

2025 ANNUAL GROUNDWATER MONITORING AND
CORRECTIVE ACTION REPORT FOR
FLY ASH RESERVOIR (FAR) II
CARDINAL UPLAND DISPOSAL FACILITY
BRILLIANT, OHIO

by
Haley & Aldrich, Inc.
Cleveland, Ohio

for
Cardinal Operating Company
Brilliant, Ohio

File No. 210218
January 2026

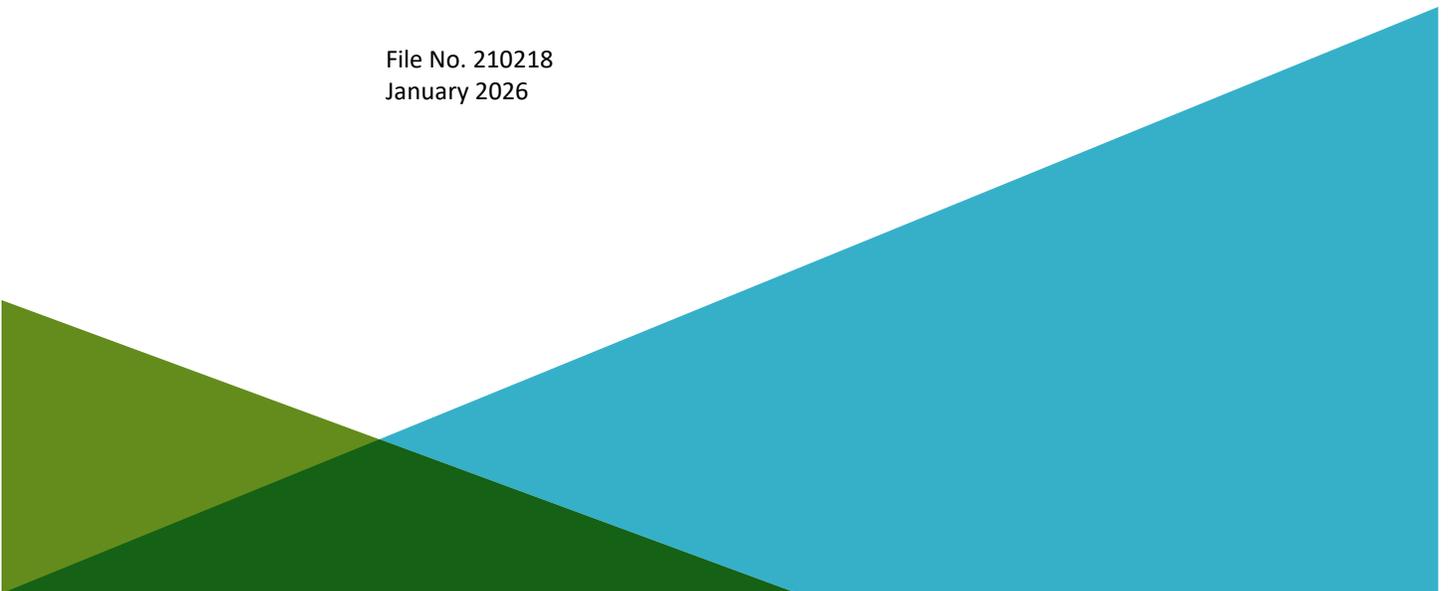


Table of Contents

	Page
List of Tables	ii
List of Figures	ii
1. Annual Groundwater Monitoring and Corrective Action Report Summary	1
2. 40 CFR §257.90 Applicability	3
2.1 40 CFR § 257.90(a) AND (c)	3
3. 40 CFR § 257.90(e) Annual Groundwater Monitoring and Corrective Action Report	4
3.1 STATUS OF THE GROUNDWATER MONITORING PROGRAM	4
3.2 KEY ACTIONS COMPLETED	4
3.3 PROBLEMS ENCOUNTERED	5
3.4 ACTIONS TO RESOLVE PROBLEMS	5
3.5 PROJECT KEY ACTIVITIES FOR UPCOMING YEAR	5
3.6 40 CFR § 257.90(e) – INFORMATION	5
3.6.1 40 CFR § 257.90(e)(1)	5
3.6.2 40 CFR § 257.90(e)(2)	6
3.6.3 40 CFR § 257.90(e)(3)	6
3.6.4 40 CFR § 257.90(e)(4)	6
3.6.5 40 CFR § 257.90(e)(5)	6

List of Tables

Table No.	Title
1	Summary of 2025 Samples Collected – FAR II Shallow Aquifer
2	Summary of 2025 Samples Collected – FAR II Morgantown Aquifer
3	Summary of 2025 2025 Analytical Results – FAR II Shallow Aquifer
4	Summary of 2025 Analytical Results – FAR II Morgantown Aquifer
5	Groundwater Protection Standards – FAR II Shallow Aquifer
6	Groundwater Protection Standards – Morgantown Aquifer
7	Groundwater Flow Calculations, April 2025 – FAR II Shallow Aquifer
8	Groundwater Flow Calculations, April 2025 – FAR II Morgantown Aquifer
9	Groundwater Flow Calculations, October 2025 – FAR II Shallow Aquifer
10	Groundwater Flow Calculations, October 2025 – FAR II Morgantown Aquifer

List of Figures

Figure No.	Title
1	CCR Unit and Monitoring Wells – FAR II Shallow Aquifer
2	CCR Unit and Monitoring Wells – FAR II Morgantown Aquifer
3	Potentiometric Surface FAR II Shallow Aquifer – April 2025
4	Potentiometric Surface FAR II Morgantown Aquifer – April 2025
5	Potentiometric Surface FAR II Shallow Aquifer – October 2025
6	Potentiometric Surface FAR II Morgantown Aquifer – October 2025

1. Annual Groundwater Monitoring and Corrective Action Report Summary

Haley & Aldrich, Inc. has prepared this 2025 Annual Groundwater Monitoring and Corrective Action Report (Report) for the Fly Ash Reservoir (FAR) II, an existing coal combustion residual (CCR) unit at the Cardinal Upland Disposal Facility in Brilliant, Ohio. This Report was prepared to comply with the United States Environmental Protection Agency (EPA) Hazardous and Solid Waste Management System; Disposal of CCR from Electric Utilities, Title 40 Code of Federal Regulations (CFR) Part 257, Subpart D dated April 17, 2015 (Rule), specifically subsection § 257.90(e)(1) through (6).

This Report summarizes groundwater monitoring activities conducted pursuant to the CCR Rule from January 1 through December 31, 2025.

In accordance with § 257.90(e)(6), an overview of the current status of groundwater monitoring and corrective action programs for the CCR unit is provided below:

- 40 CFR § 257.90(e)(6)(i) and (ii): For the entire calendar year of 2025 (January 1 through December 31, 2025), FAR II was operating under an assessment monitoring program (§ 257.95).
- Assessment monitoring was initiated following the May 2018 groundwater sampling event in accordance with 40 CFR § 257.90(e)(6)(iii)(B).
- In February 2019, FAR II transitioned to a corrective action program following detection of statistically significant levels (SSLs) of lithium and molybdenum in some wells above groundwater protection standards (GWPSs), consistent with 40 CFR § 257.90(e)(6)(iv)(B). An assessment of corrective measures for the SSLs was initiated on February 7, 2019, completed on July 9, 2019, and later revised on November 30, 2020.
- A public meeting regarding the assessment of corrective measures was held on September 4, 2019 in accordance with 40 CFR § 257.90(e)(6)(iv)(C). A remedy was selected on October 27, 2020 and remedial activities were initiated in 2021. FAR II stopped receiving waste streams in July 2021 and is currently undergoing closure pursuant to § 257.98.
- 40 CFR § 257.90(e)(6)(iii)(A): Statistically significant increases (SSIs) above background levels were identified during statistical evaluation of the fall 2024 sampling event¹ for the following Appendix III constituents:
 - Shallow Aquifer:
 - chloride: S-9
 - Morgantown Aquifer:
 - boron: FA-8, M-10, M-11, M-21, M-22, M-23, M-1004, and M-GS-3R
 - pH: M-1309²
 - These SSIs were also identified in the 2024 Annual Report, except for pH at M-1309. The fall 2024 pH result at M-1309 was slightly below the lower prediction limit. The FAR II

¹ Data quality review and statistical evaluation of the fall 2024 sampling event were completed in 2025; therefore, results and any statistical exceedances associated with the fall 2024 data are presented in this report.

² For pH, statistically significant exceedances include both increases above upper prediction limits (SSIs) and decreases below lower prediction limits (SSDs). The fall 2024 pH result at M-1309 represents a SSD.

unit was already in assessment monitoring and corrective action at the time; therefore, no additional regulatory action was required beyond continued monitoring and reporting.

- 40 CFR § 257.90(e)(6)(iii)(A): SSLs above background levels were identified during statistical evaluation of the spring 2025 sampling event for the following Appendix III constituents:
 - Shallow Aquifer:
 - chloride: S-9
 - Morgantown Aquifer:
 - boron: M-10, M-11, M-21, M-22, M-23, M-1004, and M-GS-3R
 - These SSLs were also identified in the 2024 Annual Report.
- 40 CFR § 257.90(e)(6)(iv)(A): SSLs above GWPS values were detected at FAR II during statistical evaluation of the fall 2024 sampling event for the following Appendix IV constituents:
 - Morgantown Aquifer:
 - lithium: FA-8 and M-11
 - molybdenum: FA-8 and M-11
 - These SSLs were also identified in the 2024 Annual Report.
- 40 CFR § 257.90(e)(6)(iv)(A): SSLs above GWPSs were detected at FAR II during statistical evaluation of the spring 2025 sampling event for the following Appendix IV constituents:
 - Morgantown Aquifer:
 - Lithium and molybdenum at M-11, both of which were identified as SSLs in the 2024 Annual Report.
- Background levels for the FAR II Shallow and Morgantown aquifers were updated in November 2025 to incorporate data collected from February 2023 through April 2025 for the Shallow Aquifer and from June 2016 through April 2025 for the Morgantown Aquifer. These updated background levels and associated GWPS values will be used for statistical evaluations starting with the fall 2025 monitoring event.
- Statistical evaluation of fall 2025 monitoring data is ongoing and will be included in the 2026 Annual Report.

2. 40 CFR §257.90 Applicability

To report on the activities conducted during the prior calendar year and document progress complying with the CCR Rule, the specific requirements listed in § 257.90(e)(1) through (5) are provided in the next section in bold/italic type followed by a short narrative stating how that specific requirement was met.

2.1 40 CFR § 257.90(a) AND (c)

All CCR landfills, CCR surface impoundments, and lateral expansions of CCR units are subject to the groundwater monitoring and corrective action requirements under § 257.90 through § 257.98.

