Request No. 15:

Refer to the Site Assessment Report (SAR), Attachment A, Preliminary Site Layout. The map that is provided is not legible. Provide an updated site plan for the proposed project that is of sufficient quality. Separate the site plan into discrete project areas and file the documents separately so each one can be accessed and enlarged.

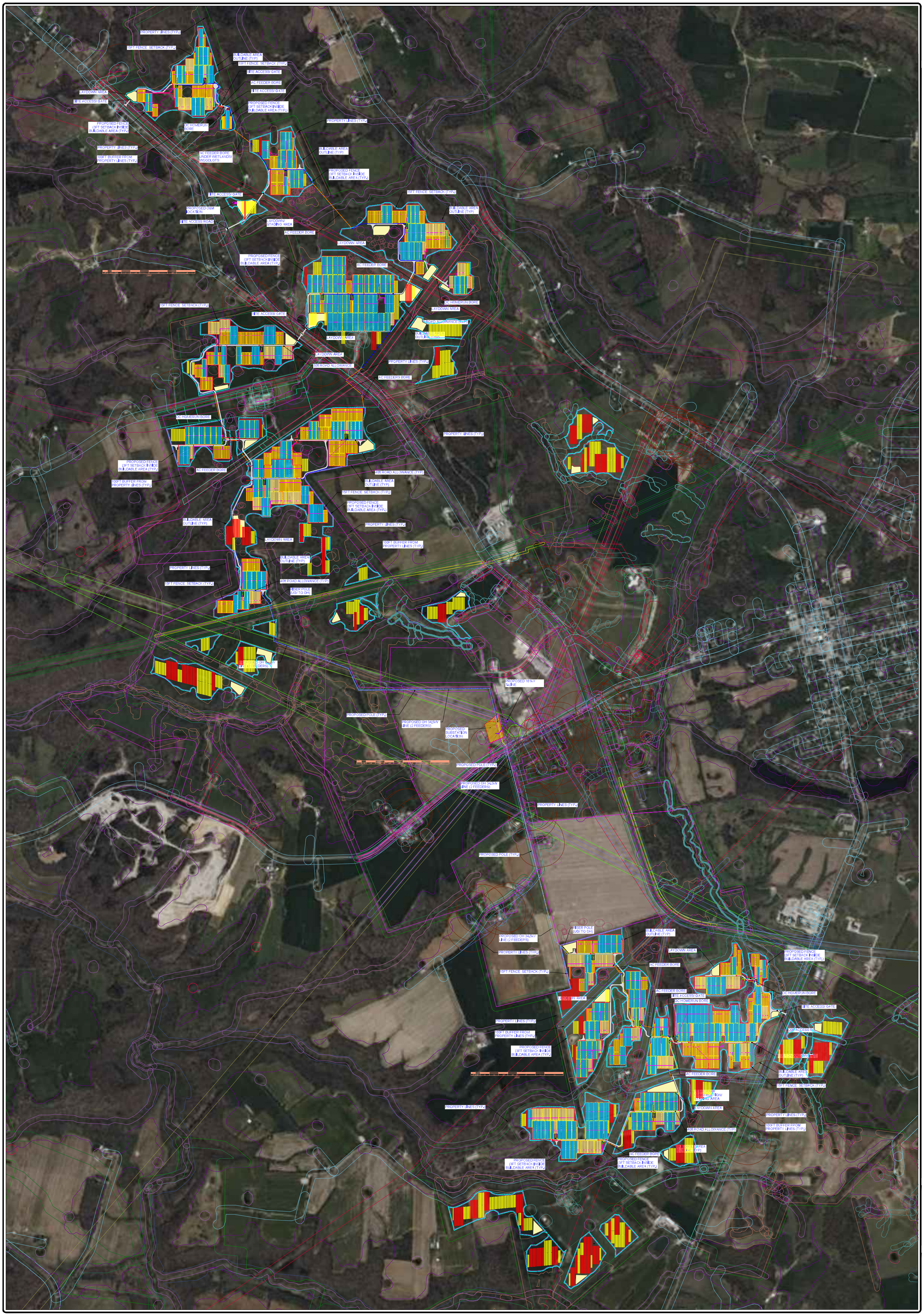
Original Response to Request No. 15:

Please see the attached updated SAR Attachment A.

Supplemental Response to Request No. 15:

Please see attached updated SAR Attachment A, revised to remove parcels 59-8 and 59-15.

Responding Witness: Jesse Eick



PCL CONSTRUCTION

TORONTO DISTRICT
2201 Bristol Circle, Suite 500
Oakville, Ontario, L6H 0J8
Phone: 905-276-7600

LEGEND

- 4.3 MVA INVERTER STATION
- 4.3 MVA TRANSFORMER
- BLOCK OUTLINE
- DC DISCONNECT SWITCH BOUNDARY OUTLINE
- DC DISCONNECT SWITCH
- DC UNDERGROUND TRENCH
- DC ABOVE GROUND
- SECURITY FENCE
- 15' FENCE SETBACK LINE
- 16' SITE ACCESS ROAD
- BORE & SPLICE LOCATION FOR AC/DC CABLE RUNS
- 3-WAY SPLICE KIT
- 1-WAY SPLICE KIT
- 34.5kV AC COLLECTOR FEEDER 1
- 34.5kV AC COLLECTOR FEEDER 2
- 34.5kV AC COLLECTOR FEEDER 3
- 34.5kV AC OVERHEAD FEEDER 1
- 34.5kV AC OVERHEAD FEEDER 2
- 34.5kV AC OVERHEAD FEEDER 3
- PROPOSED 161kV T-LINE

Rev. No.	Initials	Date	Description
5	W.A.	10/31/24	T-LINE LOCATION ADDED
4	W.A.	10/30/24	O&M BUILDING LOCATION ADDED
3	W.A.	10/07/24	PERMITTING SAT AND INVERTERS

Plot Scale: As Shown
Date: May 31, 2024
Drawn By: M.D.
Checked By: W.A.

Sheet Title:
EDPR - Clover Creek PERMITTING LAYOUT

PCL Job No.:

Sheet No.: PCL-1.3

Request No. 26:

The proposed Project site sits in a karst prone region with high groundwater sensitivity levels. Provide any mitigation measures Clover Creek Solar will implement during construction and operations in response.

Original Response to Request No. 26:

Clover Creek Solar has taken steps to ensure that karst features are avoided and any potential impacts are mitigated throughout the Project area. Consultant THG prepared an initial Phase 3 Karst Assessment in March of 2023, and is currently performing an additional assessment of the Project area to determine if any amendment is necessary. Applicant anticipates completion of the updated Phase 3 Karst assessment by February 2025. The preliminary site layout requires a strict 50 foot setback from all karst and potential karst features identified on site, which the Project has communicated with the EPC.

Supplemental Response to Request No. 26:

Please see the attached Geophysical Investigation of New Frontiers Solar Park.

Responding Witness: Jesse Eick

Geophysical Investigation

New Frontiers Solar Park

Breckinridge County, Kentucky

Prepared for:

EDP Renewables
1501 McKinney Street, Suite 1300
Houston, Texas 77010

February 3, 2025

Prepared by:
Matt Toland, PG, PGp
THG Geophysics, Ltd.
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THG Project No. 847-12051

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FIGURES

DIGITAL APPENDIX

1.0 INTRODUCTION

1.1 BACKGROUND

The New Frontiers Solar Park formerly known as the Clover Creek Solar Project, is an approximately 890-acre proposed solar electrical generation project located in Breckinridge County, Kentucky (**Figures 1 and 2**). The installation of solar panel arrays and related infrastructure will include excavation for and construction of solar table foundations. The occurrence of subsurface voids, breakdown, and faults in the vicinity of foundations can impede operations, increase cost, and delay the completion of the project. THG completed a desktop geological study of the site that identified geologic conditions prone to karst development, including numerous existing depressions across the site's footprint (THG, 2022a).

Renewable Resource Consultants, LLC (RRC) contracted with THG to perform a geophysical investigation of the site in October/November 2022 utilizing Terrain Conductivity Mapping (TCM) techniques (THG, 2022b). Due to varying site conditions, the results of the TCM survey were not conclusive. During acquisition of the TCM survey, numerous unmapped surficial features indicative of underlying karst conditions were identified across the site. RRC contracted with THG to conduct a second geophysical investigation in March 2023 utilizing 2-D Electrical Resistivity Imaging (EI) methods (THG, 2023). The objective of the survey was to identify potential, karst features on the surface and assess their associated subsurface conditions. That investigation identified numerous surficial karst features and imaged interpreted air-filled voids and fractures; saturated/clay-filled voids and fractures; and other karst conditions such as limestone pinnacles and variable rock competency..

Based on an updated project layout, EDP Renewables (EDPR) contracted with THG to perform a third geophysical investigation completed from January 3-8, 2025 utilizing EI methods. This report includes the findings of the current and THG (2023) geophysical investigations as they pertain to the current project layout (**Figure 2**).

1.2 WORK SCOPE

The objective of the geophysical survey was to map and image the locations of field-identified surficial karst features such as sinkholes and surface depressions located within New Frontiers Solar Park's permitted areas, along proposed AC collection alignments, along proposed internal roadways, and within some areas considered for future development. The work scope consisted of site reconnaissance to identify surficial features indicative of karst, EI to image the subsurface of identified surface features, and limited 1-D multichannel analysis of surface waves (MASW) testing to derive shear-wave velocity profiles used to constrain EI data interpretations.

At the time of the investigation, the site consisted of harvested agricultural fields, wooded areas, and grassy fields. Topography is generally sloped with rolling hills and some flat areas. Soils conditions generally consist of moist clay. Several snow, rain, and sleet precipitation events occurred during the investigation. For comparison, geophysical data were collected in areas before and after precipitation events to ensure water saturation was not altering the geophysical results.

2.0 GEOPHYSICAL INVESTIGATION

2.1 ELECTRICAL IMAGING THEORY

2.1.1 Introduction

Electrical resistance is based upon Ohm's Law:

$$R = \frac{V}{I} \quad [ohms]$$

Where, resistance, **R**, is equal to the ratio of potential, **V** (volts) to current flow, **I** (amperes).

Resistivity is the measure of the resistance along a linear distance of a material with a known cross-sectional area. Consequently, resistivity is measured in Ohmmeters. This report presents the geophysical results as geo-electrical profiles of modeled resistance plotted as 2-dimensional profiles of distance (feet) and elevation (feet above mean sea level [ft amsl]).

Electrical currents propagate as a function of three material properties (1) ohmic conductivity, (2) electrolytic conductivity, and (3) dielectric conductivity. Ohmic conductivity is a property exhibited by metals. Electrolytic conductivity is a function of the concentration of total dissolved solids and chlorides in the groundwater that exists in the pore spaces of a material. Dielectric conductivity is a function of the permittivity of the matrix of the material. Therefore, the matrix of most soil and bedrock is highly resistive. Of these three properties, electrolytic conductivity is the dominant material characteristic that influences the apparent resistivity values collected by this method. In general, resistivity values decrease in water-bearing rocks and soil with increasing:

1. Fractional volume of the rock occupied by groundwater;
2. Total dissolved solid and chloride content of the groundwater;
3. Permeability of the pore spaces; and,
4. Temperature.

Materials with minimal primary pore space (i.e., limestone, dolomite) or those which lack groundwater in the pore spaces will exhibit high resistivity values when compared to highly porous, moist, or saturated materials that tend to exhibit very low resistivity values (Mooney, 1980).

In homogeneous ground, the apparent resistivity is the true ground resistivity; however, in heterogeneous ground, the apparent resistivity represents a weighted average of all formations through which the current passes. Many electrode placements (arrays) have been proposed (for examples see Reynolds, 1997); however, the Schlumberger array has proven to be an effective configuration for imaging bedrock. The following Schlumberger array was used in the collection of data:

$$R_i = \frac{\pi a^2}{b}\left[1 - \frac{b^2}{4a^2}\right]R; \; a = 5b$$

Where, R_i, resistivity, is related to the number of poles, ***n***, the separation distance between the current source and current sink ***b***, and the pole spacing, **a**.

2.1.2 Methods

The resistivity survey was performed using the ARES II electrical resistivity system equipped with multi-electrode cables (GF Instruments, s.r.o., Brno, Czech Republic). The survey was conducted using stainless steel electrodes and passive multi-electrode cables with switch boxes. The EI profiles were collected with a 1- and 2-meter electrode spacing and Schlumberger or Schlumberger high density arrays (**Figures 3 through 77**). The locations and elevations of all data were recorded in the field using a Trimble Geo-7XH global positioning system (GPS) with differential corrections (2023 investigation) and a Juniper Systems Geode GPS equipped with ATLAS real-time kinematic (RTK) corrections (2025 investigation). Locational data were cross checked with publicly available digital elevation map (DEM) data for accurate vertical control.

2.1.3 Processing

A forward modeling subroutine was used to calculate the apparent resistivity values using the AGI EarthImager 2D program (AGI, 2002). This program is based on the smoothness-constrained least-squares method (deGroot-Hedlin and Constable, 1990; Loke and Barker, 1996). The smoothness-constrained least-squares method is based upon the following equation:

$$J^T g = (J^T J + \mu F)d$$

Where **F** is a function of the horizontal and vertical flatness filter, **J** is the matrix of partial derivatives, **μ** is the damping factor, **d** is the model perturbation vector, and **g** is the discrepancy vector.

The EarthImager 2D program divides the 2-D subsurface space into several rectangular blocks. Resistivities of each block are then calculated to produce an apparent resistivity pseudo section. The pseudo section is compared to the actual measurements for consistency. A measure of the difference is given by the root-mean-squared (rms) error.

