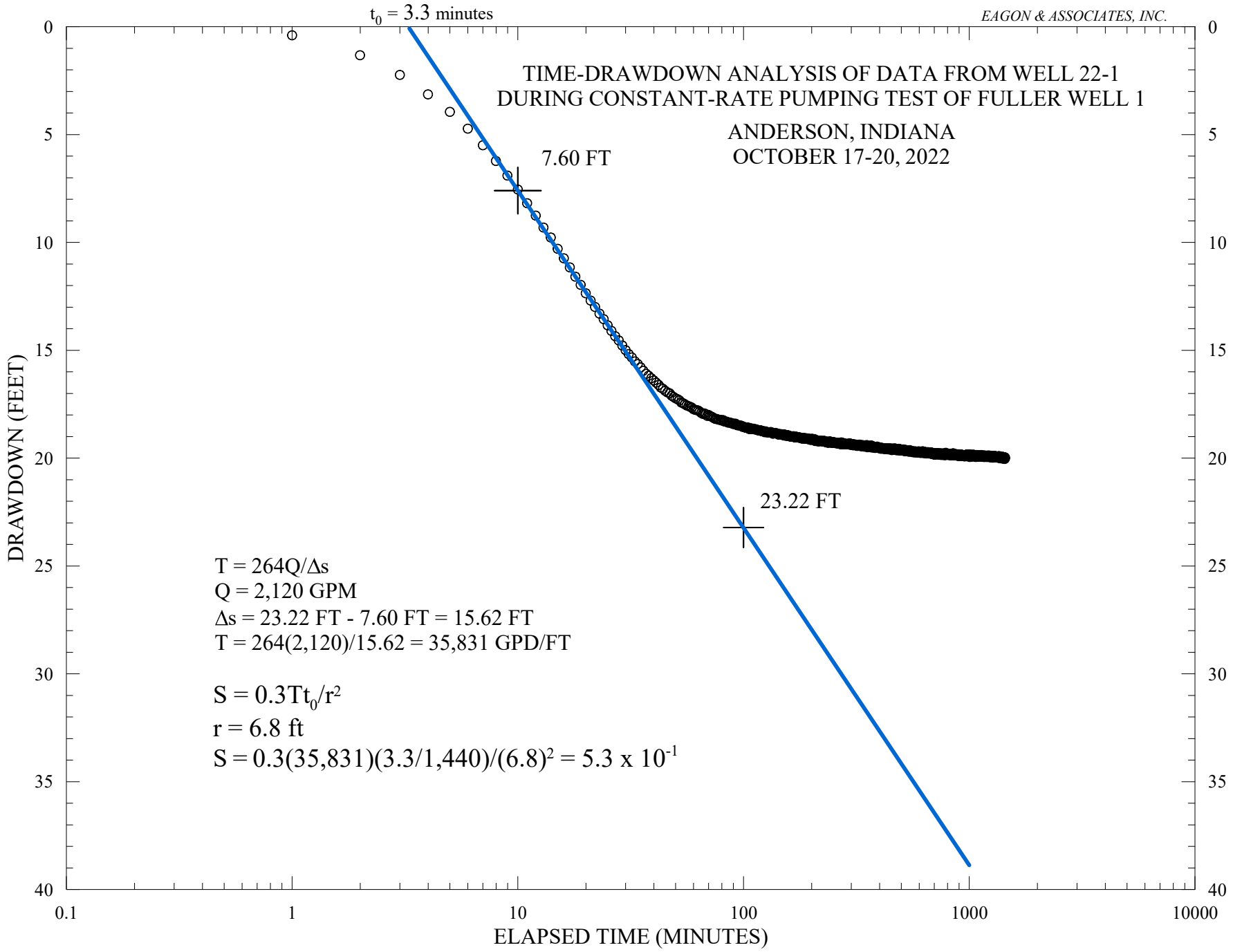