Once a groundwater monitoring system and groundwater monitoring program has been established at the CCR unit as required by this subpart, the owner or operator must conduct groundwater monitoring and, if necessary, corrective action through the active life and post-closure care period of the CCR unit.

FAR II is a CCR surface Impoundment. As of July 2021, FAR II no longer receives waste streams and is undergoing closure. As such, it is subject to the groundwater monitoring and corrective action requirements set forth by the EPA in 40 CFR §§ 257.90 through 257.98. This document satisfies the requirement under § 257.90(e), which requires the CCR Unit Owner/Operator to prepare an Annual Groundwater Monitoring and Corrective Action Report.

The FAR II groundwater monitoring network consists of two aquifers: the Shallow Aquifer and the Morgantown Aquifer. Each of these aquifers are considered part of the uppermost aquifer and are monitored as part of the groundwater monitoring program.

3. 40 CFR § 257.90(e) Annual Groundwater Monitoring and Corrective Action Report

For existing CCR landfills and existing CCR surface impoundments, no later than January 31, 2018, and annually thereafter, the owner or operator must prepare an annual groundwater monitoring and corrective action report. For the preceding calendar year, the annual report must document the status of the groundwater monitoring and corrective action program for the CCR unit, summarize key actions completed, describe any problems encountered, discuss actions to resolve the problems, and project key activities for the upcoming year. For purposes of this section, the owner or operator has prepared the annual report when the report is placed in the facility's operating record as required by § 257.105(h)(1).

This Report documents the activities completed in 2025 for FAR II as required by the subject regulations. Groundwater sampling and analysis were conducted per the requirements of § 257.93, and the status of the groundwater monitoring program, set forth in § 257.95, is provided in this Report.

3.1 STATUS OF THE GROUNDWATER MONITORING PROGRAM

SSIs of Appendix III constituents and SSLs of Appendix IV constituents were identified at FAR II during statistical evaluations of the fall 2024 sampling event and the spring 2025 sampling event. FAR II remains in assessment monitoring and corrective action.

3.2 KEY ACTIONS COMPLETED

- In 2025, two groundwater monitoring events were completed:
 - The first semiannual groundwater monitoring event was completed in April and May 2025.
 - The second semiannual groundwater monitoring event was completed in October and November 2025.
- A resampling event was conducted in December 2025 at background well M-6, and downgradient wells M-10 and M-11 to conform to the sampling procedures detailed in the Sampling and Analysis Plan. Elevated constituent concentrations were not observed in these FAR II wells.
- Potentiometric monitoring was conducted during the semiannual sampling events, as detailed in Section 3.6.5.
- Two semiannual statistical evaluations were completed in 2025. These evaluations were conducted for the fall 2024 and spring 2025 semiannual sampling events. The statistical evaluation of the fall 2025 semiannual sampling event is ongoing and will be presented in the 2026 Annual Report.
- Background levels for FAR II Shallow and Morgantown aquifers were updated in November 2025 to incorporate data collected from February 2023 through April 2025 for the Shallow Aquifer and from June 2016 through April 2025 for the Morgantown Aquifer. These updated background levels and associated GWPS values will be used for statistical evaluations starting with the fall 2025 monitoring event.

3.3 PROBLEMS ENCOUNTERED

- A sample was unable to be taken from background well M-12 due to pump malfunctions during both semiannual sampling events.
- A sample was unable to be taken from background well S-1005 during the fall 2025 semiannual sampling event due to insufficient water.
- A sample was unable to be taken from downgradient monitoring well FA-8 during both semiannual sampling events due to insufficient water.
- Groundwater collected from M-21 was highly turbid during sampling.
- Monitoring wells M-6, M-10 and M-11 were not sampled in accordance with the Sampling and Analysis Plan and had to be re-sampled in December 2025.

3.4 ACTIONS TO RESOLVE PROBLEMS

- Samples will continue to be attempted at background monitoring wells M-12 and S-1005 during future semiannual sampling events.
- Samples will continue to be attempted at downgradient monitoring well FA-8 during future semiannual sampling events. SSLs have been reported at this well previously.
- Monitoring well M-21 is being evaluated for high turbidity and possible solutions.
- The sampling consultant was made aware of the sampling issues at M-6, M-10, and M-11 and a meeting was held to review the correct procedures from the Sampling and Analysis Plan.

3.5 PROJECT KEY ACTIVITIES FOR UPCOMING YEAR

Key activities to be completed in 2026 include the following:

- Prepare the 2026 Annual Report; place it in the record as required by § 257.105(h)(1); notify the state [§ 257.106(d)]; and post it to the website [§ 257.107(d)].
- Prepare the semiannual statistical report for the October 2025 sampling event.
- Conduct semiannual groundwater monitoring and reporting as required by § 257.95.
- Conduct semiannual statistical analyses in accordance with the FAR II Statistical Analysis Plan.

3.6 40 CFR § 257.90(e) – INFORMATION

At a minimum, the annual groundwater monitoring and corrective action report must contain the following information, to the extent available:

3.6.1 40 CFR § 257.90(e)(1)

A map, aerial image, or diagram showing the CCR unit and all background (or upgradient) and downgradient monitoring wells, to include the well identification numbers, that are part of the groundwater monitoring program for the CCR unit;

As required by § 257.90(e)(1), maps showing the locations of FAR II and associated upgradient and downgradient monitoring wells are presented as Figure 1 (Shallow Aquifer) and Figure 2 (Morgantown Aquifer).

3.6.2 40 CFR § 257.90(e)(2)

Identification of any monitoring wells that were installed or decommissioned during the preceding year, along with a narrative description of why those actions were taken;

There was no change in the monitoring well network for FAR II in 2025.

3.6.3 40 CFR § 257.90(e)(3)

In addition to all the monitoring data obtained under § 257.90 through § 257.98, a summary including the number of groundwater samples that were collected for analysis for each background and downgradient well, the dates the samples were collected, and whether the sample was required by the detection monitoring or assessment monitoring programs;

In accordance with § 257.95(b) and § 257.95(d)(1), two independent samples from each background and downgradient monitoring well were collected and analyzed, except M-12, FA-8, and S-1005, as discussed in Section 3.3. Summary tables including the sample names, dates of sample collection, the reason for sample collection, and monitoring data obtained for the groundwater monitoring program for FAR II are presented in Table 1 (Shallow Aquifer) and Table 2 (Morgantown Aquifer). A summary of the analytical results for the Shallow and Morgantown aquifers is presented in Tables 3 and 4, respectively. In addition, in accordance with § 257.95(d)(3), Tables 5 and 6 include GWPS values established 2025 under § 257.95(d)(2) for the Shallow and Morgantown aquifers, respectively. Tables 5 and 6 present both the historical and updated background levels. The historical levels were utilized for the fall 2024 and spring 2025 statistical evaluations, while the updated levels will be utilized beginning with the fall 2025 event.

3.6.4 40 CFR § 257.90(e)(4)

A narrative discussion of any transition between monitoring programs (e.g., the date and circumstances for transitioning from detection monitoring to assessment monitoring in addition to identifying the constituent(s) detected at a statistically significant increase over background levels); and

In accordance with §257.95 of the CCR Rule, assessment monitoring at FAR II was initiated in May 2018 after SSIs over groundwater background levels were detected. Following detection of SSLs above GWPS values, FAR II initiated assessment of corrective measures and entered the corrective action program pursuant to §257.96. The monitoring wells for FAR II continue to be sampled for Appendix III and Appendix IV constituents in accordance with applicable assessment monitoring and corrective action requirements.

3.6.5 40 CFR § 257.90(e)(5)

Other information required to be included in the annual report as specified in § 257.90 through § 257.98.

Other information specified § 257.90 through § 257.98 is discussed in preceding sections.

TABLES

TABLE 1
SUMMARY OF 2025 SAMPLES COLLECTED
FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	Type of Well	Sample Date	Constituents Analyzed	Purpose	Sample Type
CA-0623A	Background	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
CA-0623A	Background	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-09	Downgradient	04/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-09	Downgradient	10/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-21	Downgradient	04/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-21	Downgradient	10/27/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-23	Downgradient	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-23	Downgradient	10/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-1005	Background	04/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-15	Background	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-15	Background	10/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-22	Background	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
S-22	Background	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary

Notes:

Background well S-1005 was unable to be sampled in fall 2025 due to insufficient water.

TABLE 2
SUMMARY OF 2025 SAMPLES COLLECTED
FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	Type of Well	Sample Date	Constituents Analyzed	Purpose	Sample Type
CA-0622A	Background	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
CA-0622A	Background	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-06	Background	04/30/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-06	Background	10/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-06	Background	12/03/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Resample
M-08	Downgradient	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-08	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-10	Downgradient	04/30/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-10	Downgradient	10/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-10	Downgradient	12/03/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Resample
M-11	Downgradient	04/30/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-11	Downgradient	10/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-11	Downgradient	12/03/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Resample
M-13	Downgradient	04/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-13	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-14	Downgradient	04/25/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-14	Downgradient	10/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-15	Downgradient	04/25/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-15	Downgradient	10/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-16	Downgradient	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-16	Downgradient	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Duplicate
M-16	Downgradient	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-21	Downgradient	05/02/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-21	Downgradient	11/07/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-22	Downgradient	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-22	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-22	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Duplicate
M-23	Downgradient	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-23	Downgradient	10/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1003	Downgradient	04/25/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1003	Downgradient	10/27/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1004	Downgradient	04/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1004	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1302	Background	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1302	Background	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1309	Downgradient	04/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-1309	Downgradient	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-2000	Corrective Mesasures	04/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-2000	Corrective Measures	10/27/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-1	Downgradient	04/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-1	Downgradient	10/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-2	Downgradient	04/29/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-2	Downgradient	10/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-3R	Downgradient	04/28/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-3R	Downgradient	10/23/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-4	Downgradient	04/25/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-4	Downgradient	10/21/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-5	Background	04/22/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary
M-GS-5	Background	10/24/2025	Appendix III, Appendix IV	Assessment Monitoring Program	Primary

Notes:

Background well M-12 and downgradient monitoring well FA-8 were unable to be sampled in 2025.