2.2 MULTICHANNEL ANALYSIS OF SURFACE WAVES THEORY

MASW is a method of collecting shear-wave velocity data using surface-wave velocity analysis (Xia, et al., 2000). MASW uses surface wave fronts (i.e., Raleigh and Love Waves) to predict the shear-wave velocity often to a depth of 100 feet or greater. This method is non-destructive and non-intrusive. MASW theory holds that the penetration depth of a surface wave increases with wavelength. Further, propagation velocity (i.e., phase velocity) is determined mainly by the shear-wave velocity of penetrated materials; consequently, surface waves have nearly the same velocity as shear-waves at depth. The shear-wave velocity with depth is derived using dispersion curves, or the change of propagation speed (i.e., phase velocity) with wavelength (or frequency).

For a given frequency, there are multiple phase velocities at which surface waves can travel; the slowest velocity is referred to as the fundamental mode and subsequent higher velocities are referred to as a first mode, and increasing periodically. Higher modes of surface waves have been accepted as interfered components of surface waves and accurate interpretation of MASW data is based on determination of the fundamental mode. Field parameters such as geophone spread length, geophone spacing, and shot offset distance are important factors that directly affect the investigation depth, near- and far-field effects, and resolution of the dispersion image during data acquisition (Dikmen et al, 2010).

1-D MASW data were collected at five (5) locations (**Figures 7, 12, 35, 46, 56, and 67**). Elastic waves were initiated using a 16-lb sledgehammer striking a 10- by 10-inch aluminum plate. Velocity data were collected using a Geometrics ES-3000 8-channel seismograph (THG, 2023) and a Geometrics Geode 24-channel seismograph (current investigation). All MASW testing utilized 4.5-Hz geophones with 3- and 5-foot geophone spacing.

To reduce near field effects and to maximize fundamental mode signals, several shot offsets were tested prior to collecting MASW records at each test location. Two (2) events (5 stacks) for each MASW test location were recorded using the walk-away testing method during the THG (2023) investigation and one

(1) event (5 stacks) was recorded at each test location during the current investigation. Resulting dispersion curves were processed using SurfSeis 6.0.1.46 software (**Figure 67**). The location of each MASW test was recorded using a Trimble Geo-7XH GPS (THG, 2023) or a Juniper Geode GPS (current investigation).

2.3 SITE RECONNAISSANCE

Through the THG (2023) investigation and the current investigation, THG performed site reconnaissance of the New Frontiers Solar Park permitted areas, proposed alternating current (AC) collection alignments, proposed internal roadways, the substation footprint, and some areas considered for future development to ensure all karst surface features were included in the geophysical investigation. Using a UTV, slow observational passes were made in evenly spaced paths across all survey areas. Additionally, in areas where karst surface features were prevalent, reconnaissance was performed on-foot.

The locations and limits of all field-identified surface features indicative of karst were recorded using GPS. In some cases, THG identified suspected surficial karst features outside the survey limits and recorded their locations for consideration in future development or project layout modifications. All features within the survey limits were photographed. Suspected field-identified surficial karst surface features were categorized into three types: depressions, sinkholes, and open sinkholes. Pond features were also recorded; however, they often appeared to be man-made and were not included in the scope of work.

For the purpose of this report, depressions are defined as localized enclosed dips in topography with a measurable change in elevation of less than approximately 1.5 feet below grade (bg) and with no natural external surface drainage, often displaying a unique surface geometry such as a circle. Sinkholes are defined as more severe depressions with a measurable change in elevation greater than approximately 1.5 feet bg. Open sinkholes are sinkholes that contained a visible hole or “throat” in the bottom of the feature.

2.4 QUALITY ASSURANCE AND QUALITY CONTROL

The interpretation of geophysical data is not an exact science since the responses to induced disturbance is affected by many phenomena including buried metals, operator error, precipitation, and net changes in ground saturation conditions. Some sources of spurious data can be overcome through a QA/QC program and use of multiple geophysical methods. The quality control program employed with this study included frequent checks of the equipment and resurveys of lines and locations. The QA/QC program indicates that all geophysical equipment functioned as designed during the survey program.

3.0 GEOLOGY

3.1 INTRODUCTION

Karst topography is formed from the dissolution of soluble rocks such as limestone, dolomite, and gypsum. The dissolution of these lithologies within the subsurface often leads to the development of underground drainage systems, sinkholes, and caves.

The bedrock geology at the proposed New Frontiers Solar Park is predominantly characterized by the middle to upper Mississippian formations with sedimentary units primarily composed of limestone, shale, siltstone, and sandstone (Amos, 1975; Lorin and Crittengen, 1965; KGS, 2022a). The region of Breckinridge County where the proposed solar park is to be built is overlain by alluvial deposits, with obvious surficial karst features. A geologic map of the project area is included in the desktop report (THG, 2022a). Forty-five (45) geotechnical borings and nineteen (19) test pits (RRC, 2022) and fourteen soil boring logs (Westwood, 2024) were collected at the site. Of the 78 geotechnical logs, 40 encountered rock. Lithologies identified in the boring logs include mudstone, limestone, sandstone and shale.

3.2 STRATIGRAPHY

Surficial geology over the project area is overlain by loess and alluvium deposits. The loess deposits are only in upland surfaces characterized by non-bedded, mostly quartz, clay- to silt-sized deposits associated with a high-wind depositional environment. Alluvial deposits are associated with stream and floodplain environments characterized by varying intercalated sequences of clay, silt, sand, and gravel (Haagen, 2001).

3.2.1 Surficial Soils

Surficial soil maps of Kentucky were developed by the USDA Natural Resources Conservation Service (NRCS) to represent horizontal soil distributions. The near-surface soils in the project area primarily consist of loamy deposits. There are numerous soil classifications within the region that fall under two main soil types: Salder-Zanesville and Rosine-Gilpan-Zanesville (Haagen, 2001).

- Salder-Zanesville: Soils within this unit make up approximately 19 percent of Breckinridge County and is the most abundant soil unit within the Clover Creek project area. This unit is found on broad ridgetop flats. Sadler units are loamy, level to gently sloping soils found on upland flats. They are typically thick units with moderate draining ability. Zanesville units are similar in that they are loamy, thick units that have moderate- to well-drained ability. These soils are typically found on upper side slopes of uplands and narrow ridgetops. Both units are formed from loess deposits and underlying sandstone, siltstone, or shale, and have fragipan horizons, or layers that restrict flow, at approximately 26 inches and 23 inches bg, respectively (Haagen, 2001).

- Rosine-Gilpan-Zanesville: This unit is found on steep to very steep slopes characterized by drainage ways or cutouts. Rosine soils are loamy in the upper horizons and clayey in the lower horizons, resultant from loess deposits and underlying weathered shale. These soils are well-drained and lie on very steep slopes and ridges. Gilpin soils are generally loamy throughout, formed from weathered sandstone and siltstone. Similarly, Gilpin soils are found on dissected side slopes and well-drained areas (Haagen, 2001).

3.2.2 Bedrock Deposits

The deposits of Breckinridge County, Kentucky are characteristic of shallowing marine environments. Surveys and well logs have identified multiple formations underlying the surficial deposits from the middle to late Mississippian sub period (Amos, 1975; Lorin and Crittengen, 1965; KGS, 2022a).

Mississippian-Aged Rocks

- Tar Springs Sandstone: Chesterian-aged formation with interbedded shale, siltstone, and sandstone deposits with thicknesses ranging from 0 to 10 feet thick.

- Glen Dean Sandstone: Chesterian-aged formation with an approximately 55-foot thickness. The upper portion consists of thick fossiliferous limestone and calcareous shale sequences. The lower subzone is dominantly a course-grained, very fossiliferous limestone.

- Hardinsburg Sandstone: Consisting of a coarsening downward sequence of sandstone, siltstone, and shale deposits overlying the Golconda Formation.

- Golconda Formation: The Golconda Formation is subdivided into 3 units: the Haney Limestone Member, the Big Clifty Sandstone Member, and the Beach Creek Limestone Member. The upper and lower horizons are similar with medium- to thick-bedded limestone units interbedded with calcareous shale. Limestone units are medium- to fine-grained sediments and very fossiliferous. The Big Cliffy Sandstone Member ranges from 45 to 95 feet thick with interbedded shale, siltstone, and sandstone facies.

- Equivalent of Elwren Sandstone of Mallott: Evenly bedded Chesterian-aged sandstone, siltstone, and shale deposits. Sandstone units are fine- to very fine-grained with ripples in thin- to medium-thick units. Shale beds are common in upper portions and are thin-bedded in the lower portion of the formation.

- Reelsville Limestone: Dominantly limestone with interbedded shale units. Shale bed thicknesses range from 1 to 4 feet thick in the middle with thin beds in the upper and lower portions. Limestone is fine- to medium-grained with some coarse-grained, cross-bedded calcarenite beds. Generally, limestone beds are oolitic in lower and upper portions and highly fossiliferous throughout.

- Sample Sandstone: Siltstone, sandstone, and shale unit ranging in thicknesses of 15 to 65 feet. Fine- to medium-grained sandstone is locally thin-bedded and commonly contains ripples and crossbedding. Shale beds are commonly silty but locally are calcareous and interbedded with siltstone.

4.0 GEOPHYSICAL ANALYSIS

4.1 INTRODUCTION

This geophysical analysis summarizes the findings from earlier investigations (THG 2023) and the current geophysical investigations as they pertain to the current New Frontiers Solar Park project layout. The previous reports focused on investigating and imaging karst features only located within PV arrays and the substation footprint of the project layout at that time; however, numerous suspected karst features outside the PV array and substation limits were field-identified and their locations recorded but not imaged. The current study focused on investigating and imaging karst features within the current project layout including all permitted areas, proposed AC collection system alignments, proposed internal roadways, and some areas considered for potential development; however, numerous suspected karst features outside these areas were field-identified and their locations recorded but not imaged. Many surficial karst features that were imaged during previous investigation are no longer within the limits of the current project layout.

Based on the current project design, site reconnaissance identified ninety-one (91) surface features indicative of karst located within the geophysical survey limits and eighty-two (82) surface features indicative of karst located near the project limits. Additionally, several surface features indicative of karst identified during the 2023 investigation were determined to be man-made drainage features. The locations and approximate limits of surface features indicative of karst are included in the digital appendix (**Appendix A**). The field-identified surface features indicative of karst are confined to nine (9) areas of the project site (**Figures 3, 7, 12, 35, 46, 56, 61, 63, and 65**; THG, 2023).

Fifty-four (54) EI profiles were collected over the field-identified surface features (**Figures 3 through 66**). EI profiles were designed to image at least 20 feet bg. Generally, the anticipated size of subsurface targets intended to be imaged using EI dictates the electrode spacing where features smaller than the electrode spacing will sometimes lack definitive geometry in the EI data. However, site observations, geologic information, and preliminary data processing indicate that deeper EI data would be valuable in some places. Additionally, the use of high-density arrays increases data density allowing for higher resolution using wider electrode spacings. All surficial karst features within the current project layout were imaged using 1- and 2-meter electrode spacings. In some cases, EI profiles were positioned to image through multiple karst surface features using a single profile.

Furthermore, a series of EI profiles were collected across the substation footprint during a previous investigation (THG, 2023). Although no surface features indicative of karst were identified within the substation footprint, the substation infrastructure could be affected by differential settlement by deep karst features. Four (4) EI profiles utilizing 3-meter electrode spacing were collected over the substation footprint to image the deep subsurface in this area (THG, 2023).

EI data collected at the site are located within different lithologic units; therefore, apparent resistivity ranges are interpreted to correlate to different rock types. These ranges were derived using MASW data constraints and field observations. A color scale was developed that could be consistently applied to all data collected at the site over both investigations. Apparent resistivity values from 0 to 120 Ohm-m are interpreted to correspond to overburden materials and soils; apparent resistivity values from 120 to 300 Ohm-m are interpreted to correspond to sandstone; and apparent resistivities greater than or equal to 300 Ohm-m are interpreted to correspond to limestone.

A shear-wave velocity range of approximately 1,000 to 2,000 ft/s is interpreted to correspond to sandstone bedrock and shear-wave velocities from approximately 2,000 to 3,000 ft/s are interpreted to correspond to limestone (**Figure 67**).

4.2 DISCUSSION

Area 1:

Area 1 is positioned within the northernmost portion of the project limits (**Figures 2 and 3**). Five (5) surface features indicative of karst were identified within the survey areas and nineteen (19) surface features were identified near the survey areas. All five (5) features located within the project limits were imaged with EI. Additionally, thirteen (13) surface features, all located outside the current project layout, were imaged using EI during the 2023 investigation, totaling four (4) EI profiles (THG, 2023). Surface features indicative of karst identified within this area are located overlying either the Haney Limestone member or the Hardinsburg Sandstone. An individual analysis for each EI profile is included on each profile's figure (**Figures 4 through 6**).

Based on the results of the 2023 and current investigation within Area 1, surficial expressions of underlying karst conditions are prevalent between approximate elevations 575 to 595 feet above mean sea level (amsl) and are all located within the areas of the site where the mapped bedrock is the Haney Limestone or where thin sections of the Hardinsburg Sandstone overly the Haney Limestone (KGS, 2022a). It appears that the limestone along this interval is severely weathered and air-filled and/or saturated/clay-filled fracture zones and voids are prevalent and the effects of these karst conditions within the limestone are impacting both the overlying sandstone and surficial soils. As differential dissolution due to groundwater movement continues within the Haney Limestone, future karst development in this area could negatively impact the integrity of solar infrastructure.

Karst Identification Summary Table: Area 1							
EI Profile	**Figure Number**	**Surficial Classification**	**Geologic Unit**	**Air-filled Void or Fractures**	**Saturated/Clay-filled Void or Fractures**	**Karst Conditions: No Voids**	**No Karst Identified**
1	4	Sinkholes, Depression	Hardinsburg Sandstone			X	
2	5	Sinkhole and Depression	Hardinsburg Sandstone			X	
3	6	Depression	Haney Limestone Member		X		

Area 2:

Area 2 is located southeast of Area 1 (**Figures 2 and 7**). Ten (10) surface features indicative of karst were identified within the project limits and thirty-one (31) features were identified near the project limits. All ten (10) features located within the project limits were imaged with EI. Nineteen (19) of the surface features located outside the current project limits were imaged during the 2023 investigation, totaling seven (7) EI profiles (THG, 2023). Surface features indicative of karst identified within this area are located where bedrock is documented as the Haney Limestone member or Hardinsburg Sandstone (KGS, 2022a). An individual analysis for each EI profile is included on each profile's figure (**Figures 8 through 11**).