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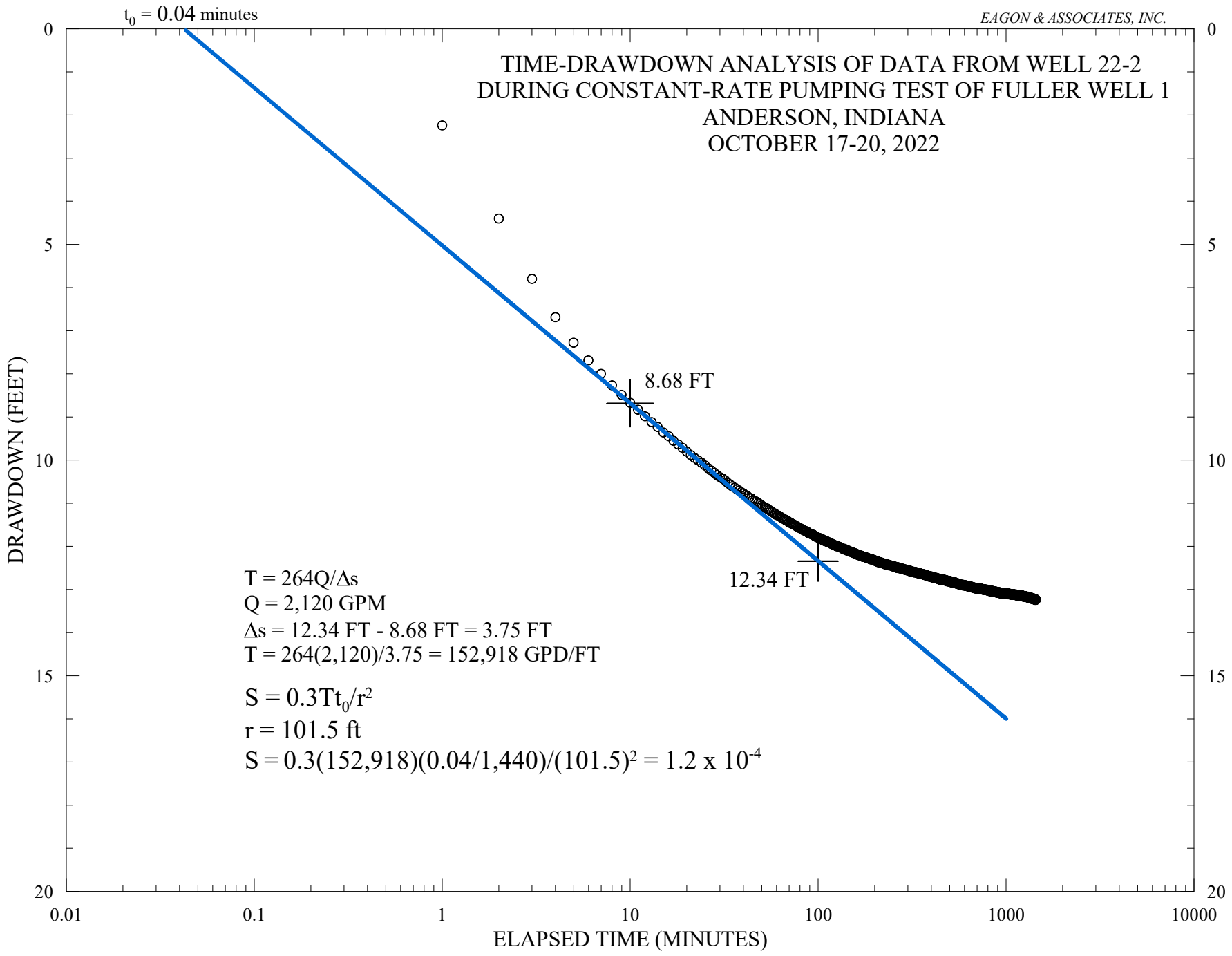