TABLE 3
SUMMARY OF 2025 ANALYTICAL RESULTS
FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	CA-0623A	CA-0623A	S-09	S-09	S-21	S-21	S-23	S-23	S-1005
Sample Name	CA-0623A-04222025	CA-0623A-10212025	S-9-04242025	S-9-10292025	S-21-04242025	S-21-10272025	S-23-04282025	S-23-10242025	S-1005-04232025
Sample Date	04/22/2025	10/21/2025	04/24/2025	10/29/2025	04/24/2025	10/27/2025	04/28/2025	10/24/2025	04/23/2025
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Type of Well	Background	Background	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Background
APPENDIX III CONSTITUENTS (mg/L)									
Boron, Total	0.51	0.469	0.436	0.452	0.437	0.473	0.0841	0.0701	0.424
Calcium, Total	1.1	1.04	225	241	356	344	65.1	73.2	368
Chloride	23.9	21.1	144	139	7.9	9.4	20.4	4.8	2.1
Fluoride	2.3	2.4	0.19	0.22	0.12	0.16	0.39	0.1	2.8
Sulfate	21	23.1	691	704	1020	1040	17.2	13.1	4000
Total Dissolved Solids (TDS)	647	645	1460	1410	1960	1850	309	333	5190
pH, Field (pH units)	8.15	7.94	7.09	7.07	6.67	6.35	6.91	6.88	3.27
APPENDIX IV CONSTITUENTS (mg/L)									
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0313
Barium, Total	0.0241	0.0238	0.0228	0.0234	0.0228	0.0216	0.247	0.232	0.005
Beryllium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.0222
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00033
Chromium, Total	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	0.021
Cobalt, Total	< 0.0005	< 0.0005	0.0012	0.0013	0.0006	< 0.0005	< 0.0005	< 0.0005	0.0734
Fluoride	2.3	2.4	0.19	0.22	0.12	0.16	0.39	0.1	2.8
Lead, Total	< 0.0005	< 0.0005	0.0029	0.0041	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0011
Lithium, Total	0.0234	0.0236	0.0294	0.0277	0.0498	0.0449	0.0142	0.0152	0.5
Mercury, Total	< 0.00000052	< 0.00000052	0.00000135	0.00000103	0.00000297	0.000003	< 0.0000005	< 0.0000005	0.0000016
Molybdenum, Total	< 0.0005	< 0.0005	0.00079	< 0.0005	0.0114	0.0096	0.00052	0.004	< 0.005
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0434
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	0.293 ± 0.891	0.131 ± 1.06	1.41 ± 1.11	1.06 ± 0.789	0.463 ± 0.996	0.673 ± 0.692	0.51 ± 0.847	1.47 ± 0.881	1.21 ± 0.977

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

S-1005 was unable to be sampled in fall 2025.

TABLE 3
SUMMARY OF 2025 ANALYTICAL RESULTS
FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	S-15	S-15	S-22	S-22
Sample Name	S-15-04282025	S-15-10242025	S-22-04282025	S-22-10232025
Sample Date	04/28/2025	10/24/2025	04/28/2025	10/23/2025
Sample Type	Primary	Primary	Primary	Primary
Type of Well	Background	Background	Background	Background
APPENDIX III CONSTITUENTS (mg/L)				
Boron, Total	0.166	0.186	0.0399	0.0442
Calcium, Total	262	256	405	455
Chloride	45.4	61	2	2
Fluoride	0.3	0.36	< 0.05	0.095
Sulfate	1110	1020	898	925
Total Dissolved Solids (TDS)	1710	1600	1630	1700
pH, Field (pH units)	4.89	5.48	6.81	6.65
APPENDIX IV CONSTITUENTS (mg/L)				
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	0.0171	0.0141	< 0.0005	< 0.0005
Barium, Total	0.0105	0.0112	0.024	0.02
Beryllium, Total	0.001	0.0011	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chromium, Total	0.0016	0.0017	< 0.001	< 0.001
Cobalt, Total	0.0147	0.0151	0.0013	0.00088
Fluoride	0.3	0.36	< 0.05	0.095
Lead, Total	< 0.0005	0.00052	0.00054	< 0.0005
Lithium, Total	0.0606	0.0618	0.0293	0.0334
Mercury, Total	0.00000179	0.00000272	0.00000147	0.00000113
Molybdenum, Total	0.00054	0.0011	< 0.0005	0.00064
Selenium, Total	0.0022	0.0026	0.0006	0.00053
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	1.79 ± 2.05	1.8 ± 0.909	1.66 ± 1.32	0.874 ± 0.888

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

S-1005 was unable to be sampled in fall 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	CA-0622A	CA-0622A	M-06	M-06	M-06	M-08	M-08	M-10	M-10
Sample Name	CA-0622A-04222025	CA-0622A-10212025	M-6-04302025	M-6-10292025	M-6-12032025	M-8-04282025	M-8-10232025	M-10-04302025	M-10-10282025
Sample Date	04/22/2025	10/21/2025	04/30/2025	10/29/2025	12/03/2025	04/28/2025	10/23/2025	04/30/2025	10/28/2025
Sample Type	Primary	Primary	Primary	Primary	Resample	Primary	Primary	Primary	Primary
Type of Well	Background	Background	Background	Background	Background	Downgradient	Downgradient	Downgradient	Downgradient
APPENDIX III CONSTITUENTS (mg/L)									
Boron, Total	0.407	0.319	0.283	0.276	0.281	0.0333	0.0348	0.497	0.505
Calcium, Total	54.4	57.5	13.1	5.8	9.66	97.9	99.9	7.61	8.61
Chloride	2940	3300	48.6	45.8	45.4	6.3	6.8	13.9	13.8
Fluoride	0.59	0.72	1.2	1.4	1.2	0.086	0.1	0.81	0.83
Sulfate	14.2	1.1	14.6	14.9	29.9	95.2	109	123	139
Total Dissolved Solids (TDS)	5600	6190	792	694	810	423	431	724	719
pH, Field (pH units)	7.33	7.18	7.94	7.46	6.96	6.82	6.73	7.68	7.64
APPENDIX IV CONSTITUENTS (mg/L)									
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.00064	< 0.0005
Arsenic, Total	0.0134	0.0056	0.0047	0.0015	0.0029	0.0011	0.0015	< 0.0005	< 0.0005
Barium, Total	1.06	1.35	0.506	0.194	0.381	0.101	0.097	0.0779	0.0764
Beryllium, Total	< 0.0001	< 0.0001	0.0017	0.00012	0.001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	0.00021	< 0.0001	0.00014	< 0.0001	< 0.0001	0.00081	0.00037
Chromium, Total	0.0013	< 0.001	0.0075	0.0012	0.0046	< 0.001	< 0.001	0.0011	< 0.001
Cobalt, Total	< 0.0005	< 0.0005	0.0046	< 0.0005	0.0026	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fluoride	0.59	0.72	1.2	1.4	1.2	0.086	0.1	0.81	0.83
Lead, Total	< 0.0005	< 0.0005	0.0311	0.0034	0.0236	< 0.0005	0.0039	0.0043	0.00088
Lithium, Total	0.0753	0.0763	0.0221	0.0145	0.0185	< 0.01	< 0.01	0.0236	0.0199
Mercury, Total	0.00000229	0.00000147	0.0000143	0.00000086	0.0000079	< 0.0000005	< 0.0000005	0.00000998	0.00000191
Molybdenum, Total	0.00076	0.0017	0.0011	0.0011	0.0014	< 0.0005	< 0.0005	0.002	0.0017
Selenium, Total	< 0.0005	< 0.0005	0.0065	< 0.0005	0.0042	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	9.7 ± 2.35	15.1 ± 3.24	7.09 ± 2.08	1.88 ± 0.976	3.69 ± 1.37	1.95 ± 1.18	1.71 ± 1.13	1.27 ± 0.967	1.79 ± 0.972

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	M-10	M-11	M-11	M-11	M-13	M-13	M-14	M-14	M-15
Sample Name	M-10-12032025	M-11-04302025	M-11-10282025	M-11-12032025	M-13-04292025	M-13-10232025	M-14-04252025	M-14-10222025	M-15-04252025
Sample Date	12/03/2025	04/30/2025	10/28/2025	12/03/2025	04/29/2025	10/23/2025	04/25/2025	10/22/2025	04/25/2025
Sample Type	Resample	Primary	Primary	Resample	Primary	Primary	Primary	Primary	Primary
Type of Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
APPENDIX III CONSTITUENTS (mg/L)									
Boron, Total	0.461	5.96	6.03	6.27	0.247	0.251	0.235	0.222	0.274
Calcium, Total	7.32	285	285	302	6.82	6.14	0.63	0.599	1.56
Chloride	12.7	30.2	23.8	23.9	2.6	2.7	1.9	1.9	21.7
Fluoride	0.78	0.42	0.46	0.49	1.5	1.6	0.88	0.95	1.3
Sulfate	121	821	843	844	15.5	15.6	< 0.25	0.27	2.8
Total Dissolved Solids (TDS)	742	1470	1450	1510	492	489	376	396	564
pH, Field (pH units)	7.31	7.1	7.05	8.06	7.98	7.55	8.3	8.24	8.26
APPENDIX IV CONSTITUENTS (mg/L)									
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	< 0.0005	0.0124	0.0069	0.0232	0.00054	< 0.0005	< 0.0005	< 0.0005	0.0012
Barium, Total	0.0841	0.0305	0.0318	0.0343	0.0902	0.0781	0.0172	0.0166	0.043
Beryllium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	0.0008	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00012
Chromium, Total	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt, Total	< 0.0005	0.0012	0.00084	0.0019	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fluoride	0.78	0.42	0.46	0.49	1.5	1.6	0.88	0.95	1.3
Lead, Total	0.0053	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Lithium, Total	0.0224	0.18	0.169	0.175	0.0118	0.0104	< 0.01	0.0101	0.0115
Mercury, Total	0.00000853	< 0.0000005	< 0.0000005	< 0.0000005	0.00000146	0.00000132	< 0.0000005	< 0.0000005	< 0.00000052
Molybdenum, Total	0.0016	0.246	0.231	0.285	0.00052	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	1.33 ± 1.04	0.557 ± 0.891	0.374 ± 0.836	1.47 ± 0.838	1.27 ± 1.07	1.4 ± 1.08	0.901 ± 1.1	0.543 ± 0.856	0.507 ± 0.797