Based on the results of the 2023 and current investigation within Area 2, surficial expressions of underlying karst conditions are prevalent between approximate elevations 585 to 620 feet amsl; within the mapped Haney Limestone and where thin sections of the Hardinsburg Sandstone overly the Haney Limestone. It appears that the limestone along this interval is severely weathered and air-filled and/or saturated/clay-filled fracture zones and voids are present within the Haney Limestone and are impacting the overlying sandstone and surficial soils. Variable bedrock profiles mapped in the EI data collected over the Hardinsburg Sandstone suggest that karst is present in the limestone below and the movement of sediments through sandstone fractures into deeper voids may result in further subsidence in Area 2.

Karst Identification Summary Table: Area 2							
EI Profile	Figure Number	Surficial Classification	Geologic Unit	Air-filled Void or Fractures	Saturated/Clay-filled Void or Fractures	Karst Conditions: No Voids	No Karst Identified
4	8	Open Sinkhole	Haney Limestone Member		X		
5	9	Open Sinkhole	Hardinsburg Sandstone	X			
6	10	Depressions	Hardinsburg Sandstone				X
7	11	Depressions	Hardinsburg Sandstone				X

Area 3:

Area 3 is located southeast of Area 2 (**Figures 2 and 12**). Thirty-three (33) surface features indicative of karst were identified within the project limits and seven (7) surface features were identified near the project limits. Of the thirty-three (33) features located within the project limits, thirty-two (32) were imaged with EI, totaling twenty (20) EI profiles. One feature contained trash and could not be imaged. All features within Area 3 that were imaged during the 2023 investigation are still located within the current project limits (THG, 2023). Surface features indicative of karst identified within this area are located where bedrock is mapped as the Haney Limestone member or the Hardinsburg Sandstone (KGS, 2022a). An individual analysis for each EI profile is included on each profile's figure (**Figures 13 through 32**).

Based on the results of the 2023 and current investigation within Area 3, surficial expressions of underlying karst conditions are prevalent between approximate elevations 595 to 635 feet amsl. The surface features indicative of karst are predominantly located where mapped bedrock is the Hardinsburg Sandstone but appears to only occur where the thickness of the sandstone overlying the limestone is less than 30 feet, suggesting that thicker sections of sandstone overlying limestone are less susceptible to the effects of karst within the limestone. The limestone within Area 3 appears to be heavily weathered. EI data imaged numerous interpreted air- and/or clay-filled/saturated voids and fractures, and other karst features such as limestone pinnacles and variable limestone competency.

Karst Identification Summary Table: Area 3							
EI Profile	Figure Number	Surficial Classification	Geologic Unit	Air-filled Void or Fractures	Saturated/Clay-filled Void or Fractures	Karst Conditions: No Voids	No Karst Identified
8	13	Depression	Hardinsburg Sandstone			X	
9	14	Sinkholes	Hardinsburg Sandstone		X		
10	15	Sinkhole and Depression	Hardinsburg Sandstone		X		
11	16	Depression and Open Sinkholes	Hardinsburg Sandstone		X		
12	17	Sinkholes	Hardinsburg Sandstone	X			
13	18	Depression	Hardinsburg Sandstone				X
14	19	Depression	Hardinsburg Sandstone				X
15	20	Depression	Hardinsburg Sandstone			X	
16	21	Depressions	Hardinsburg Sandstone			X	
17	22	Sinkhole	Hardinsburg Sandstone			X	
18	23	Depression	Hardinsburg Sandstone				X
19	24	Open Sinkhole	Hardinsburg Sandstone	X			
20	25	Open Sinkhole	Hardinsburg Sandstone		X		
21	26	Open Sinkhole and Sinkhole	Hardinsburg Sandstone		X		
22	27	Large Sinkhole	Hardinsburg Sandstone			X	
23	28	Open Sinkholes	Hardinsburg Sandstone		X		
24	29	Sinkhole	Hardinsburg Sandstone		X		
25	30	Depression and Sinkhole	Hardinsburg Sandstone		X		
26	31	Sinkholes	Haney Limestone Member		X		
27	32	Open Sinkholes	Hardinsburg Sandstone		X		

Area 4:

Area 4 is located southwest of Area 3, in the north-central portion of the project area **(Figures 2 and 33)**. Field reconnaissance during the 2023 investigation identified six (6) surface depressions located within this area, each containing orange, vertical drainage intake pipes (THG, 2023). Additional reconnaissance conducted during the current study did not identify any additional surface features indicative of karst. Discussions with landowners in the field revealed that these features are man-made drainage ditches and are part of a network of underground drainage systems called field tiling. In many cases, sediment will wash away into tile ditches resulting in the appearance of open sinkholes near the intake pipes; however, these features are not related to karst. To confirm this information, THG collected one (1) EI profile over a drainage ditch (**Figure 34**). The EI data imaged a thick section of interpreted saturated sediments confirming the classification of these features as man-made. No surface expressions of underlying karst features are present within Area 4.

Area 5:

Area 5 is located south of Area 4 in the central portion of the project (**Figures 2 and 35**). Fifteen (15) surface features indicative of karst were identified within the project limits and seven (7) surface features were identified near the project limits. All fifteen (15) features located within the project limits were imaged with EI, totaling ten (10) EI profiles. All features within Area 5 that were imaged during the 2023 investigation are still located within the current project limits (THG, 2023). The surface features indicative of karst identified within this area are all located where bedrock is mapped as the Hardinsburg Sandstone (KGS, 2022a). An individual analysis for each EI profile is included on each profile's figure (**Figures 36 through 45**).

Based on the results of the 2023 and current investigation within Area 5, surficial expressions of underlying karst conditions are prevalent between approximate elevations 595 to 610 feet amsl. The surficial karst features, all located overlying the Hardinsburg Sandstone, appear to only occur where the thickness of the sandstone overlying limestone is less than 20 feet, suggesting that thicker sections of sandstone are less susceptible to the effects of subsidence within the limestone. The limestone within Area 5 appears to be heavily weathered. EI data imaged numerous interpreted clay-filled and saturated voids or fractures, and other karst features such as limestone pinnacles and variable limestone competency.

Karst Identification Summary Table: Area 5							
EI Profile	**Figure Number**	**Surficial Classification**	**Geologic Unit**	**Air-filled Void or Fractures**	**Saturated/Clay-filled Void or Fractures**	**Karst Conditions: No Voids**	**No Karst Identified**
29	36	Depression	Hardinsburg Sandstone				X
30	37	Depression	Hardinsburg Sandstone		X		
31	38	Sinkhole and Depression	Hardinsburg Sandstone		X		
32	39	Sinkhole and Depression	Hardinsburg Sandstone		X		
33	40	Open Sinkhole and Depression	Hardinsburg Sandstone		X		
34	41	Depressions	Hardinsburg Sandstone		X		
35	42	Sinkholes	Hardinsburg Sandstone			X	
36	43	Depression	Hardinsburg Sandstone			X	
37	44	Open Sinkhole	Hardinsburg Sandstone		X		
38	45	Open Sinkhole	Hardinsburg Sandstone		X		

Area 6:

Area 6 is located southeast of Area 5 in the central portion of the project (**Figures 2 and 46**). Eighteen (18) surface features indicative of karst were identified within the project limits and eight (8) surface features were identified near the project limits. All eighteen (18) features located within the project limits were imaged with EI, totaling nine (9) EI profiles. No features within the project limits in Area 6 were imaged during the 2023 investigation (THG, 2023). Surficial karst features identified within this area are all located within the mapped Hardinsburg Sandstone (KGS, 2022a). An individual analysis for each EI profile is included on each profile's figure (**Figures 47 through 55**).

Based on the results of the 2023 and current investigation within Area 6, surficial expressions of underlying karst conditions are prevalent between approximate elevations 585 to 620 feet amsl. The surface features indicative of karst that were mapped within this area appear to only occur where the Haney Limestone is the mapped bedrock or where the thickness of overlying sandstone is less than 25 feet, suggesting that thicker sections of overlying sandstone are less susceptible to the effects of karst within the limestone. The limestone within Area 6 appears to be heavily weathered. EI data imaged numerous interpreted air- and/or clay-filled/saturated voids and fractures, and other karst features such as limestone pinnacles and variable limestone competency.

Karst Identification Summary Table: Area 6							
EI Profile	**Figure Number**	**Surficial Classification**	**Geologic Unit**	**Air-filled Void or Fractures**	**Saturated/Clay-filled Void or Fractures**	**Karst Conditions: No Voids**	**No Karst Identified**
39	47	Depressions	Hardinsburg Sandstone			X	
40	48	Depression and Sinkhole	Hardinsburg Sandstone		X		
41	49	Open Sinkhole	Haney Limestone Member		X		
42	50	Depression and Sinkhole	Haney Limestone Member		X		
43	51	Open Sinkhole and Depression	Haney Limestone Member				X
44	52	Sinkhole, Depression, and Open Sinkhole	Hardinsburg Sandstone	X			
45	53	Sinkholes	Hardinsburg Sandstone		X		
46	54	Depression	Hardinsburg Sandstone			X	
47	55	Depressions and Sinkhole	Hardinsburg Sandstone		X		

Area 7:

Area 7 is located west of Area 6 in the central portion of the project (**Figures 2 and 56**). Seven (7) surface features indicative of karst were identified within the project limits and five (5) surface features were identified near the project limits. Of the seven (7) features located within the project limits, six (6) were imaged with EI, totaling four (4) EI profiles. One feature contained trash and could not be imaged. All features within Area 7 imaged during the 2023 investigation are still located within the project limits (THG, 2023). Surface features indicative of karst identified within Area 7 are located where bedrock is mapped as the Haney Limestone member, the Hardinsburg Sandstone or the Big Clifty Sandstone member (KGS, 2022a). An individual analysis for each EI profile is included on each profile's figure (**Figures 57 through 60**).

Based on the results of the 2023 and current investigation within Area 7, surficial expressions of underlying karst conditions are confined to an approximate elevation range of 560 to 610 feet amsl when located where bedrock is mapped as the Haney Limestone member or Hardinsburg Sandstone. The surface feature located where the Big Clifty Sandstone member is the mapped geology, occurs at approximately 475 feet amsl, but is only approximately 5 feet above the elevation where the Beech Creek Limestone member is mapped as bedrock (KGS, 2022a). Like other areas of the project, karst features are located where limestone bedrock is mapped nearest the surface or where overlying sandstones are less than 10 feet thick, suggesting that thicker sections of overlying sandstone are less susceptible to the effects of karst within the limestone. The limestone within Area 7 is only partially imaged by one profile, E-48, but the overlying sandstone is interpreted to contain clay-filled and saturated fractures/fracture zones that are caused by dissolution within underlying limestone.

Karst Identification Summary Table: Area 7							
EI Profile	Figure Number	Surficial Classification	Geologic Unit	Air-filled Void or Fractures	Saturated/Clay-filled Void or Fractures	Karst Conditions: No Voids	No Karst Identified
48	57	Open Sinkholes	Hardinsburg Sandstone		X		
49	58	Open Sinkholes	Haney Limestone Member		X		
50	59	Open Sinkhole	Hardinsburg Sandstone		X		
51	60	Sinkhole	Big Clifty Sandstone Member		X		

Area 8:

Area 8 is located over the easternmost extent of the permitted areas and currently does not contain any proposed solar park infrastructure (**Figures 2 and 61**). One (1) surface feature indicative of karst was identified within the project limits and two (2) surface features were identified near the project limits. EI profile E-52 was collected over the depression identified within the current project limits during the 2023 investigation (THG, 2023). All three (3) surface features identified within Area 8 are located where bedrock is mapped as the Haney Limestone member (KGS, 2022a).

An individual analysis for EI profile E-52 is included on the profile's figure. No karst was interpreted from the EI profile (**Figure 62**). Based on the results of the investigations within Area 8, karst conditions impacting the surface are not common and the Haney Limestone member is likely overlain by thick sediments. No air- or clay-filled/saturated voids or fractures are identified within the geophysical data for Area 8.

Area 9:

Area 9 is located along the proposed AC collection system alignment northwest of the proposed substation location (**Figures 2 and 63**). One (1) surface feature indicative of karst was identified within 10 feet of the proposed collection system alignment, and three (3) features were identified between 140 and 250 feet south of the collection alignment. EI profile E-53 was collected over the depression identified near the collection alignment. No portions of Area 9 were included in the 2023 investigation scope of work (THG, 2023). All three (3) surface features identified within Area 9 are all located where bedrock is mapped as the Hardinsburg Sandstone (KGS, 2022a).

An individual analysis for EI profile E-53 is included on the profile's figure. Karst was not interpreted from the EI profile (**Figure 64**). Based on the results of the investigation within Area 9, karst conditions impacting the surface are not common and the depression identified near the collection alignment may be related to sediment piping away from the surface along a drainage tile that may be present within this agricultural field. No air- or clay-filled/saturated voids or fractures are identified within the geophysical data for Area 9.

Area 10:

Area 10 is located over a portion of the project located south of the proposed substation (**Figures 2 and 65**). One (1) surface feature indicative of karst was identified within the project limits in Area 10. EI profile E-54 was collected over the depression, that is located where the mapped bedrock is the Hardinsburg Sandstone (KGS, 2022a). No surface features indicative of karst were identified within Area 10 during the 2023 investigation (THG, 2023).

An individual analysis for EI profile E-54 is included in the profile’s figure. Karst was not interpreted from the EI profile (**Figure 66**). Based on the results of the investigation within Area 10, karst conditions impacting the surface are not common and the depression identified is interpreted to be related to karst features within deeper limestone units. No air- or clay-filled/saturated voids or fractures are identified within the geophysical data for Area 10.