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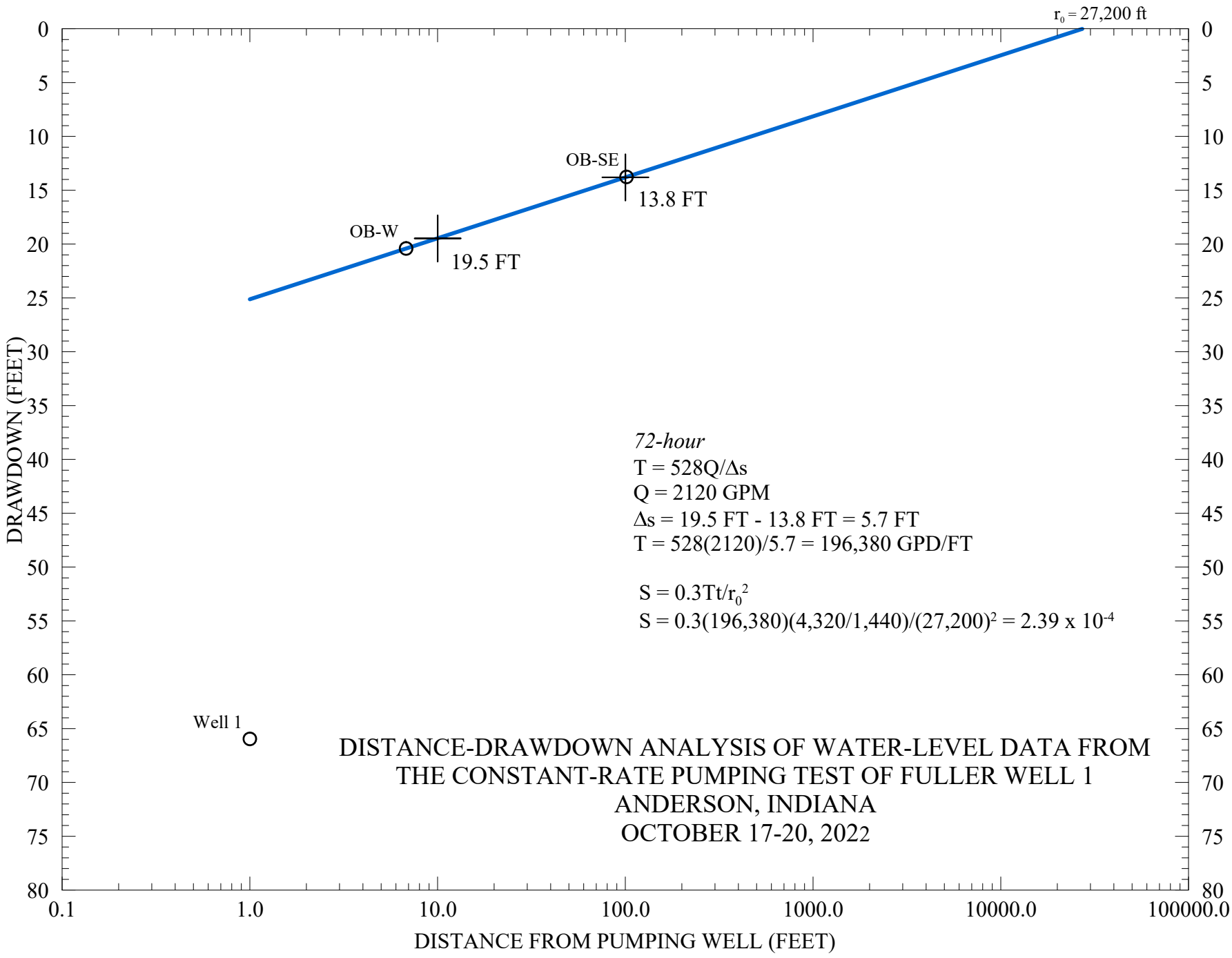

FIGURE 9.