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	M-15	M-16	M-16	M-16	M-21	M-21	M-22	M-22	M-22
Sample Name	M-15-10222025	M-16-04222025	M-16A-04222025	M-16-10212025	M-21-05022025	M-21-11072025	M-22-04282025	M-22-10232025	M-22A-10232025
Sample Date	10/22/2025	04/22/2025	04/22/2025	10/21/2025	05/02/2025	11/07/2025	04/28/2025	10/23/2025	10/23/2025
Sample Type	Primary	Primary	Duplicate	Primary	Primary	Primary	Primary	Primary	Duplicate
Type of Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient
APPENDIX III CONSTITUENTS (mg/L)									
Boron, Total	0.248	0.204	0.202	0.187	3.63	3.7	3.51	3.4	3.2
Calcium, Total	1.49	2.11	2.06	2.08	272	280	158	150	151
Chloride	23.5	10.9	11.3	11	74.8	39.9	37.3	38.4	36
Fluoride	1.4	0.43	0.43	0.47	0.11	0.13	0.59	0.62	0.52
Sulfate	7.6	213	204	197	994	923	349	370	361
Total Dissolved Solids (TDS)	574	746	725	698	1680	1540	840	838	838
pH, Field (pH units)	8.15	8.19	-	7.58	7.03	6.75	6.73	6.8	-
APPENDIX IV CONSTITUENTS (mg/L)									
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	0.001	< 0.0005	< 0.0005	< 0.0005	0.00071	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Barium, Total	0.0421	0.0325	0.0316	0.029	0.0182	0.0175	0.021	0.0205	0.0201
Beryllium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00032	0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	0.00012	< 0.0001	< 0.0001	< 0.0001
Chromium, Total	< 0.001	< 0.001	< 0.001	< 0.001	0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0034	0.002	< 0.0005	< 0.0005	0.0012
Fluoride	1.4	0.43	0.43	0.47	0.11	0.13	0.59	0.62	0.52
Lead, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0016	0.001	< 0.0005	< 0.0005	< 0.0005
Lithium, Total	0.0128	0.0122	0.0147	0.0141	0.0881	0.088	0.0413	0.0394	0.0348
Mercury, Total	< 0.00000052	0.00000059	0.00000068	0.00000111	0.00000399	0.00000108	< 0.0000005	< 0.0000005	< 0.0000005
Molybdenum, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0237	0.0291	0.0465	0.0448	0.0501
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0007	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	1.04 ± 0.792	0.966 ± 1.16	0.502 ± 1.31	1.08 ± 0.816	2 ± 1.27	1.33 ± 1.13	0.997 ± 1.18	2.11 ± 0.913	2.04 ± 1.03

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	M-23	M-23	M-1003	M-1003	M-1004	M-1004	M-1302	M-1302
Sample Name	M-23-04282025	M-23-10242025	M-1003-04252025	M-1003-10272025	M-1004-04292025	M-1004-10232025	M-1302-04222025	M-1302-10212025
Sample Date	04/28/2025	10/24/2025	04/25/2025	10/27/2025	04/29/2025	10/23/2025	04/22/2025	10/21/2025
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Type of Well	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Downgradient	Background	Background
APPENDIX III CONSTITUENTS (mg/L)								
Boron, Total	0.694	0.653	0.139	0.151	2.54	2.86	0.315	0.301
Calcium, Total	103	88.2	86.9	90.5	96.9	110	2.83	2.86
Chloride	12	14	10.9	10.3	32.7	38.3	31.7	30.6
Fluoride	0.57	0.65	0.18	0.18	1.7	1.3	2.2	2.5
Sulfate	1640	1670	185	197	264	344	39.3	29.9
Total Dissolved Solids (TDS)	3380	3420	584	560	826	870	690	689
pH, Field (pH units)	6.95	6.77	6.95	7.29	6.77	6.66	8.03	8.04
APPENDIX IV CONSTITUENTS (mg/L)								
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	0.0011	0.0011	0.00077	0.00064	0.0015	0.001	< 0.0005	< 0.0005
Barium, Total	0.009	0.0105	0.0909	0.085	0.0487	0.0311	0.11	0.107
Beryllium, Total	< 0.0001	< 0.0001	0.00014	0.00013	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chromium, Total	< 0.001	0.0017	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt, Total	0.00053	0.00075	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fluoride	0.57	0.65	0.18	0.18	1.7	1.3	2.2	2.5
Lead, Total	< 0.0005	0.0011	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Lithium, Total	0.0564	0.0575	0.0145	0.0156	0.0239	0.0216	0.0171	0.0159
Mercury, Total	0.00000072	0.00000146	< 0.0000005	0.00000063	0.000002	0.000000623	< 0.00000052	< 0.00000052
Molybdenum, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	0.0092	0.0107	< 0.0005	< 0.0005
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	2.23 ± 1.15	2.57 ± 1.02	1.8 ± 1.29	6.1 ± 1.62	1.51 ± 1.05	2.43 ± 1.03	1.25 ± 0.761	1.61 ± 1.08

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	M-1309	M-1309	M-2000	M-2000	M-GS-1	M-GS-1	M-GS-2	M-GS-2
Sample Name	M-1309-04242025	M-1309-10212025	M-2000-04242025	M-2000-10272025	M-GS-1-04292025	M-GS-1-10222025	M-GS-2-04292025	M-GS-2-10222025
Sample Date	04/24/2025	10/21/2025	04/24/2025	10/27/2025	04/29/2025	10/22/2025	04/29/2025	10/22/2025
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary	Primary	Primary
Type of Well	Downgradient	Downgradient	Corrective Measures	Corrective Measures	Downgradient	Downgradient	Downgradient	Downgradient
APPENDIX III CONSTITUENTS (mg/L)								
Boron, Total	0.281	0.274	4.99	5.26	0.261	0.245	0.285	0.277
Calcium, Total	2.74	2.51	232	252	5.47	5.77	6.01	4.67
Chloride	42.7	40.5	36.8	32.3	17.7	16.2	14	13.2
Fluoride	1.1	1.2	0.32	0.35	1.3	1.5	2.3	2.5
Sulfate	47.9	56.8	801	797	107	143	41.9	49.8
Total Dissolved Solids (TDS)	636	666	1440	1390	703	740	633	652
pH, Field (pH units)	6.64	6.67	6.96	6.84	7.63	7.43	8.11	7.55
APPENDIX IV CONSTITUENTS (mg/L)								
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	0.0024	0.0011	0.0012	0.0014	< 0.0005	< 0.0005	0.003	0.0032
Barium, Total	0.0362	0.0242	0.0223	0.0215	0.0891	0.0928	0.0311	0.0262
Beryllium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chromium, Total	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt, Total	< 0.0005	< 0.0005	0.00092	0.00083	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fluoride	1.1	1.2	0.32	0.35	1.3	1.5	2.3	2.5
Lead, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Lithium, Total	0.0115	0.0153	0.151	0.159	0.0175	0.0202	0.0129	0.017
Mercury, Total	0.00000201	0.00000127	< 0.0000005	< 0.0000005	< 0.00000052	< 0.00000052	< 0.0000005	< 0.0000005
Molybdenum, Total	0.00082	0.00052	0.189	0.183	< 0.0005	< 0.0005	0.0024	0.0033
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	0.483 ± 1.03	0.192 ± 0.862	1.48 ± 1.24	1.78 ± 0.851	1.83 ± 1.12	0.717 ± 0.783	0.966 ± 1.1	1.07 ± 0.968

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 4
SUMMARY OF 2025 ANALYTICAL RESULTS
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Location Name	M-GS-3R	M-GS-3R	M-GS-4	M-GS-4	M-GS-5	M-GS-5
Sample Name	M-GS-3R-04282025	M-GS-3R-10232025	M-GS-4-04252025	M-GS-4-10212025	M-GS-5-04222025	M-GS-5-10242025
Sample Date	04/28/2025	10/23/2025	04/25/2025	10/21/2025	04/22/2025	10/24/2025
Sample Type	Primary	Primary	Primary	Primary	Primary	Primary
Type of Well	Downgradient	Downgradient	Downgradient	Downgradient	Background	Background
APPENDIX III CONSTITUENTS (mg/L)						
Boron, Total	2.72	2.76	0.191	0.182	0.315	0.319
Calcium, Total	161	156	2.7	2.55	4.24	3.49
Chloride	42.5	43.3	10.6	9.8	55.6	151
Fluoride	0.18	0.22	0.55	0.58	5.2	6.3
Sulfate	439	467	3.3	3.4	645	239
Total Dissolved Solids (TDS)	932	970	446	451	1550	1210
pH, Field (pH units)	6.79	7.33	8.33	8.34	7.93	7.55
APPENDIX IV CONSTITUENTS (mg/L)						
Antimony, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Arsenic, Total	0.0019	0.002	0.001	0.001	0.0054	0.0112
Barium, Total	0.0136	0.014	0.0282	0.0272	0.0483	0.087
Beryllium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Cadmium, Total	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Chromium, Total	0.003	0.0037	< 0.001	< 0.001	< 0.001	< 0.001
Cobalt, Total	0.0013	0.0018	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Fluoride	0.18	0.22	0.55	0.58	5.2	6.3
Lead, Total	< 0.0005	0.00051	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Lithium, Total	0.0265	0.0247	< 0.01	0.012	0.0215	0.0156
Mercury, Total	0.00000066	0.0000011	< 0.0000005	< 0.0000005	< 0.0000005	< 0.0000005
Molybdenum, Total	0.0368	0.0352	< 0.0005	< 0.0005	0.002	0.0038
Selenium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Thallium, Total	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005	< 0.0005
Radium-226 & 228 (pCi/L)	0.577 ± 0.903	0.863 ± 0.751	0.658 ± 1	0.97 ± 0.85	2.43 ± 1.06	1.63 ± 0.917

Notes and Abbreviations:

mg/L = milligram per liter

pCi/L = picocuries per liter

< = Not detected at reporting limit

Bold = detected

M-12 and FA-8 were unable to be sampled in 2025.

TABLE 5
GROUNDWATER PROTECTION STANDARDS
FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

	Concentration Units	MCL	CCR Rules § 257.95(h)(2)	Background Upper Tolerance Limit [1]	FAR II GWPS [1]	Background Upper Tolerance Limit [2]	FAR II GWPS [2]
APPENDIX IV CONSTITUENTS							
Antimony	mg/L	0.006	-	0.0005	0.006	0.0005	0.006
Arsenic	mg/L	0.01	-	0.0854	0.0854	0.0854	0.0854
Barium	mg/L	2	-	0.024	2	0.0241	2
Beryllium	mg/L	0.004	-	0.0344	0.0344	0.0344	0.0344
Cadmium	mg/L	0.005	-	0.0013	0.005	0.0016	0.005
Chromium	mg/L	0.1	-	0.0372	0.1	0.0372	0.1
Cobalt	mg/L	-	0.006	0.208	0.208	0.208	0.208
Fluoride	mg/L	4	-	2.7	4	2.8	4
Lead	mg/L	-	0.015	0.004	0.015	0.0025	0.015
Lithium	mg/L	-	0.04	0.685	0.685	0.685	0.685
Mercury	mg/L	0.002	-	0.0000828	0.002	0.000074	0.002
Molybdenum	mg/L	-	0.1	0.01	0.1	0.01	0.1
Radium 226 and 228 Combined	pCi/L	5	-	1.888	5	2.06	5
Selenium	mg/L	0.05	-	0.06	0.06	0.06	0.06
Thallium	mg/L	0.002	-	0.0011	0.002	0.0011	0.002

Notes and Abbreviations:

MCL = maximum contaminant level

CCR = coal combustion residual

FAR = Fly Ash Reservoir

mg/L = milligrams per liter

pCi/L = picocuries per liter

[1] Background upper tolerance limits and GWPS values presented by Cox-Calvin in October 2023 and incorporate samples collected between February 2023 and June 2023. These values were used for statistical evaluations of the fall 2024 and spring 2025 datasets.