5.0 CONCLUSION

THG performed a geophysical investigation of the New Frontiers Solar Park located in Breckinridge County, Kentucky from January 3-8, 2025 (**Figures 1 and 2**). This investigation was supplemental to a previous investigation (THG, 2023) that included all areas of the project layout including permitted areas, proposed internal roads, the proposed AC collection system, and some areas considered for future development. The scope of work included site reconnaissance to identify surficial karst features and EI imaging methods to characterize the subsurface in the vicinity of field-identified surficial karst features.

THG identified ninety-one (91) suspected surface features indicative of karst located within the project limits and eighty-two (82) surface features located near the project limits. The surface features are confined to nine (9) areas of the project site (**Figures 3, 7, 12, 35, 46, 56, 61, 63, and 65)**. All surface features located within the project limits were imaged using EI, totaling fifty-four (54) EI profiles (**Figures 3 through 66**). Surface features indicative of karst are only expressed where the mapped bedrock is characterized as the Haney Limestone member, the Hardinsburg Sandstone, or the Big Clifty Sandstone member. Additionally, all field-identified surface features are largely constrained to an elevation range of approximately 560 to 645 feet amsl and appear to predominantly occur only where sandstone overlying limestone is less than 30 feet thick, suggesting that portions of the project site where thicker sections of sandstone overly limestone are less susceptible to the effects of karst within deeper limestone.

EI data collected across surface features indicative of karst displayed several subsurface conditions. Interpreted subsurface conditions include air-filled voids or fractures, clay-filled/saturated voids and fractures, karst conditions containing no voids such as limestone pinnacles and variable rock competency, and subsurface conditions showing no evidence of karst.

6.0 REFERENCES

AGI, (2002). EarthImager Program. American Geosciences Inc., Austin Texas.

Amos, D.H., (1975). Geologic map of the Hardinsburg quadrangle, Breckinridge County, Kentucky: U.S. Geologic Survey Geologic Quad. Map GQ-1232.

deGroot-Hedlin, C. and Constable, S., (1990). Occam's inversion to generate smooth, two-dimensional models from magnetotelluric data. Geophysics, V. 55, 1613-1624.

Haagen, J. E., (2001). Soil Survey of Breckinridge and Meade Counties, Kentucky Natural Resources Conservation Service Online.

Lorin, C. D. and Crittengen Jr., M. D., (1965). Geologic map of the Mattingly quadrangle, Kentucky-Indiana: U.S. Geologic Survey Geologic Quad. Map GQ-361.

Kentucky Geological Survey (KGS), (2022a). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

Kentucky Geological Society (KGS), (2022b). Kentucky Groundwater Data Repository. Breckinridge County. Online.

Loke, M. N., and Barker, R. D., 1996, Rapid least-squares inversion of apparent resistivity pseudosection by quasi-Newton method. Geophysical Prospecting, V. 44, 131-152.

Mooney, H. M. (1980). Handbook of Engineering Geophysics: Volume 2: Electrical Resistivity, Bison Instruments, Inc.

Reynolds, J. M. (1997). An Introduction to Applied and Environmental Geophysics. New York, NY, Wiley.

Renewable Resource Consultants, LLC. (RRC), (2022). Clover Creek Solar ge2201006-draft logs of borings-8.17.2022.

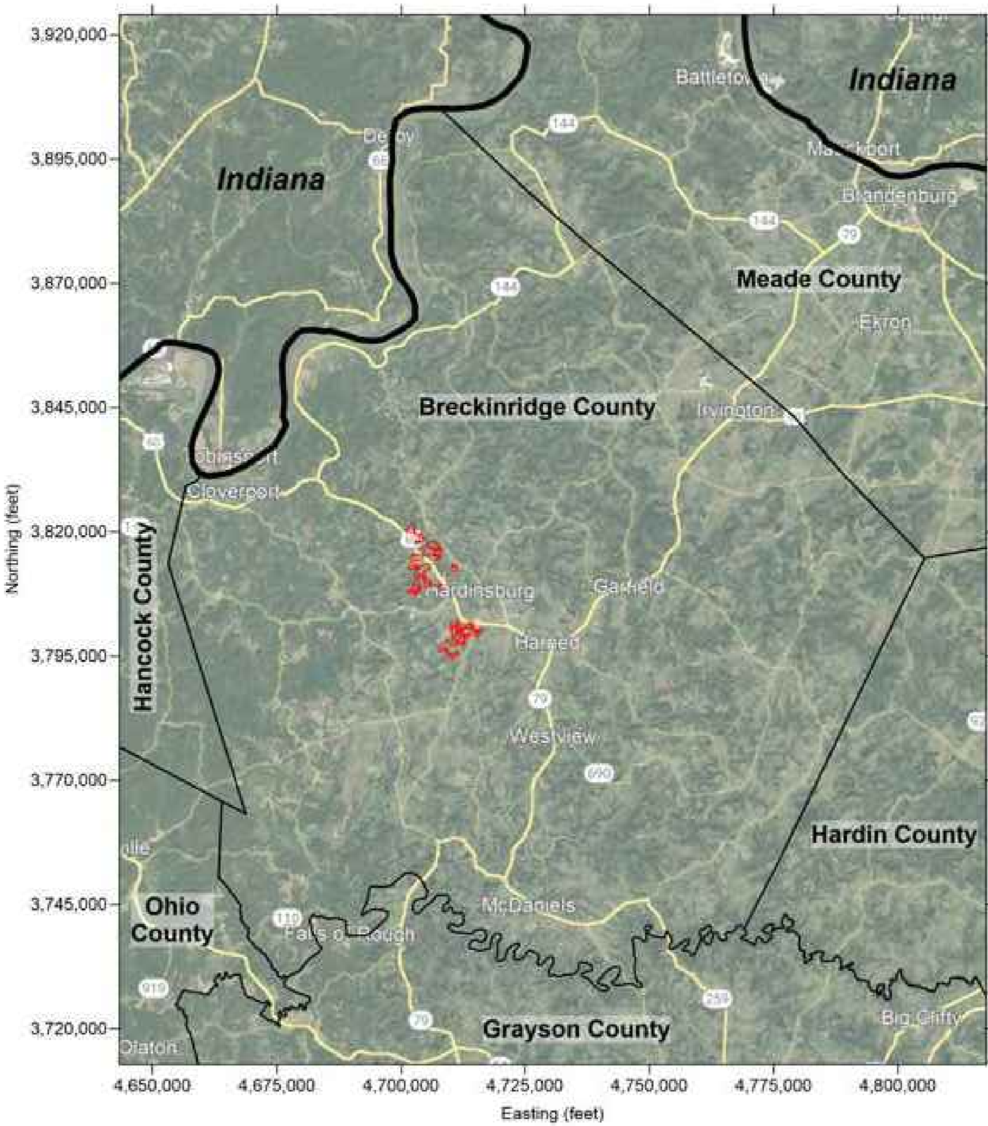
THG Geophysics, (2022a). THG Desktop Report11181-Clover Creek Solar.

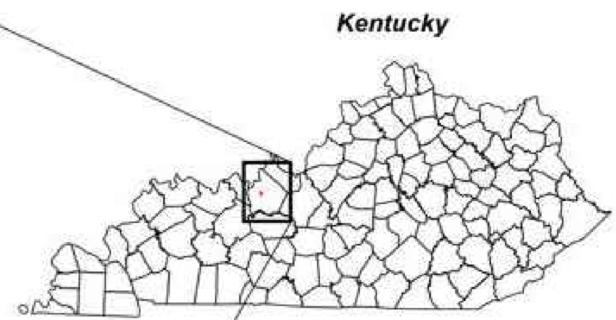
THG Geophysics, (2022b). THG Geophysical Report11181-003 Clover Creek Solar TCM.

THG Geophysics, (2023). THG Geophysical Report11181-004 Clover Creek Solar EI

Westwood, (2024). New Frontiers Boring Logs.

Xia, J.; Miller, R. D.; Park, C. B.; Hunter J. A.; Harris, J. B.; and Ivanov, J., (2002), Comparing shear-wave velocity profiles inverted from multi-channel surface wave with borehole measurements: *Soil Dynamics Earthquake Engineering*, Vol. 22, pp. 181-190.





Legend

New Frontiers Solar Park Survey Area

Notes

Map coordinates plotted in NAD83 US State Plane coordinate system (Kentucky Single Zone FIPS 1600) in US Survey feet.

Locations are approximate.

Map Scale: 1 inch = 25,000 feet

0 ft | 25,000 ft | 50,000 ft | 75,000 ft | 100,000 ft

GEOPHYSICS

DRN	MLT	01/22/25
DES	MLT	03/10/23
CHK	PJH	02/03/25
REV		
PROJ. MGR	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 25,000 feet

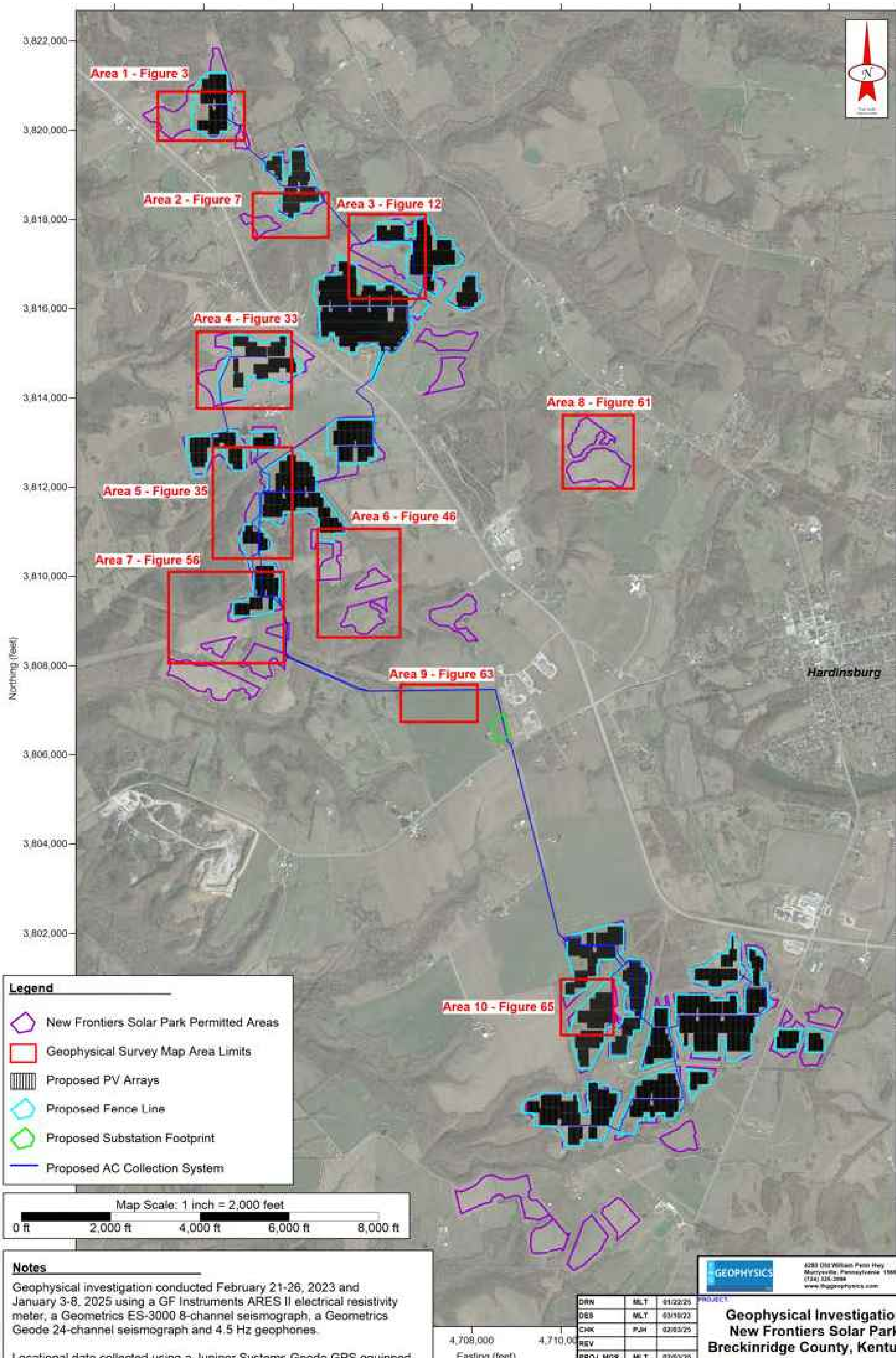
SOURCE: Google Earth, 2023

DRAWING NO.: **Figure 1** Site Location Map

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F1



Notes

Geophysical investigation conducted February 21-26, 2023 and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 8-channel seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS with differential corrections. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

GEOPHYSICS

DRN	MLT	01/22/25
DES	MLT	03/10/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT:

Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

SCALE: 1 inch = 2,000 feet

SOURCE: Google Earth, 2023

DRAWING NO.:

Figure 2
Geophysical Survey Areas Map

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F2

Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

Map Scale: 1 inch = 100 feet

0 ft 100 ft 200 ft 300 ft 400 ft

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 100 feet

SOURCE: Google Earth, 2023; KGS, 2018

PROJECT:
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

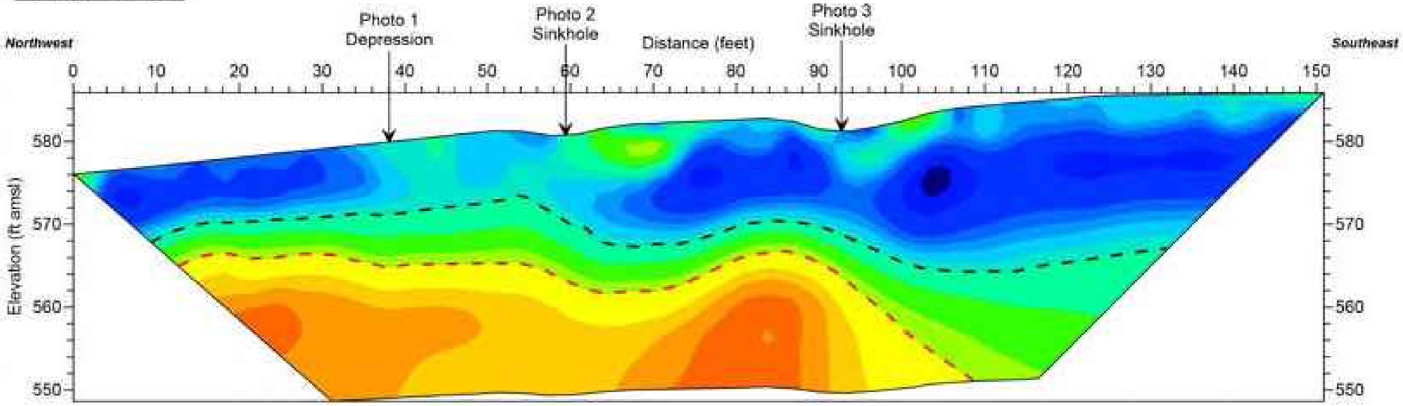
DRAWING NO.:
Figure 3
Area 1 Geophysical Survey Map

PREPARED FOR: edp

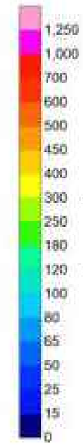
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F3

EI Profile E-1



Apparent Resistivity (Ohm-m)



EI Profile Description:

Slightly elevated apparent resistivities measured beneath each surficial karst feature are interpreted as poorly consolidated overburden materials related to differential settlement over deeper karst formations. The interpreted top of limestone is hummocky, consistent with limestone pinnacle formation. Variable apparent resistivities within the interpreted limestone are interpreted to indicate a range of competency within the unit, where lower apparent resistivities are interpreted as sections of increased weathering and may be more porous and vuggier than adjacent sections displaying higher apparent resistivities. No voids are interpreted within this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

Photo 2

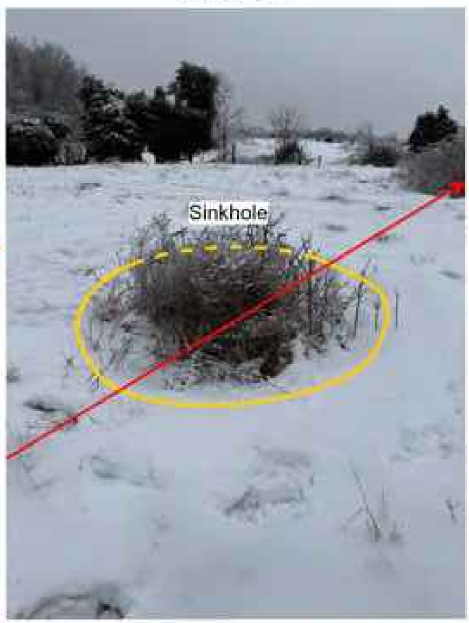
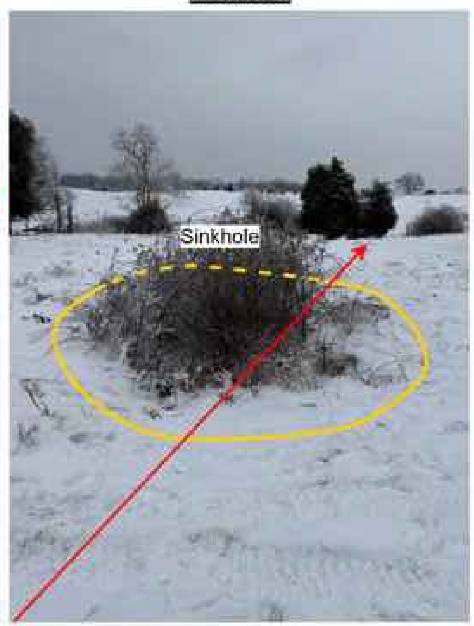


Photo 3



Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	PJH	01/31/25
REV		
PROJ. MGR.	MLT	01/31/25

SCALE: 1 inch = 15 feet
No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

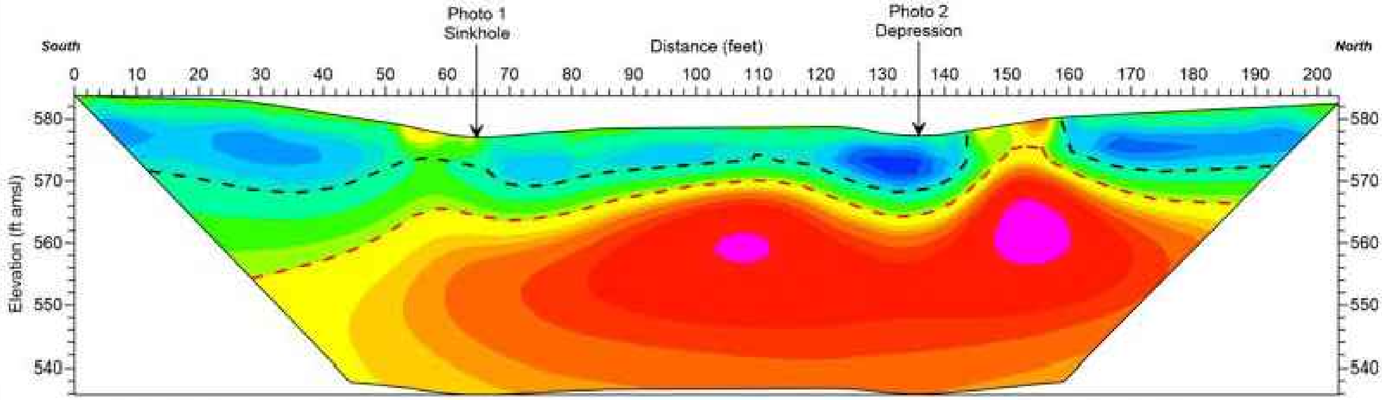
DRAWING NO.: **Figure 4**
Electrical Imaging Data
Area 1, Profile E-1

PREPARED FOR: edp

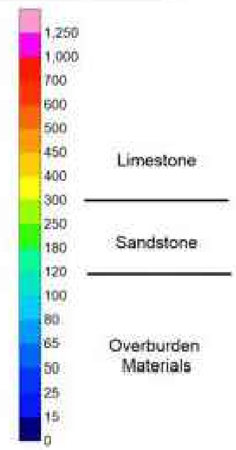
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F4

EI Profile E-2



Apparent Resistivity (Ohm-m)



EI Profile Description:

Below the sinkhole, elevated apparent resistivities are interpreted as poorly consolidated sediments overlying shallow, fractured sandstone, permitting the downward movement of materials into deeper karst units. Near the depression, a pocket of low apparent resistivities is interpreted as saturated sediments overlying a dipping interpreted bedrock surface that is likely related to deeper collapse within limestone or differential weathering of the limestone, leading to the formation of pinnacles. Also near the depression is a section of near-surface elevated apparent resistivities interpreted as very shallow rock overlying a shallow limestone pinnacle. Pockets of very high apparent resistivities within the two (2) most prominent pinnacles are interpreted as competent limestone separated by sections of lower competency limestone. No voids are interpreted within this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

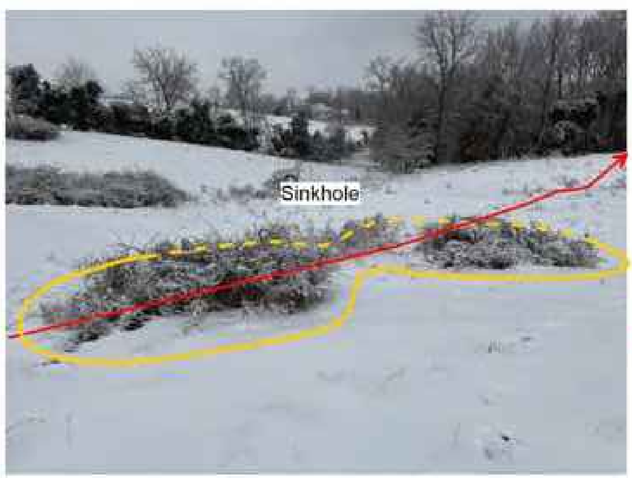
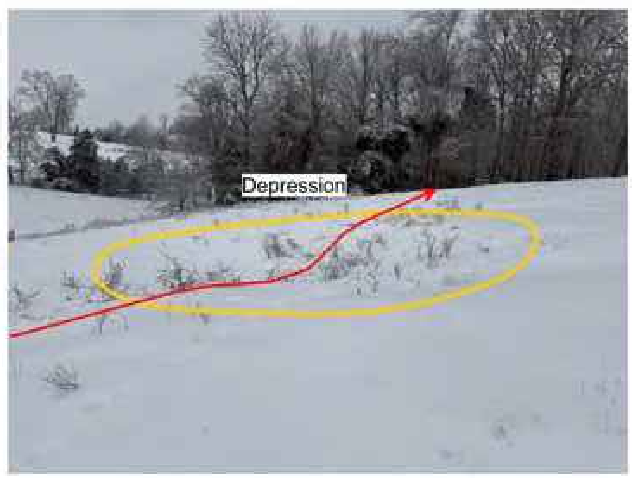


Photo 2



Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS
4250 Old William Penn Hwy
Murrysville, Pennsylvania 15668
(724) 325-3996
www.3dgeophysics.com

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 20 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

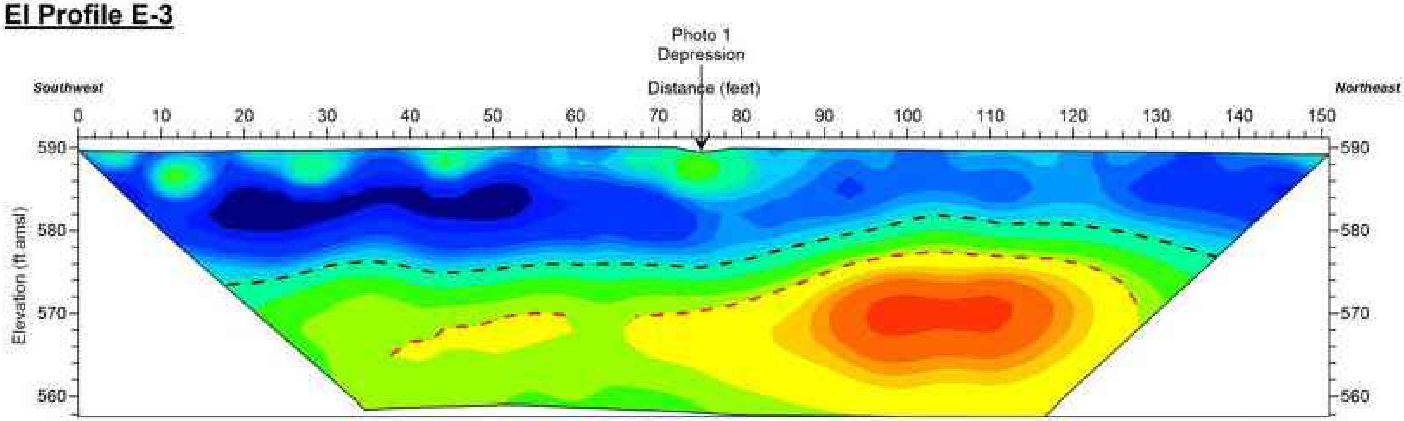
DRAWING NO.: **Figure 5** Electrical Imaging Data Area 1, Profile E-2

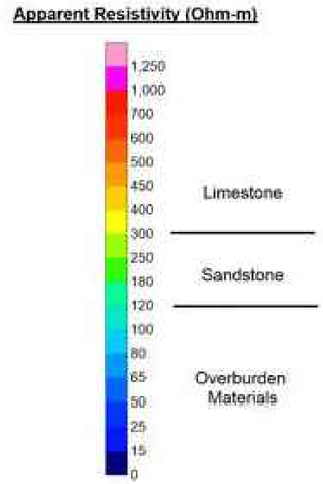
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F5

EI Profile E-3





EI Profile Description:

Below the depression is a small pocket of elevated apparent resistivities interpreted as poorly consolidated overburden materials related to differential settlement over deeper carbonate formations. The interpreted sandstone top of rock is somewhat hummocky, suggesting differential weathering of the underlying limestone. The interpreted limestone top of rock is highly irregular and contains gaps interpreted as highly fractured and vuggy intervals of limestone that are also present in deeper sections of the unit. No voids are interpreted from this profile; however, the limestone appears to severely weathered and likely has very low competency.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