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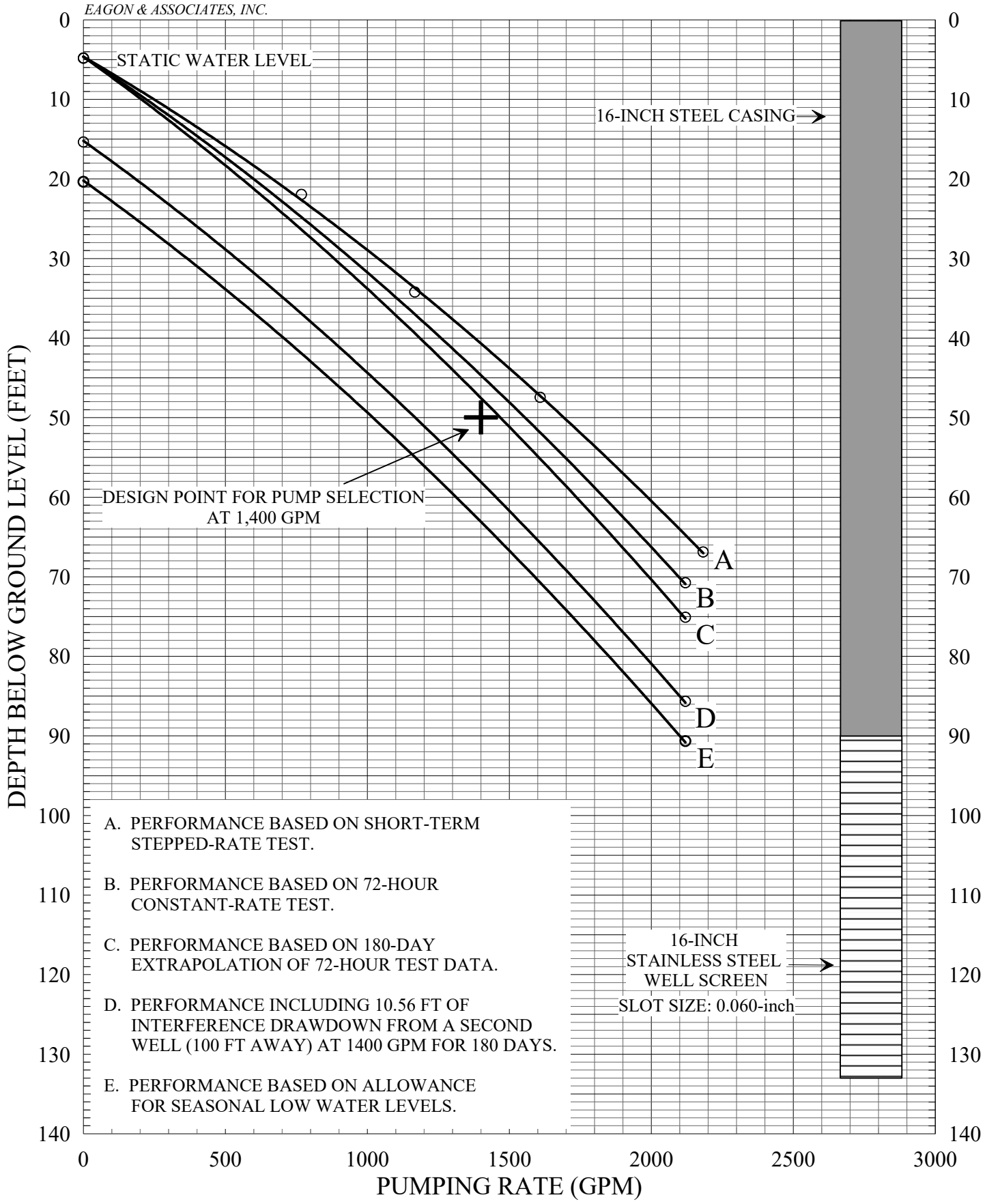

FIGURE 9. WELL PERFORMANCE CURVES FOR FULLER WELL 1
ANDERSON, INDIANA

Anderson\Fuller\Fuller 1 Perf.grf
12/6/22

APPENDIX A.

WELL LOGS, GRAIN-SIZE GRAPHS AND WELL CONSTRUCTION DIAGRAM