[2] Background upper tolerance limits and GWPS values updated in November 2025 and incorporate samples collected between February 2023 and April 2025. These values will be used for statistical evaluation starting with the fall 2025 dataset.

TABLE 6
GROUNDWATER PROTECTION STANDARDS
FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

	Concentration Units	MCL	CCR Rules § 257.95(h)(2)	Background Upper Tolerance Limit [1]	FAR II GWPS [1]	Background Upper Tolerance Limit [2]	FAR II GWPS [2]
APPENDIX IV CONSTITUENT							
Antimony	mg/L	0.006	-	0.0005	0.006	0.0047	0.006
Arsenic	mg/L	0.01	-	0.0414	0.0414	0.0372	0.0372
Barium	mg/L	2	-	1.41	2	1.41	2
Beryllium	mg/L	0.004	-	0.0025	0.004	0.0025	0.004
Cadmium	mg/L	0.005	-	0.0005	0.005	0.0011	0.005
Chromium	mg/L	0.1	-	0.0197	0.1	0.0197	0.1
Cobalt	mg/L	-	0.006	0.0404	0.0404	0.0496	0.0496
Fluoride	mg/L	4	-	6.6	6.6	6.6	6.6
Lead	mg/L	-	0.015	0.0463	0.0463	0.0463	0.0463
Lithium	mg/L	-	0.04	0.164	0.164	0.164	0.164
Mercury	mg/L	0.002	-	0.0000263	0.002	0.000026	0.002
Molybdenum	mg/L	-	0.1	0.0601	0.1	0.0601	0.1
Radium 226 and 228 Combined	pCi/L	5	-	15.76	15.76	17.2	17.2
Selenium	mg/L	0.05	-	0.0029	0.05	0.0137	0.05
Thallium	mg/L	0.002	-	0.0005	0.002	0.00076	0.002

Notes and Abbreviations:

MCL = maximum contaminant level

CCR = coal combustion residual

FAR = Fly Ash Reservoir

mg/L = milligrams per liter

pCi/L = picocuries per liter

[1] Background upper tolerance limits and GWPS values presented by Cox-Calvin in August 2023 and incorporate samples collected between June 2016 and December 2022. These values were used for statistical evaluations of the fall 2024 and spring 2025 datasets.

[2] Background upper tolerance limits and GWPS values updated in November 2025 and incorporate samples collected between June 2016 and April 2025. These values will be used for statistical evaluation starting with the fall 2025 dataset.

TABLE 7
GROUNDWATER FLOW CALCULATIONS, APRIL 2025
 FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Depth to Water (ft)	Potentiometric Elevation (ft) ²	Hydraulic Gradient ² (ft/ft)	Hydraulic Conductivity ⁴ (cm/sec)			Effective Porosity	Groundwater Velocity (ft/day)			Well Diameter ⁵ (in)
					Low	Representative	High		Low	Representative	High	
CA-0623A	Upgradient	151.07	1011.65	0.05	0.0001	0.005	0.1	0.32	0.04	2.18	43.59	6
S-9	Downgradient	44.38	936.18	0.10	0.0001	0.005	0.1	0.32	0.09	4.31	86.21	8
S-15	Upgradient	73.78	1000.55	0.66	0.0001	0.005	0.1	0.32	0.59	29.42	588.30	6
S-21	Downgradient	60.53	957.87	0.04	0.0001	0.005	0.1	0.32	0.03	1.63	32.56	8
S-22	Upgradient	30.68	977.33	0.07	0.0001	0.005	0.1	0.32	0.06	2.98	59.57	6
S-23	Downgradient	28.48	959.14	0.18	0.0001	0.005	0.1	0.32	0.16	8.10	161.93	6
S-1005	Upgradient	129.68	1001.20	0.06	0.0001	0.005	0.1	0.32	0.06	2.79	55.74	6

Notes and Abbreviations:

Measurements and calculations represent conditions on April 21, 2025.

- Hydraulic calculations were excluded from contouring because of very high hydraulic gradient.

¹ Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

² Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

³ Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

⁴ Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

⁵ Well diameter represents the diameter of the borehole (sandpack).

⁶ Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 7
GROUNDWATER FLOW CALCULATIONS, APRIL 2025
 FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Residence Time ⁶ (days)		
		Low	Representative	High
CA-0623A	Upgradient	0.01	0.23	11.47
S-9	Downgradient	-	-	-
S-15	Upgradient	0.00	0.02	0.85
S-21	Downgradient	0.02	0.41	20.47
S-22	Upgradient	0.01	0.17	8.39
S-23	Downgradient	-	-	-
S-1005	Upgradient	0.01	0.18	8.97

Notes and Abbreviations:

Measurements and calculations represent conditions on April 21, 2025.

- Hydraulic calculations were excluded from contouring because of very high hydraulic gradient.

1 Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

2 Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

3 Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

4 Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

5 Well diameter represents the diameter of the borehole (sandpack).

6 Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 8
GROUNDWATER FLOW CALCULATIONS, APRIL 2025
FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Depth to Water (ft)	Potentiometric Elevation ² (ft)	Hydraulic Gradient ³ (ft/ft)	Hydraulic Conductivity ⁴ (cm/sec)			Effective Porosity	Groundwater Velocity (ft/day)		
					Low	Representative	High		Low	Representative	High
CA-0622A	Upgradient	229.09	933.19	0.009	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.008	8.399
FA-8	Downgradient	53.50	867.53	0.055	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.049	49.046
M-6	Upgradient	71.28	939.29	0.018	1.0E-06	1.0E-04	1.0E-01	0.32	0.0002	0.016	15.723
M-8	Downgradient	71.74	821.46	0.025	1.0E-06	1.0E-04	1.0E-01	0.32	0.0002	0.022	22.055
M-10	Downgradient	105.46	877.65	0.042	1.0E-06	1.0E-04	1.0E-01	0.32	0.0004	0.038	37.648
M-11	Downgradient	97.91	882.3	0.030	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.026	26.460
M-12	Upgradient	221.42	955.68	0.006	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.006	5.584
M-13	Downgradient	82.70	908.44	0.029	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.026	26.073
M-14	Downgradient	89.51	898.7	0.033	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.029	29.228
M-15	Downgradient	147.88	926.4	0.021	1.0E-06	1.0E-04	1.0E-01	0.32	0.0002	0.019	18.541
M-16	Downgradient	118.09	950.46	0.012	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.011	11.013
M-21	Downgradient	135.56	883.05	0.034	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.030	30.032
M-22	Downgradient	108.18	899.86	0.006	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.006	5.637
M-23	Downgradient	150.55	835.35	0.053	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.047	46.808
M-1003	Downgradient	89.69	846.19	0.039	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.035	34.925
M-1004	Downgradient	102.32	905.97	0.013	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.011	11.496
M-1302	Upgradient	90.00	940.72	0.013	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.011	11.109
M-1309	Downgradient	240.9	931.19	0.013	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.012	11.584
M-GS-1	Downgradient	56.82	935.05	0.037	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.033	32.893
M-GS-2	Downgradient	94.45	896.36	0.047	1.0E-06	1.0E-04	1.0E-01	0.32	0.0004	0.042	41.875
M-GS-3R	Downgradient	91.76	909.68	0.065	1.0E-06	1.0E-04	1.0E-01	0.32	0.0006	0.057	57.165
M-GS-4	Downgradient	85.24	937.56	0.017	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.015	14.704
M-GS-5	Upgradient	83.54	956.00	0.001	1.0E-06	1.0E-04	1.0E-01	0.32	0.0000	0.001	0.966

Notes and Abbreviations:

Measurements and calculations represent conditions on April 21, 2025.

- A water level could not be collected from this well.

¹ Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

² Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

³ Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

⁴ Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

⁵ Well diameter represents the diameter of the borehole (sandpack).

⁶ Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 8
GROUNDWATER FLOW CALCULATIONS, APRIL 2025
FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Well Diameter ⁵ (in)	Residence Time in Well ⁶ (days)		
			Low	Representative	High
CA-0622A	Upgradient	6	-	-	
FA-8	Downgradient	6	0.010	10.19	1019.45
M-6	Upgradient	6	0.032	31.80	3179.97
M-8	Downgradient	6	0.023	22.67	2267.03
M-10	Downgradient	3	0.007	6.64	664.05
M-11	Downgradient	3	0.009	9.45	944.83
M-12	Upgradient	6	0.090	89.54	8953.60
M-13	Downgradient	6	0.019	19.18	1917.66
M-14	Downgradient	6	0.017	17.11	1710.70
M-15	Downgradient	6	0.027	26.97	2696.79
M-16	Downgradient	6	0.045	45.40	4540.10
M-21	Downgradient	6	0.017	16.65	1664.91
M-22	Downgradient	6	0.089	88.70	8869.84
M-23	Downgradient	6	0.011	10.68	1068.20
M-1003	Downgradient	6	0.014	14.32	1431.63
M-1004	Downgradient	4.87	0.035	35.30	3530.06
M-1302	Upgradient	6	0.045	45.01	4500.96
M-1309	Downgradient	6	0.043	43.16	4316.34
M-GS-1	Downgradient	6	0.015	15.20	1520.09
M-GS-2	Downgradient	6	0.012	11.94	1194.02
M-GS-3R	Downgradient	6	0.009	8.75	874.66
M-GS-4	Downgradient	6	0.034	34.01	3400.55
M-GS-5	Upgradient	6	0.517	517.41	51740.74

Notes and Abbreviations:

Measurements and calculations represent conditions on April 21, 2025.

- A water level could not be collected from this well.

1 Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

2 Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

3 Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

4 Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

5 Well diameter represents the diameter of the borehole (sandpack).

6 Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 9
GROUNDWATER FLOW CALCULATIONS, OCTOBER 2025
FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Depth to Water (ft)	Potentiometric Elevation (ft) ²	Hydraulic Gradient ² (ft/ft)	Hydraulic Conductivity ⁴ (cm/sec)			Effective Porosity	Groundwater Velocity (ft/day)			Well Diameter ⁵ (in)
					Low	Representative	High		Low	Representative	High	
CA-0623A	Upgradient	153.81	1008.91	0.01	0.0001	0.005	0.1	0.32	0.01	0.55	11.01	6
S-9	Downgradient	45.30	935.26	0.07	0.0001	0.005	0.1	0.32	0.06	3.03	60.51	8
S-15	Upgradient	74.55	999.78	0.20	0.0001	0.005	0.1	0.32	0.18	8.84	176.80	6
S-21	Downgradient	61.41	956.99	0.31	0.0001	0.005	0.1	0.32	0.28	13.94	278.71	8
S-22	Upgradient	34.35	973.66	0.02	0.0001	0.005	0.1	0.32	0.02	1.01	20.14	6
S-23	Downgradient	31.16	956.46	0.12	0.0001	0.005	0.1	0.32	0.11	5.40	107.97	6
S-1005	Upgradient	129.95	1000.93	0.02	0.0001	0.005	0.1	0.32	0.02	0.86	17.16	6

Notes and Abbreviations:

Measurements and calculations represent conditions on October 21, 2025.