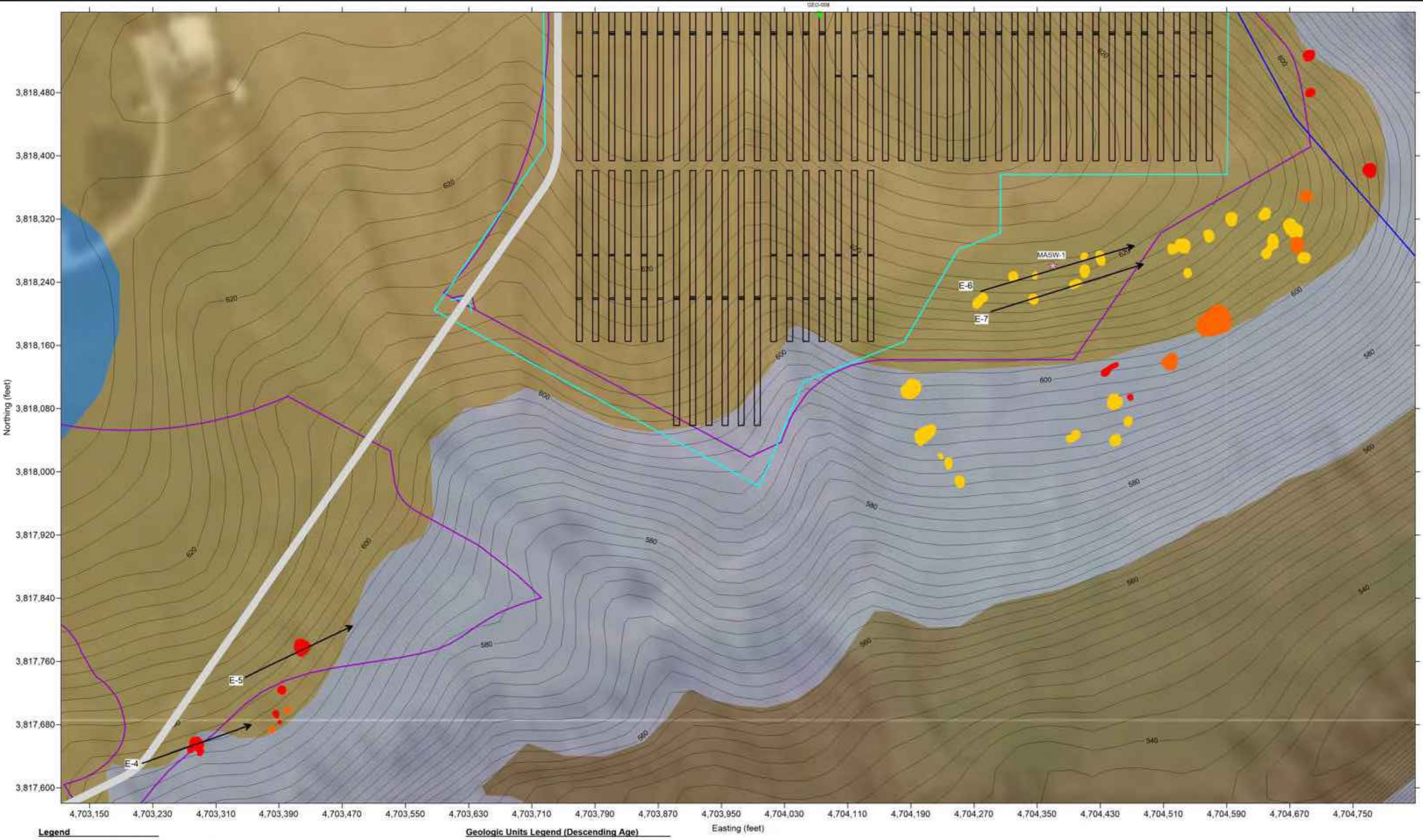
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 6** Electrical Imaging Data Area 1, Profile E-3

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F6



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 1-D MASW Test Location
- PV-01 Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

Map Scale: 1 inch = 80 feet

0 ft 80 ft 160 ft 240 ft 320 ft

GEOPHYSICS

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 80 feet

SOURCE: Google Earth, 2023 KGS, 2016

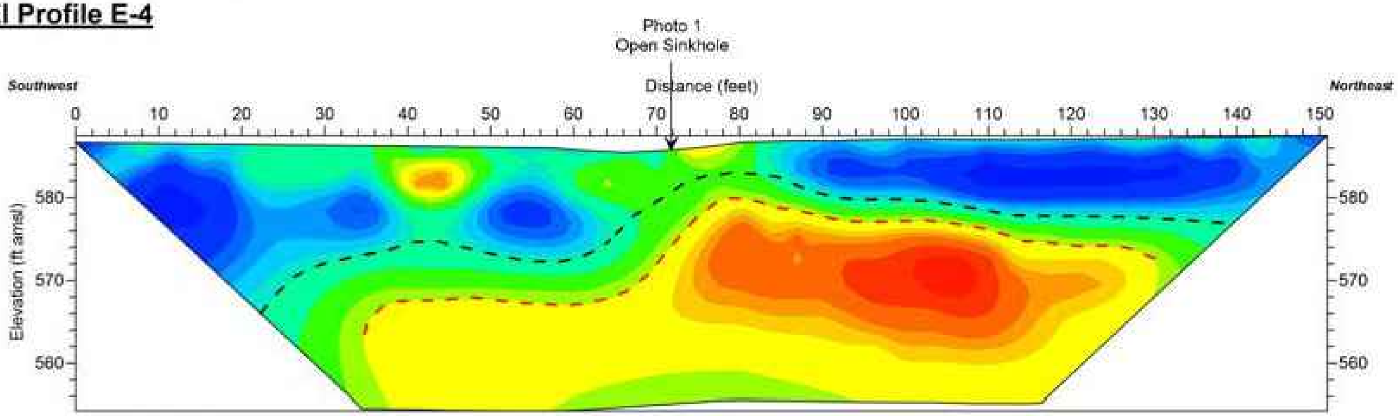
DRAWING NO.: **Figure 7** Area 2 Geophysical Survey Map

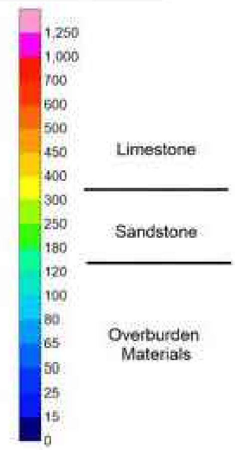
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F7

EI Profile E-4

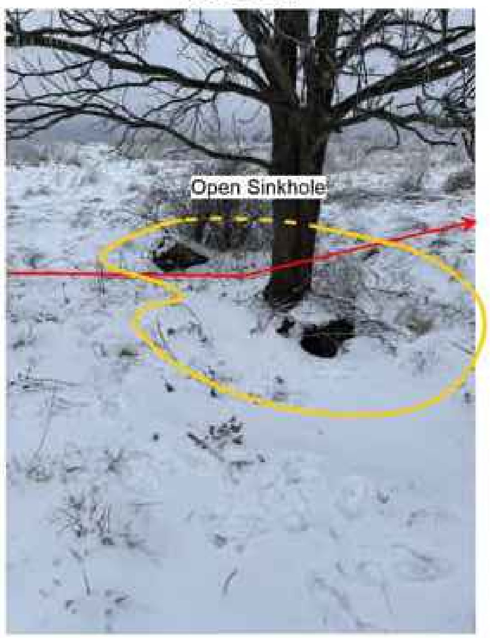




EI Profile Description:

This profile images highly irregular interpreted top of sandstone and limestone surfaces that are indicative of differential weathering and erosion of the limestone unit. Beneath the open sinkhole feature, this profile images a section of elevated apparent resistivities interpreted as poorly consolidated sediments related to the downward movement of materials into deeper karst voids. The shallow limestone beneath the open sinkhole likely contains numerous fractures or small voids that lead to the development of the sinkhole. Additionally, variable apparent resistivities within the interpreted limestone indicate a range of competency within the unit, where lower apparent resistivities are interpreted as sections of increased weathering and may be more porous and vuggier than adjacent sections displaying higher apparent resistivities. No voids are readily apparent within this profile but may be present at deeper depths.

Photo 1



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/23/25
DES	MLT	02/03/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

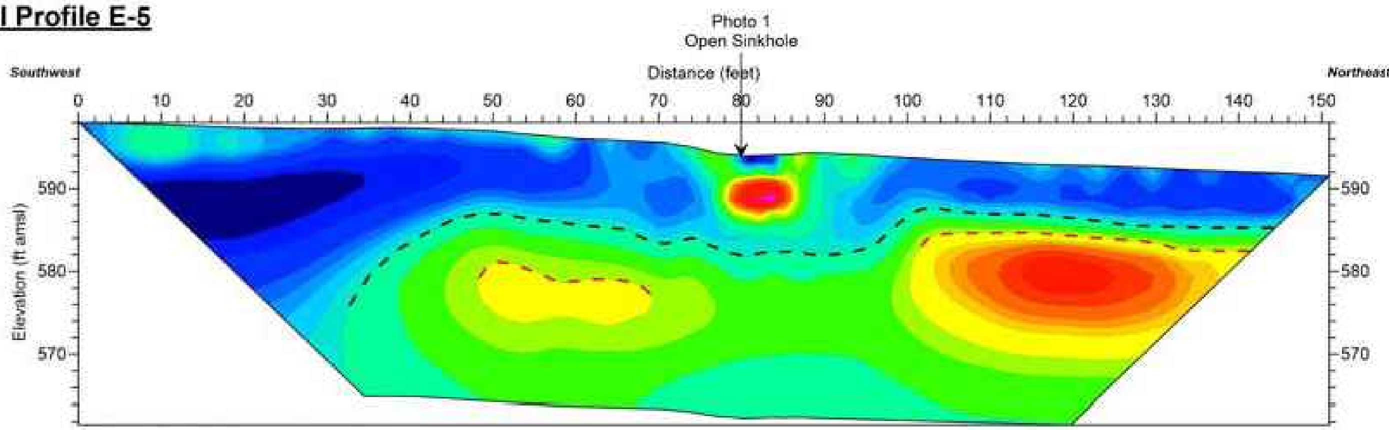
DRAWING NO.: **Figure 8** Electrical Imaging Data Area 2, Profile E-4

PREPARED FOR: edp

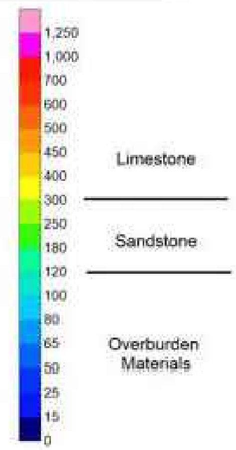
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F8

EI Profile E-5



Apparent Resistivity (Ohm-m)



EI Profile Description:

Below the open sinkhole is a small pocket of very high apparent resistivities interpreted as an air-filled void or fracture zone. The interpreted sandstone top of rock is irregular and hummocky, suggesting differential weathering of the underlying limestone. The interpreted limestone top of rock is highly irregular and contains gaps interpreted as highly fractured and vuggy intervals of limestone that are also present in deeper sections of the unit. The limestone appears to severely weathered and likely has very low competency.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/23/25
DES	MLT	01/23/25
CHK	FJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

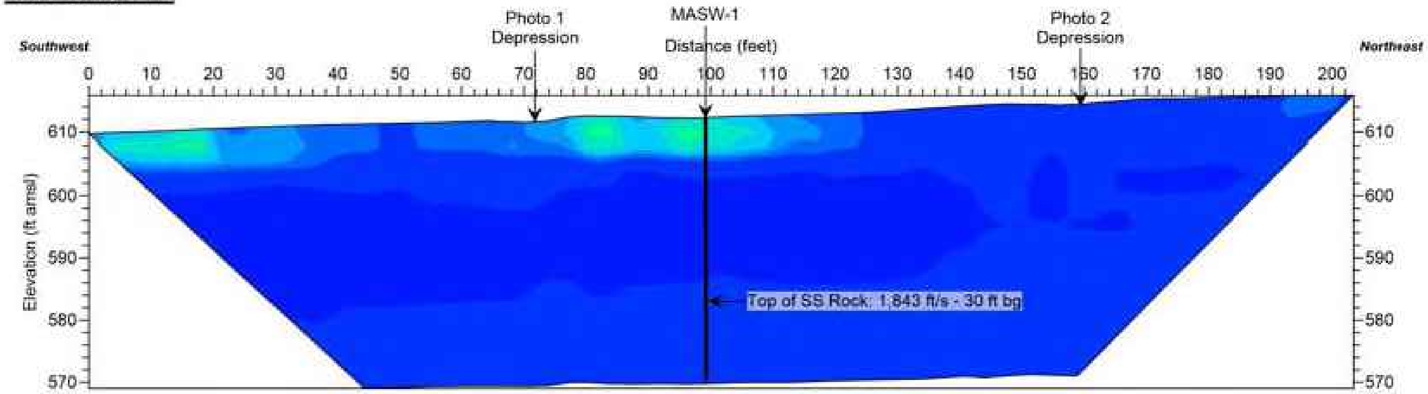
DRAWING NO.: **Figure 9** Electrical Imaging Data Area 2, Profile E-5

PREPARED FOR: edp

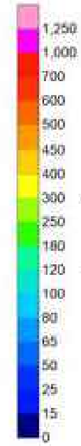
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F9

EI Profile E-6



Apparent Resistivity (Ohm-m)



EI Profile Description:

This profile displays very low apparent resistivities to depth, interpreted as deep soils. Top of rock is not mapped in this profile; however, MASW data collected along the profile suggests sandstone should occur approximately 30 feet bg. If rock is present, it is interpreted to be heavily saturated resulting in much lower apparent resistivity values. No karst features are identified in the profile and the source of the surface depressions are interpreted to be related to karst features within deeper limestone beyond the maximum profile imaging depth.

Photo 1

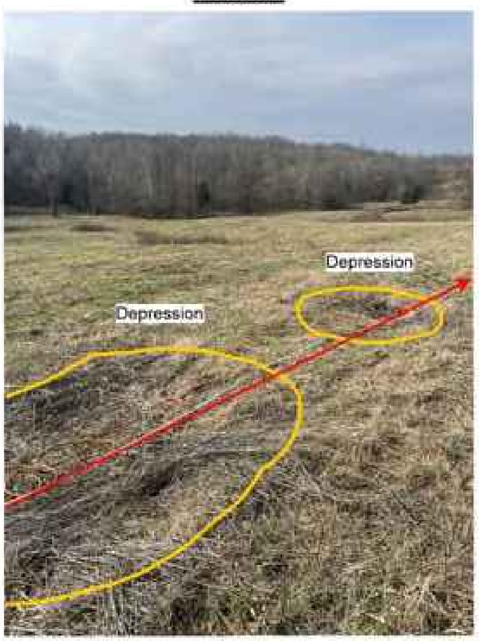
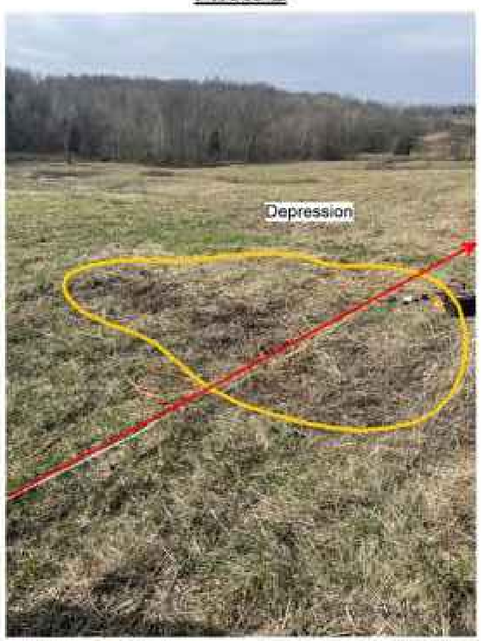


Photo 2



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/23/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 20 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

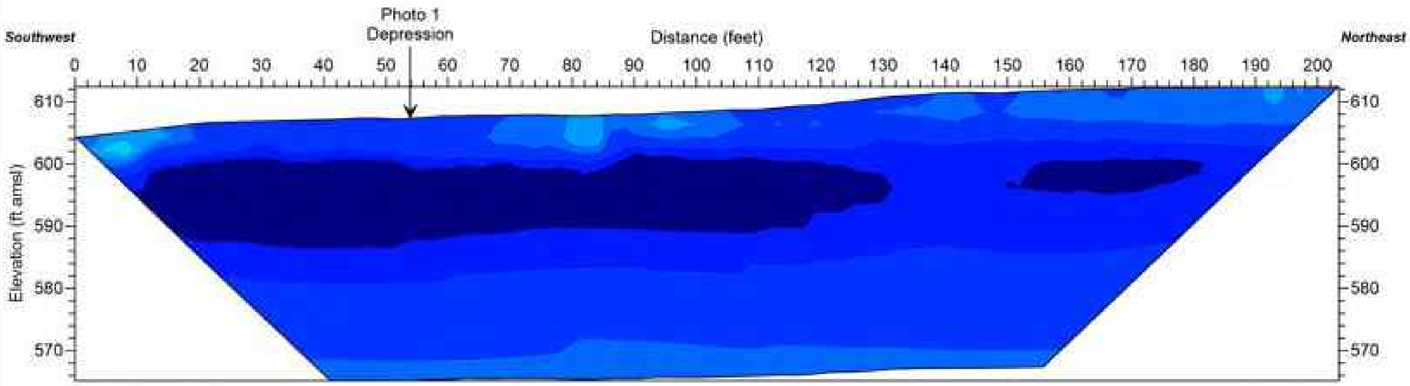
DRAWING NO.: **Figure 10** Electrical Imaging Data Area 2, Profile E-6

PREPARED FOR: edp

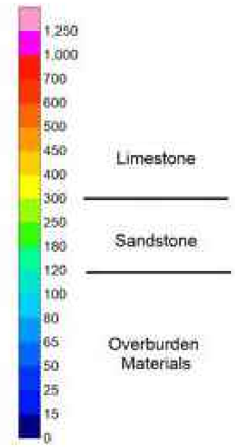
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F10

EI Profile E-7



Apparent Resistivity (Ohm-m)



EI Profile Description:

This profile displays very low apparent resistivities to depth, interpreted as deep soils. Top of rock is not mapped in this profile; however, MASW data collected along profile E-6 suggests sandstone should occur approximately 27 feet bg. If rock is present, it is interpreted to be heavily saturated resulting in much lower apparent resistivity values. No karst features are identified in the profile and the source of the surface depressions are interpreted to be crelated to karst features within deeper limestone beyond the maximum profile imaging depth.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/24/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 20 feet, No vertical exaggeration

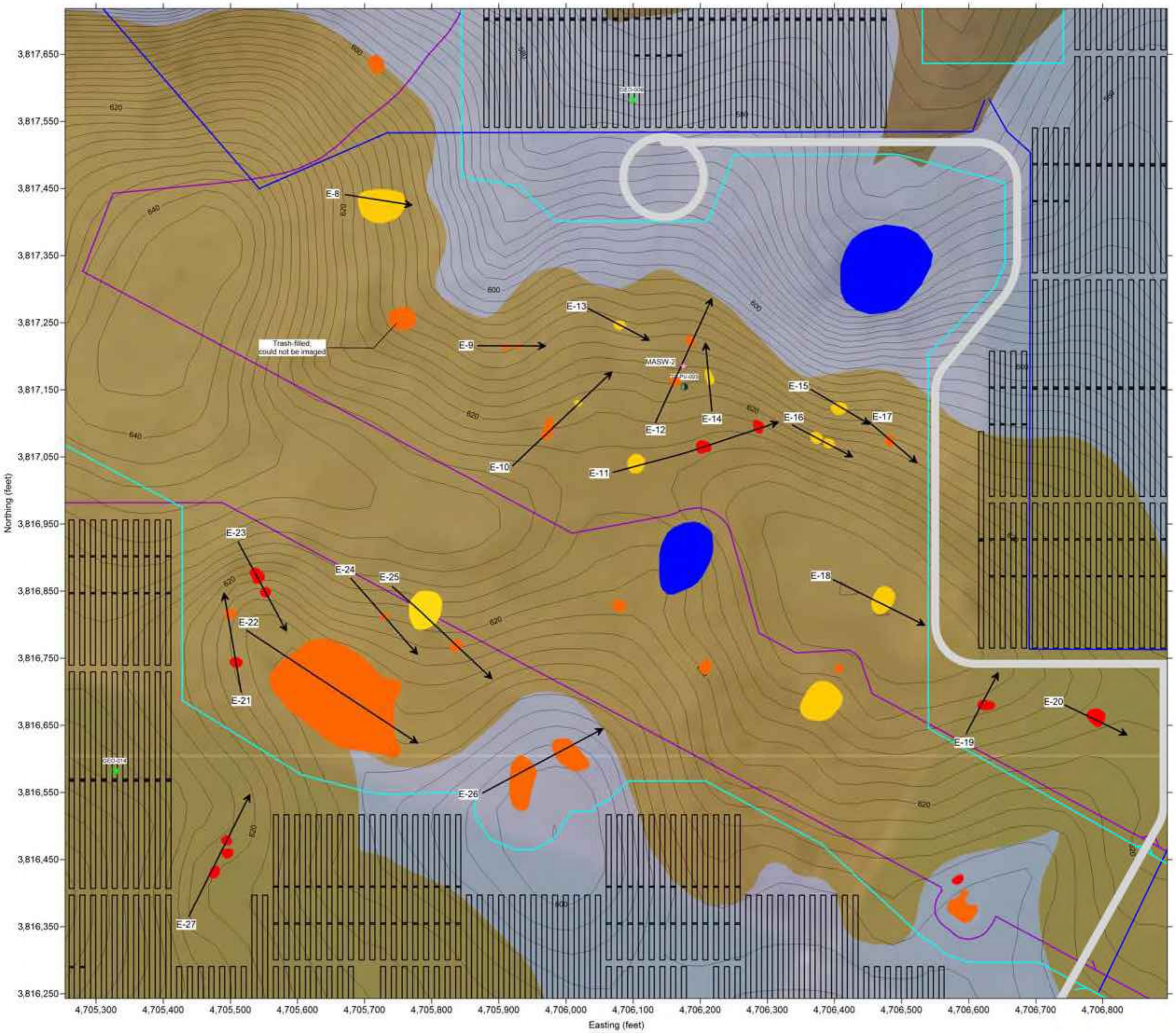
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 11** Electrical Imaging Data Area 2, Profile E-7

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F11



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

Map Scale: 1 inch = 100 feet

0 ft, 100 ft, 200 ft, 300 ft, 400 ft

DRN	MLT	01/24/25
DES	MLT	01/24/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 100 feet

SOURCE: Google Earth, 2023; KGS, 2018

GEOPHYSICS

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

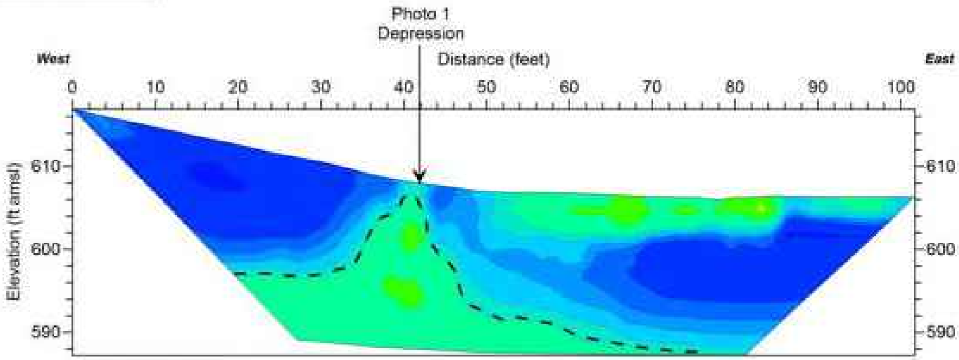
DRAWING NO.: **Figure 12** Area 3 Geophysical Survey Map

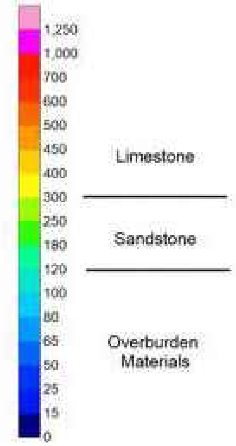
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F12

El Profile E-8





El Profile Description:

This profile exhibits a highly variable interpreted sandstone top of rock surface suggesting severe differential settlement from the dissolution or collapse of deeper limestone. Additionally, the shallow portion of elevate apparent resistivities beneath the depression may indicate poorly consolidated or dryer soils related to differential settlement of materails moving downward into sandstone fractures and deeper limestone karst features. No air-filled voids or fractures are identified in this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Photo 1

DRN	MLT	01/24/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

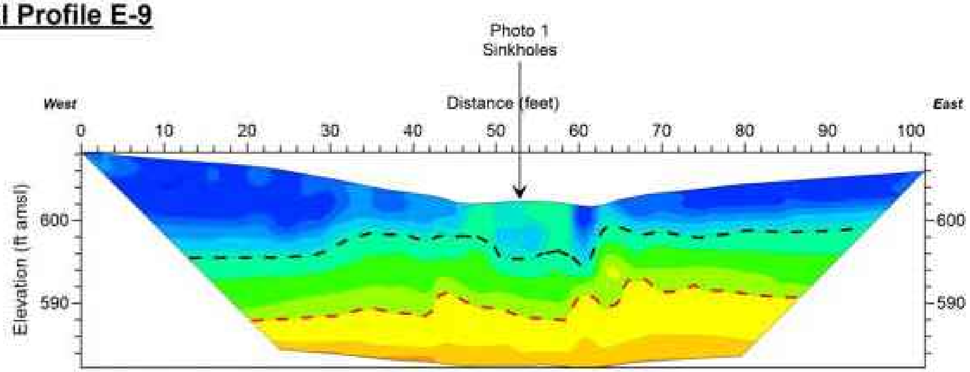
DRAWING NO.: **Figure 13** Electrical Imaging Data Area 3, Profile E-8

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F13

EI Profile E-9

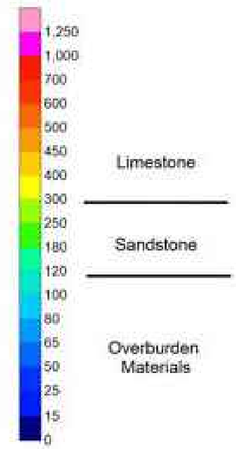


EI Profile Description:

Both the interpreted top of sandstone and top of limestone are well-defined in this EI profile. The variable limestone top of rock is likely due to differential weathering and dissolution of limestone along the contact between the two units. Two vertical extensions of resistive materials extend to the surface directly below the two sinkholes. These two resistive columns are interpreted to indicate poorly consolidated or dryer soils related to the downward movement of materials into fractures or vuggs within the deeper limestone. Additionally, small pockets of elevatd apparent resistivities within the interpreted sandstone may indicate partially air-filled pathways fractures within the rock.

Photo 1

Apparent Resistivity (Ohm-m)



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/24/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

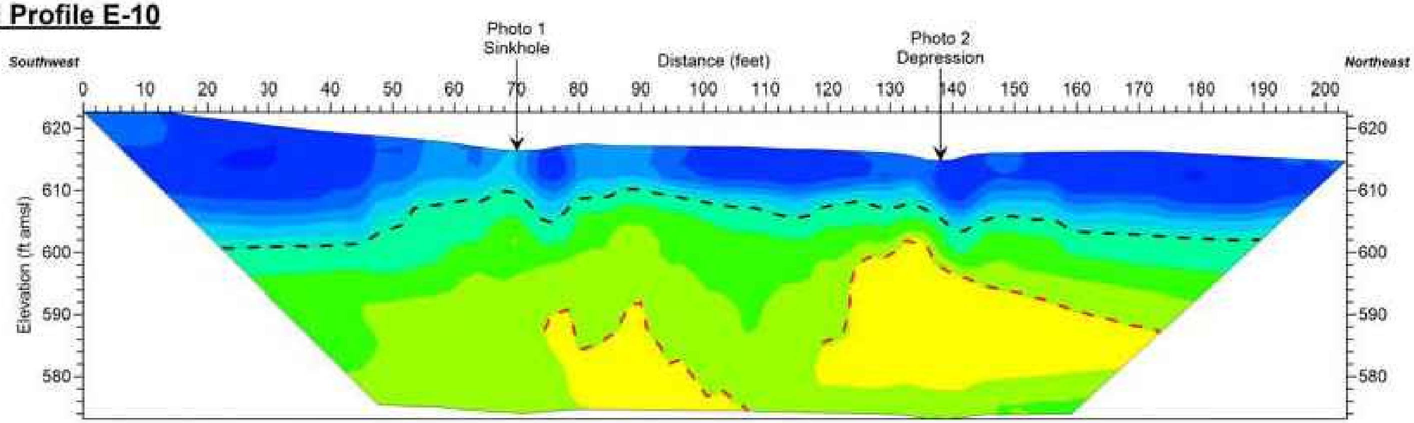
DRAWING NO.: **Figure 14** Electrical Imaging Data Area 3, Profile E-9

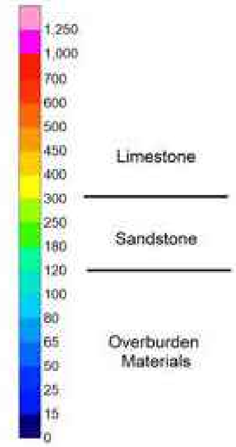
PREPARED FOR: edp

PROJECT NO.: 647-12051

SHEET TITLE: DWG12051F14

EI Profile E-10





EI Profile Description:

This profile exhibits a somewhat variable interpreted top of sandstone bedrock surface suggesting some differential settlement from the dissolution of deeper limestone, most likely near the contact between the two units. Two sections of interpreted limestone are mapped along this profile and their geometry suggests severe weathering at the contact between the two units. The sources of the sinkhole and depression are interpreted to be the result of the downward movement of sediment through sandstone fractures into small voids and fractures within the limestone near the contact of the two units.