- Hydraulic calculations were excluded from contouring because of very high hydraulic gradient.

¹ Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

² Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

³ Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

⁴ Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

⁵ Well diameter represents the diameter of the borehole (sandpack).

⁶ Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 9
GROUNDWATER FLOW CALCULATIONS, OCTOBER 2025
 FAR II SHALLOW AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Residence Time ⁶ (days)		
		Low	Representative	High
CA-0623A	Upgradient	0.05	0.91	45.42
S-9	Downgradient	0.01	0.22	11.02
S-15	Upgradient	0.00	0.06	2.83
S-21	Downgradient	0.00	0.05	2.39
S-22	Upgradient	0.02	0.50	24.83
S-23	Downgradient	0.00	0.09	4.63
S-1005	Upgradient	0.03	0.58	29.13

Notes and Abbreviations:

Measurements and calculations represent conditions on October 21, 2025.

- Hydraulic calculations were excluded from contouring because of very high hydraulic gradient.

1 Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

2 Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

3 Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

4 Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

5 Well diameter represents the diameter of the borehole (sandpack).

6 Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 10
GROUNDWATER FLOW CALCULATIONS, OCTOBER 2025
FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Depth to Water (ft)	Potentiometric Elevation ² (ft)	Hydraulic Gradient ³ (ft/ft)	Hydraulic Conductivity ⁴ (cm/sec)			Effective Porosity	Groundwater Velocity (ft/day)		
					Low	Representative	High		Low	Representative	High
CA-0622A	Upgradient	229.70	932.58	-0.015	1.0E-06	1.0E-04	1.0E-01	0.32	-0.0001	-0.014	-13.717
FA-8	Downgradient	52.38	868.65	0.054	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.048	47.593
M-6	Upgradient	73.35	937.22	0.060	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.053	53.297
M-8	Downgradient	72.68	820.52	0.110	1.0E-06	1.0E-04	1.0E-01	0.32	0.0010	0.098	97.647
M-10	Downgradient	105.64	877.47	0.039	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.035	34.827
M-11	Downgradient	97.29	882.92	0.015	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.013	13.472
M-12	Upgradient	222.54	954.56	0.019	1.0E-06	1.0E-04	1.0E-01	0.32	0.0002	0.016	16.487
M-13	Downgradient	84.90	906.24	0.056	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.050	49.712
M-14	Downgradient	90.9	897.31	0.058	1.0E-06	1.0E-04	1.0E-01	0.32	0.0005	0.052	51.802
M-15	Downgradient	149.07	925.21	0.012	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.011	10.634
M-16	Downgradient	118.98	949.57	0.034	1.0E-06	1.0E-04	1.0E-01	0.32	0.0003	0.030	29.850
M-21	Downgradient	137.01	881.6	0.156	1.0E-06	1.0E-04	1.0E-01	0.32	0.0014	0.138	137.795
M-22	Downgradient	109.25	898.79	0.008	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.007	7.291
M-23	Downgradient	151.05	834.85	0.156	1.0E-06	1.0E-04	1.0E-01	0.32	0.0014	0.138	138.243
M-1003	Downgradient	90.69	845.19	0.024	1.0E-06	1.0E-04	1.0E-01	0.32	0.0002	0.022	21.519
M-1004	Downgradient	104.61	903.68	0.016	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.014	14.361
M-1302	Upgradient	90.90	939.82	0.002	1.0E-06	1.0E-04	1.0E-01	0.32	0.0000	0.002	1.579
M-1309	Downgradient	241.07	931.02	0.003	1.0E-06	1.0E-04	1.0E-01	0.32	0.0000	0.003	2.738
M-GS-1	Downgradient	58.8	933.07	0.008	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.007	7.451
M-GS-2	Downgradient	95.85	894.96	0.081	1.0E-06	1.0E-04	1.0E-01	0.32	0.0007	0.072	72.009
M-GS-3R	Downgradient	94.4	907.04	0.050	1.0E-06	1.0E-04	1.0E-01	0.32	0.0004	0.044	44.229
M-GS-4	Downgradient	87.86	934.94	0.014	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.012	12.122
M-GS-5	Upgradient	83.19	956.35	0.006	1.0E-06	1.0E-04	1.0E-01	0.32	0.0001	0.005	5.327

Notes and Abbreviations:

Measurements and calculations represent conditions on October 21, 2025.

- A water level could not be collected from this well.

¹ Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

² Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

³ Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

⁴ Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

⁵ Well diameter represents the diameter of the borehole (sandpack).

⁶ Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

ft = feet

cm/sec = centimeters per second

in = inch

TABLE 10
GROUNDWATER FLOW CALCULATIONS, OCTOBER 2025
 FAR II MORGANTOWN AQUIFER
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

Well	Hydraulic Location ¹	Well Diameter ⁵ (in)	Residence Time in Well ⁶ (days)		
			Low	Representative	High
CA-0622A	Upgradient	6	-	-	
FA-8	Downgradient	6	0.011	10.51	1050.58
M-6	Upgradient	6	0.009	9.38	938.13
M-8	Downgradient	6	0.005	5.12	512.05
M-10	Downgradient	3	0.007	7.18	717.83
M-11	Downgradient	3	0.019	18.56	1855.71
M-12	Upgradient	6	0.030	30.33	3032.65
M-13	Downgradient	6	0.010	10.06	1005.79
M-14	Downgradient	6	0.010	9.65	965.22
M-15	Downgradient	6	0.047	47.02	4701.74
M-16	Downgradient	6	0.017	16.75	1675.05
M-21	Downgradient	6	0.004	3.63	362.86
M-22	Downgradient	6	0.069	68.57	6857.30
M-23	Downgradient	6	0.004	3.62	361.68
M-1003	Downgradient	6	0.023	23.23	2323.49
M-1004	Downgradient	4.87	0.028	28.26	2826.03
M-1302	Upgradient	6	0.317	316.72	31671.60
M-1309	Downgradient	6	0.183	182.61	18261.44
M-GS-1	Downgradient	6	0.067	67.11	6710.82
M-GS-2	Downgradient	6	0.007	6.94	694.36
M-GS-3R	Downgradient	6	0.011	11.30	1130.49
M-GS-4	Downgradient	6	0.041	41.25	4124.79
M-GS-5	Upgradient	6	-	-	

Notes and Abbreviations:

Measurements and calculations represent conditions on October 21, 2025.

- A water level could not be collected from this well.

1 Groundwater Monitoring Network Evaluation; Cardinal Site – Fly Ash Reservoir II, Brilliant, Ohio prepared by Geosyntec Consultants in September 2016 (Revised February 2017).

2 Elevations datum is National Geodetic Vertical Datum of 1929 (NGVD29).

3 Hydraulic gradient was calculated from a potentiometric surface using Arcmap software tools.

4 Low and high conductivity values are from the 2017 Groundwater Monitoring Network Evaluation, with a representative value chosen within this range that is consistent with previous velocity calculations.

5 Well diameter represents the diameter of the borehole (sandpack).

6 Residence time is an estimation of how long it would take groundwater to travel a distance equivalent to the well diameter at the calculated velocity.

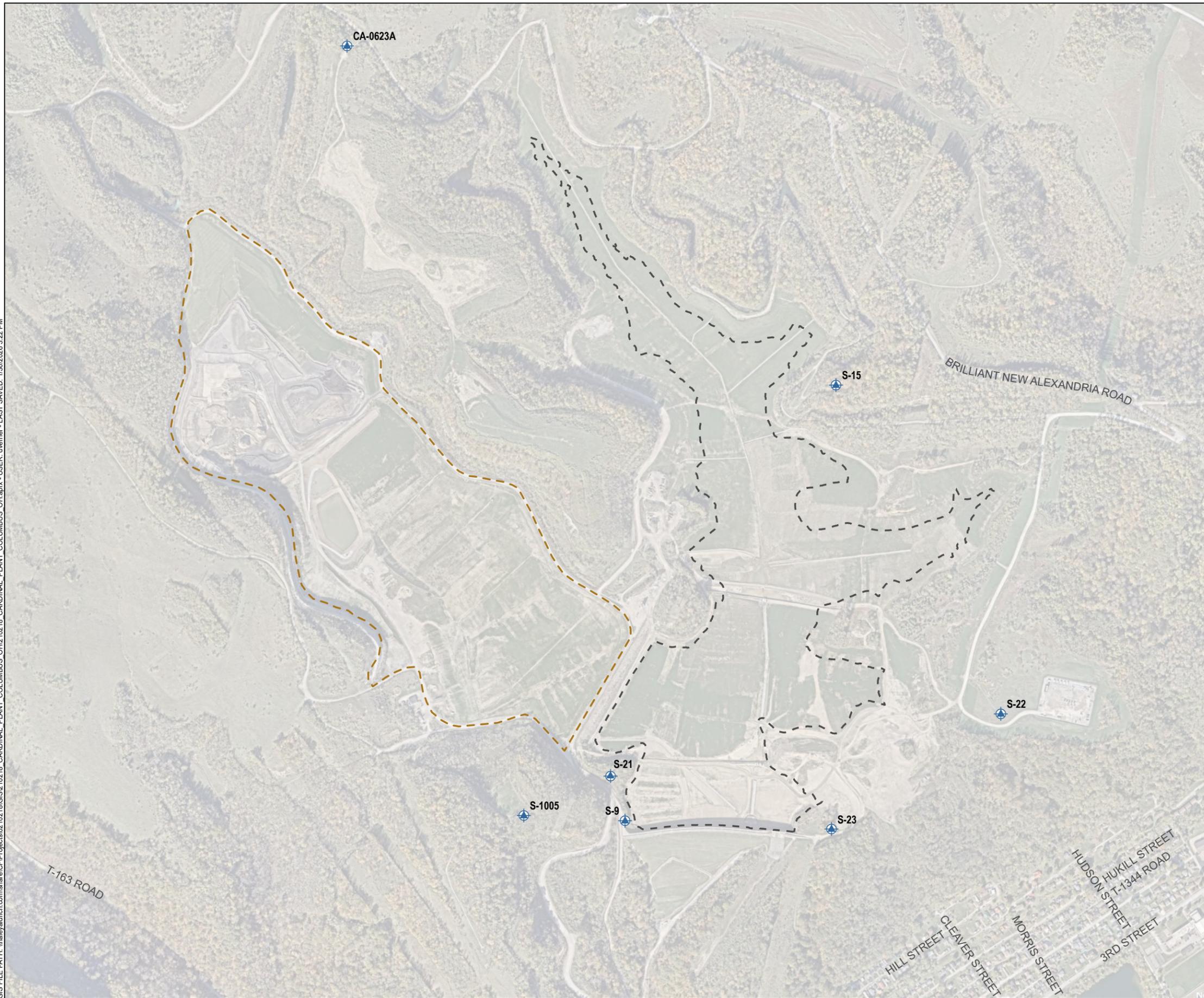
ft = feet

cm/sec = centimeters per second

in = inch

FIGURES

C:\S:\FILE PATH\haleyaldrich.com\share\CF\Projects\0210218\GIS\0210218_CARDINAL_PLANT_COLUMBUS_OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:22 PM



LEGEND

-  MONITORING WELL
-  FAR I RESIDUAL SOLID WASTE LANDFILL
-  FLY ASH RESERVOIR II (FAR II)

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025



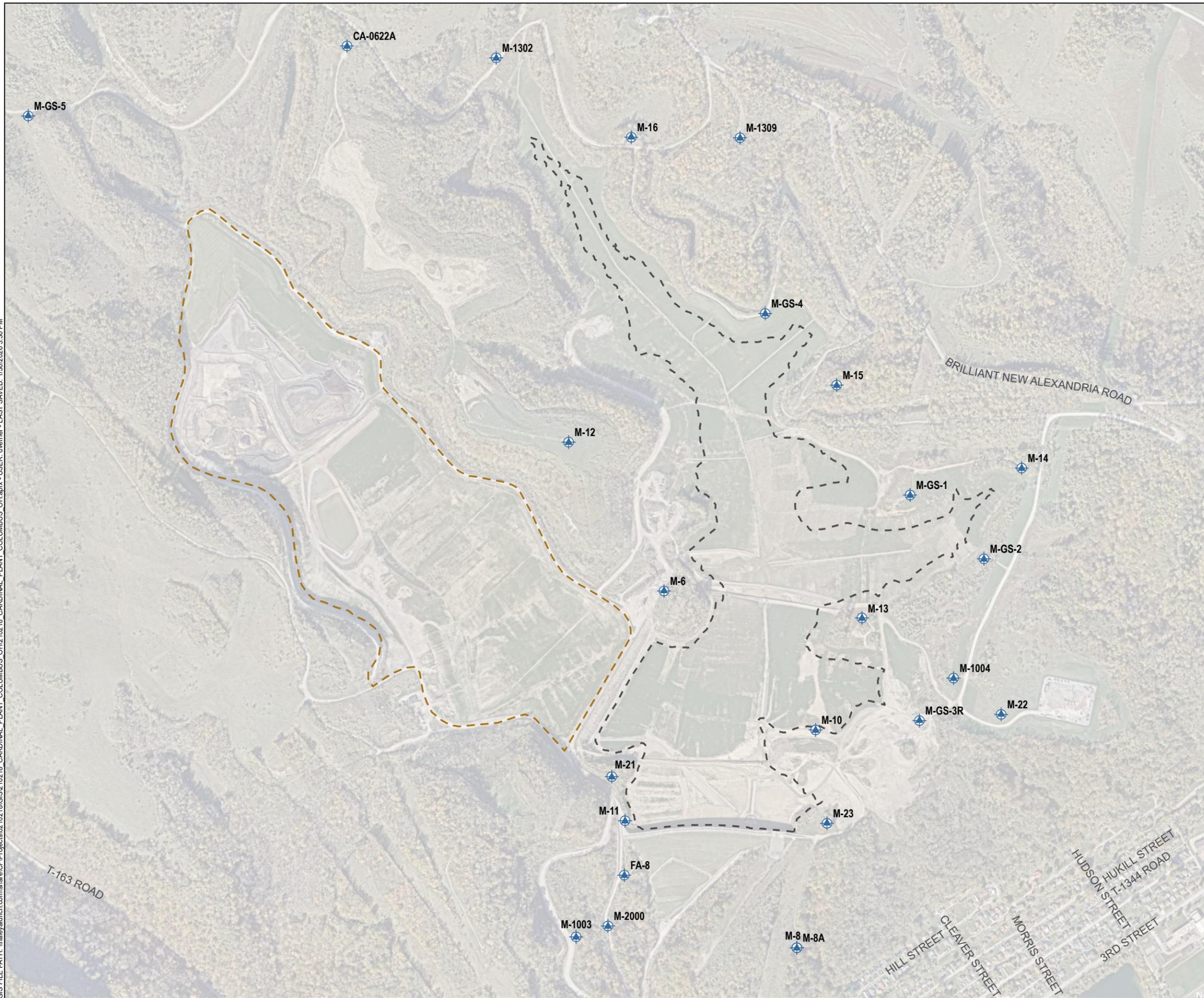
HALEY ALDRICH CARDINAL OPERATING COMPANY
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

**CCR UNIT AND MONITORING
 WELLS - FAR II SHALLOW AQUIFER**

JANUARY 2026

FIGURE 1

C:\GIS\FILE PATH\haleyaldrich.com\share\CF\Projects\0210218\GIS\0210218_CARDINAL_PLANT_COLUMBUS_OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:30 PM



LEGEND

-  MONITORING WELL
-  FAR I RESIDUAL SOLID WASTE LANDFILL
-  FLY ASH RESERVOIR II (FAR II)

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025

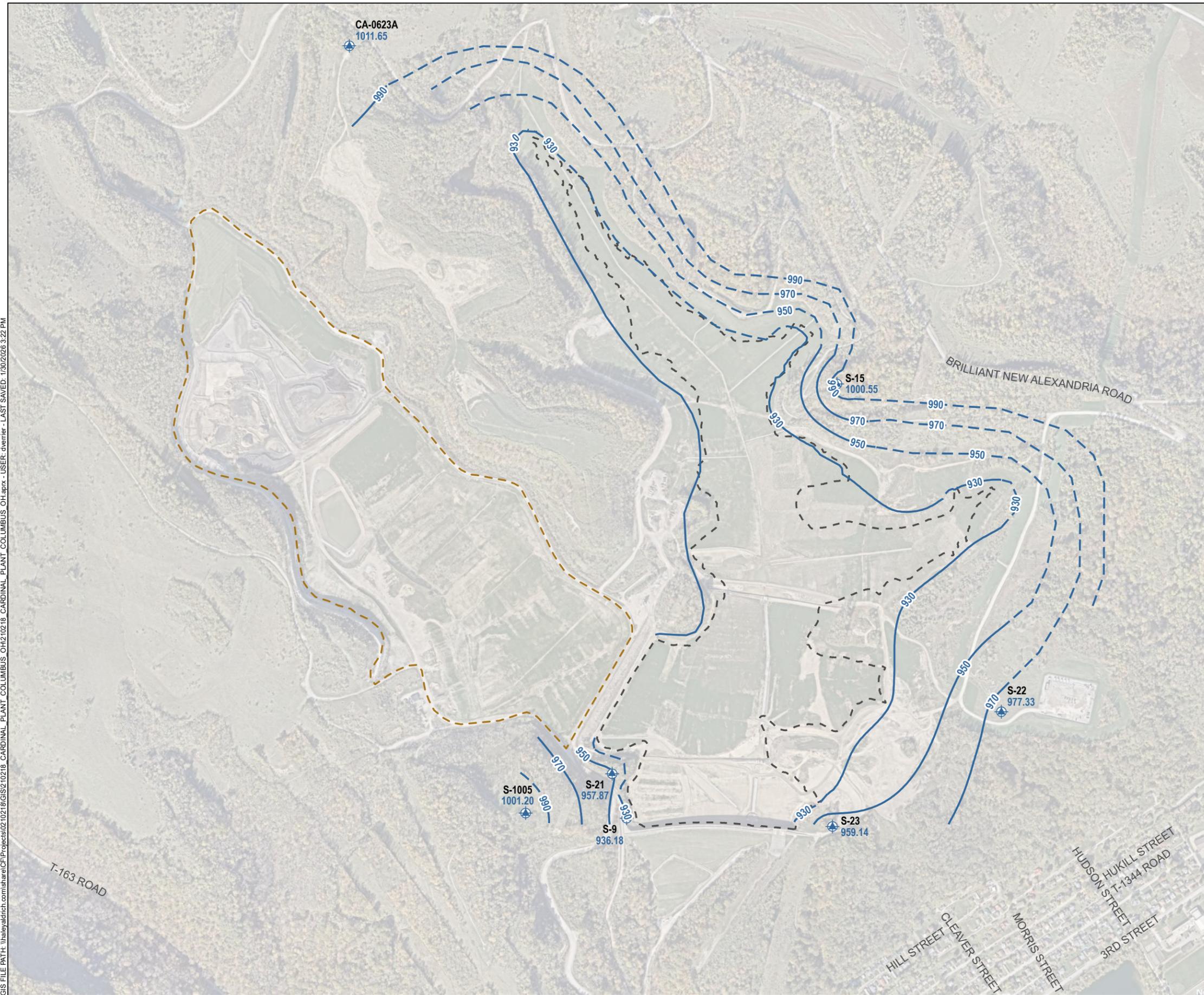
HALEY ALDRICH CARDINAL OPERATING COMPANY
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

**CCR UNIT AND MONITORING WELLS
 FAR II MORGANTOWN AQUIFER**

JANUARY 2026

FIGURE 2

C:\S:\FILE PATH\haleyaldrich.com\share\CF\Projects\0210218\GIS\0210218_CARDINAL_PLANT_COLUMBUS_OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:22 PM



LEGEND

-  MONITORING WELL WITH **GROUNDWATER ELEVATION IN FEET**
-  GROUNDWATER ELEVATION CONTOUR, 20-FT INTERVAL (NGVD29)
-  INFERRED GROUNDWATER ELEVATION CONTOUR
-  FAR I RESIDUAL SOLID WASTE LANDFILL
-  FLY ASH RESERVOIR II (FAR II)

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DEFINITIONS:
FT = FOOT
NGVD29 = NATIONAL GEODETIC VERTICAL DATUM 1929
3. GROUNDWATER ELEVATION MEASURE ON APRIL 21, 2025.
4. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
5. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025



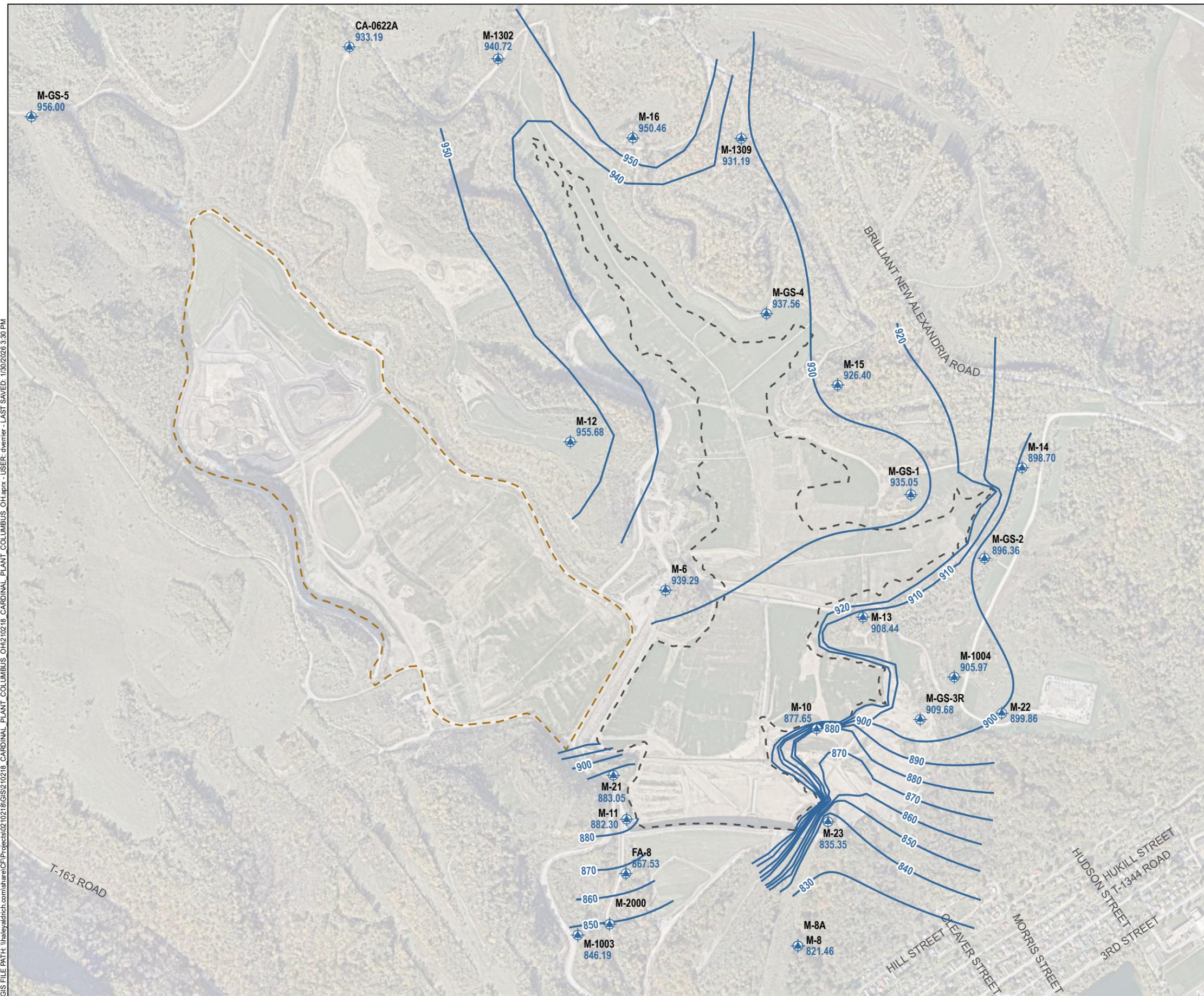
HALEY ALDRICH CARDINAL OPERATING COMPANY
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

**POTENTIOMETRIC SURFACE
 FAR II SHALLOW AQUIFER
 APRIL 2025**

JANUARY 2026

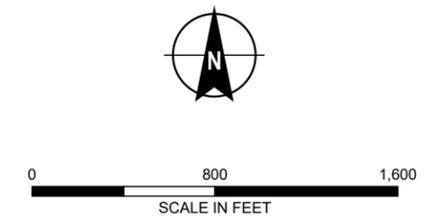
FIGURE 3

C:\GIS\FILE PATH\HaleyAldrich.com\share\CF\Projects\2021\8\GIS\210218_CARDINAL_PLANT_COLUMBUS_OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:30 PM



- LEGEND**
- MONITORING WELL WITH **GROUNDWATER ELEVATION IN FEET**
 - GROUNDWATER ELEVATION CONTOUR, 10-FT INTERVAL (NGVD29)
 - FAR I RESIDUAL SOLID WASTE LANDFILL
 - FLY ASH RESERVOIR II (FAR II)

- NOTES**
1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
 2. DEFINITIONS:
FT = FOOT
NGVD29 = NATIONAL GEODETIC VERTICAL DATUM 1929
 3. GROUNDWATER ELEVATION MEASURE ON APRIL 21, 2025.
 4. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
 5. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025



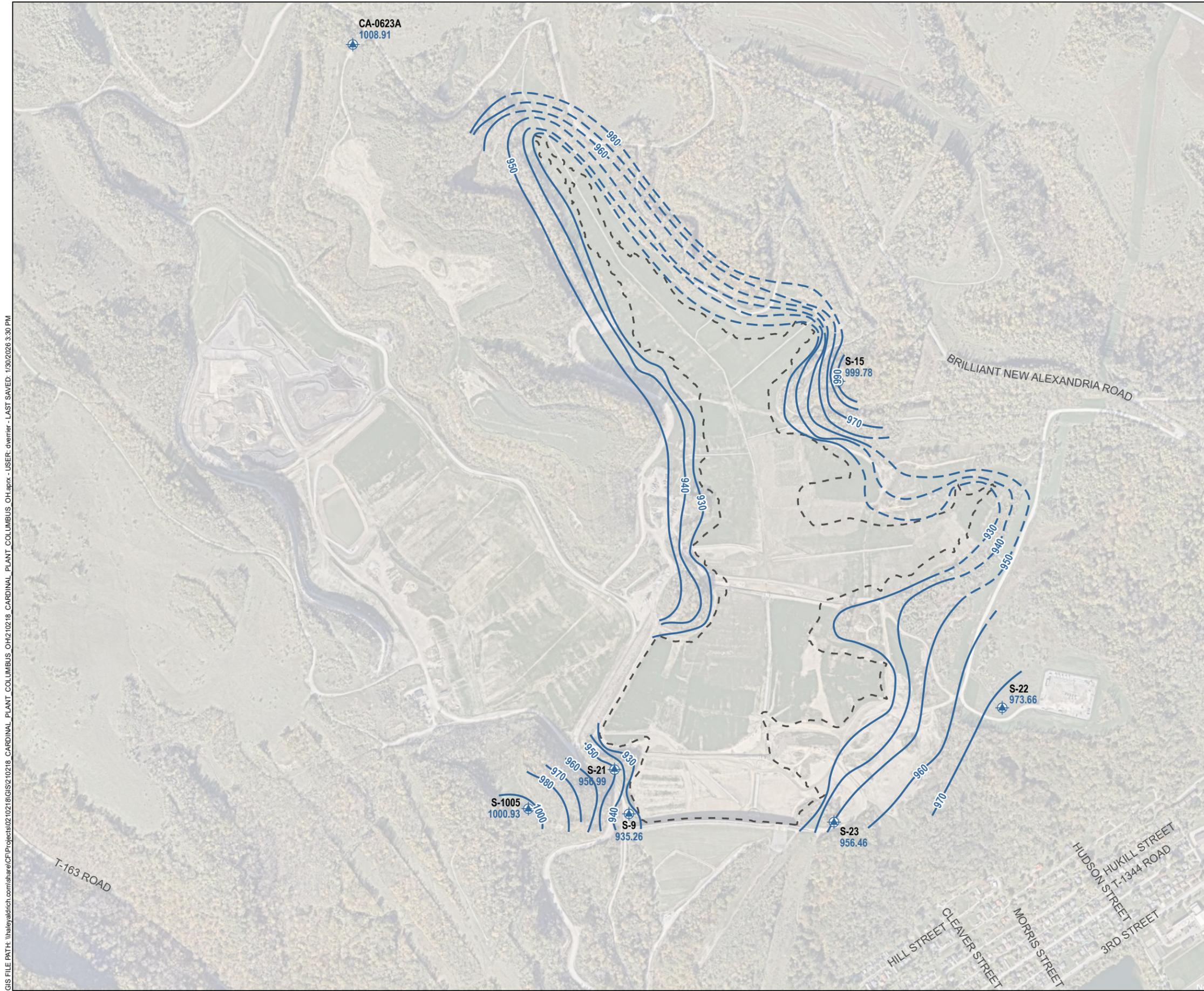
HALEY ALDRICH CARDINAL OPERATING COMPANY
CARDINAL UPLAND DISPOSAL FACILITY
BRILLIANT, OHIO

**POTENTIOMETRIC SURFACE
FAR II MORGANTOWN AQUIFER
APRIL 2025**

JANUARY 2026

FIGURE 4

C:\S:\FILE PATH\HaleyAldrich.com\share\CF\Projects\2021\GIS\2021\18 CARDINAL PLANT COLUMBUS OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:30 PM



LEGEND

-  MONITORING WELL WITH **GROUNDWATER ELEVATION** IN FEET
-  GROUNDWATER ELEVATION CONTOUR, 10-FT INTERVAL (NGVD29)
-  INFERRED GROUNDWATER ELEVATION CONTOUR
-  FLY ASH RESERVOIR (FAR II)

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DEFINITIONS:
 FT = FOOT
 NGVD29 = NATIONAL GEODETIC VERTICAL DATUM 1929
 NM = NOT MEASURED, WELL UNABLE TO BE MEASURED DURING THIS SAMPLING EVENT
3. GROUNDWATER ELEVATIONS MEASURED OCTOBER 21, 2025.
4. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
5. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025



HALEY ALDRICH CARDINAL OPERATING COMPANY
 CARDINAL UPLAND DISPOSAL FACILITY
 BRILLIANT, OHIO

**POTENTIOMETRIC SURFACE
 FAR II SHALLOW AQUIFER
 OCTOBER 2025**

JANUARY 2026

FIGURE 5

C:\GIS\FILE PATH\H:\haleyaldrich.com\share\CF\Projects\0210218\GIS\0210218 CARDINAL PLANT COLUMBUS OH.aprx - USER: dvernier - LAST SAVED: 1/30/2026 3:30 PM



LEGEND

-  MONITORING WELL WITH **GROUNDWATER ELEVATION** IN FEET
-  GROUNDWATER ELEVATION CONTOUR, 10-FT INTERVAL (NGVD29)
-  FLY ASH RESERVOIR (FAR II)

NOTES

1. ALL LOCATIONS AND DIMENSIONS ARE APPROXIMATE.
2. DEFINITIONS:
FT = FOOT
NGVD29 = NATIONAL GEODETIC VERTICAL DATUM 1929
3. GROUNDWATER ELEVATIONS MEASURED OCTOBER 21, 2025.
4. ELEVATIONS IN FEET ABOVE MEAN SEA LEVEL (FT MSL).
5. AERIAL IMAGERY SOURCE: NEARMAP, OCTOBER 27, 2025



CARDINAL OPERATING COMPANY
CARDINAL UPLAND DISPOSAL FACILITY BRILLIANT,
OHIO

**POTENTIOMETRIC SURFACE
FAR II MORGANTOWN AQUIFER
OCTOBER 2025**

JANUARY 2026

FIGURE 6