Photo 1

Photo 2

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 20 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

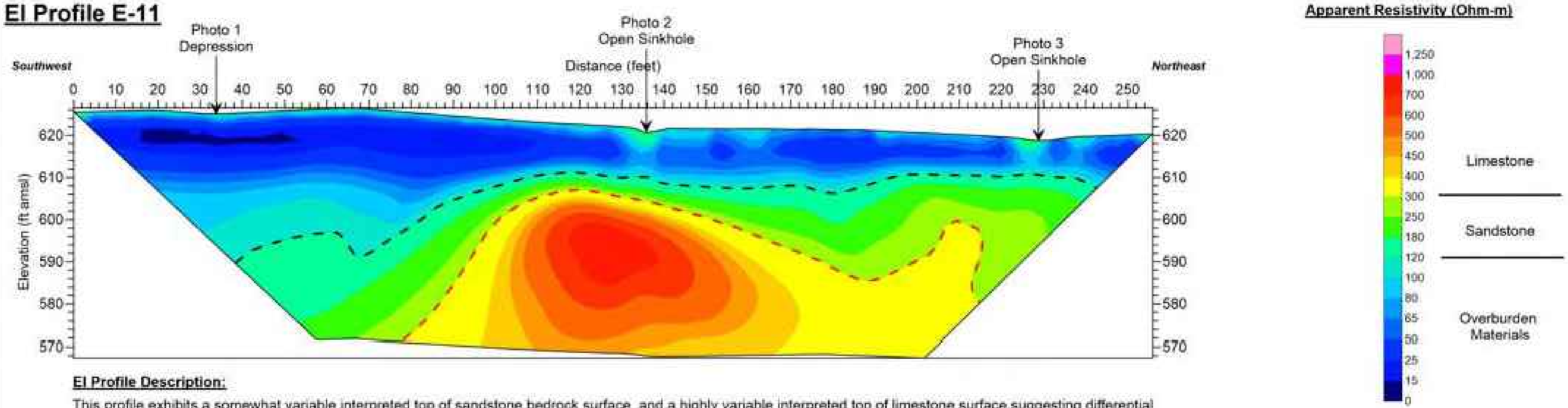
DRAWING NO.: **Figure 15** Electrical Imaging Data Area 3, Profile E-10

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F15

EI Profile E-11



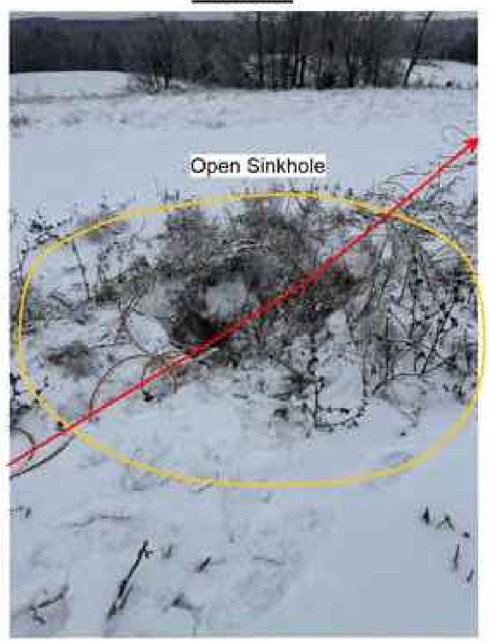
EI Profile Description:

This profile exhibits a somewhat variable interpreted top of sandstone bedrock surface and a highly variable interpreted top of limestone surface suggesting differential weathering and dissolution of the limestone, consistent with pinnacle formation. Beneath the depression are thick soils suggesting that the source of this feature occurs within deeper limestone not imaged in the profile. Beneath the open sinkholes are shallow pockets of slightly elevated apparent resistivities interpreted as poorly consolidated soils due to differential settlement into deeper karst features. The limestone unit displays variable apparent resistivities suggesting that rock competency is variable. No voids are interpreted from the profile, but sediment-filled and saturated fracture zones are likely prevalent throughout the limestone imaged in this profile.

Photo 1

Photo 2

Photo 3



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/31/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 25 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

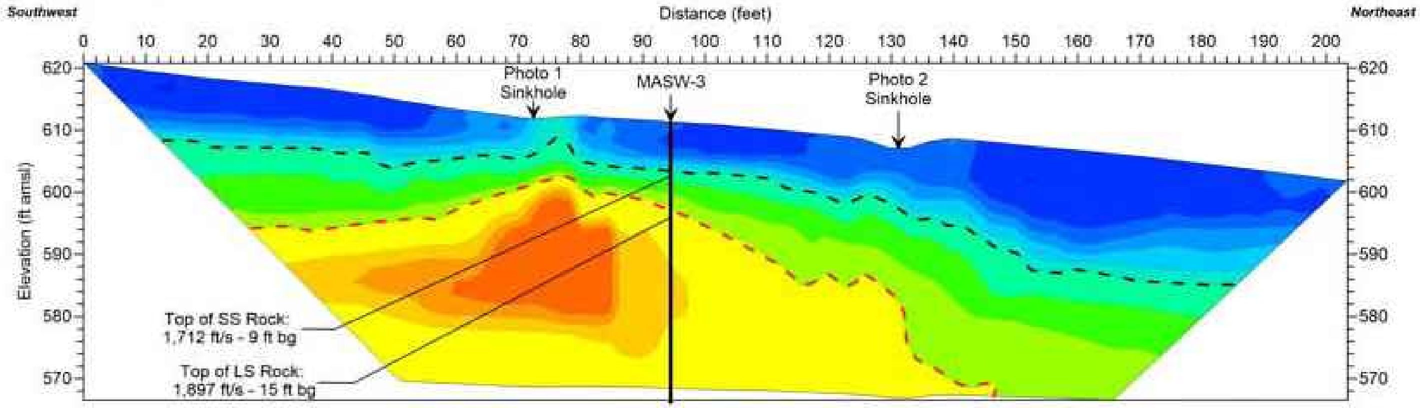
DRAWING NO.: **Figure 16** Electrical Imaging Data Area 3, Profile E-11

PREPARED FOR: edp

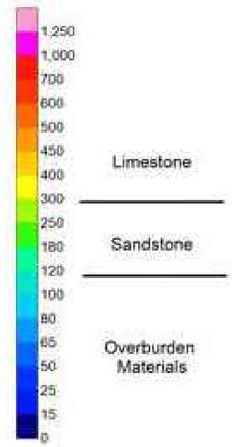
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F16

EI Profile E-12



Apparent Resistivity (Ohm-m)



EI Profile Description:

Both the Hardinsburg Sandstone and the Haney Limestone are well-displayed in this profile. The bedrock surface for each unit is variable indicating differential weathering and dissolution of the limestone. A section of elevated apparent resistivity within the interpreted limestone from approximately 60 to 88 feet along the profile and approximately 12 to 30 feet bg may be indicative of severe limestone weathering resulting in the formation of an air-filled fracture zone.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

Photo 2

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT:
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

SCALE: 1 inch = 20 feet
No vertical exaggeration

SOURCE: AGI EarthImager 2D

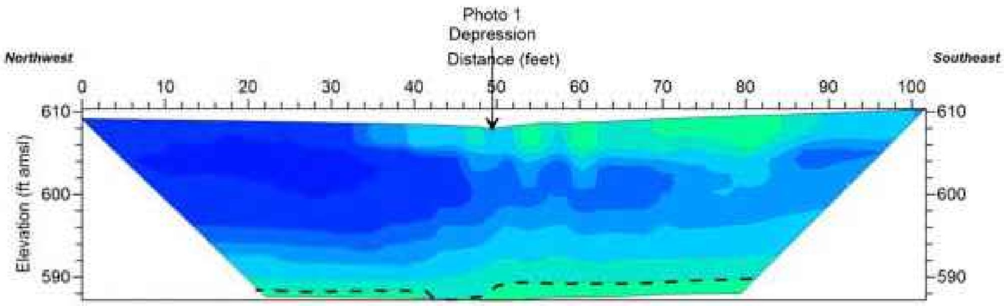
DRAWING NO.:
Figure 17
Electrical Imaging Data
Area 3, Profile E-12

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F17

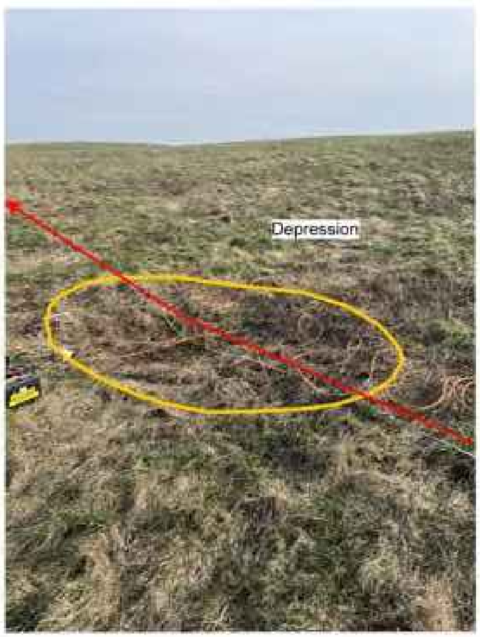
EI Profile E-13



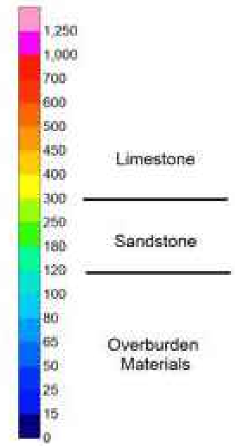
EI Profile Description:

The apparent resistivity values within the profile are very low, suggesting deep soils that are likely saturated. The interpreted top of sandstone is mapped near the base of the profile. Based on the mapped sandstone profile, the source of the surface depression is interpreted to be caused by differential settlement of soils related to karst features within deeper limestone. No voids are interpreted in this EI profile.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet; No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

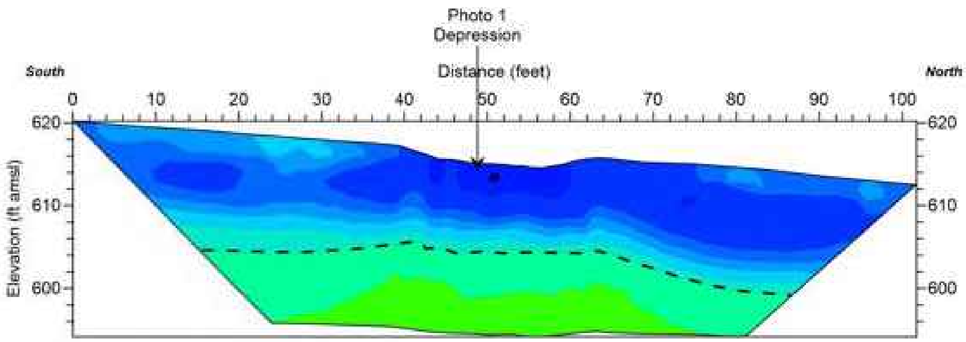
DRAWING NO.: **Figure 18** Electrical Imaging Data Area 3, Profile E-13

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F18

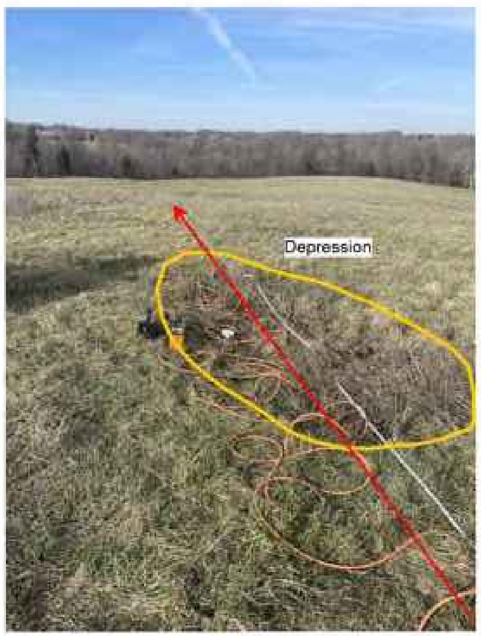
EI Profile E-14



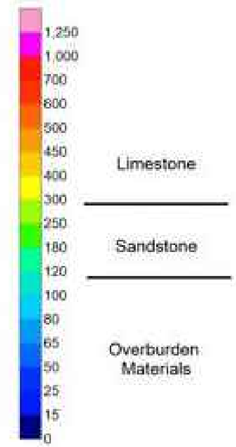
EI Profile Description:

The interpreted top of sandstone is well-displayed within this profile and is mapped at relatively consistent elevations. No air-filled voids or other karst conditions are identified in the resistivity data. The source of the surface depression is likely related to similar processes interpreted from other profiles in this area, where sediment is moving through sandstone fractures into voids, vuggs, and fractures within deeper limestone.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet; No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

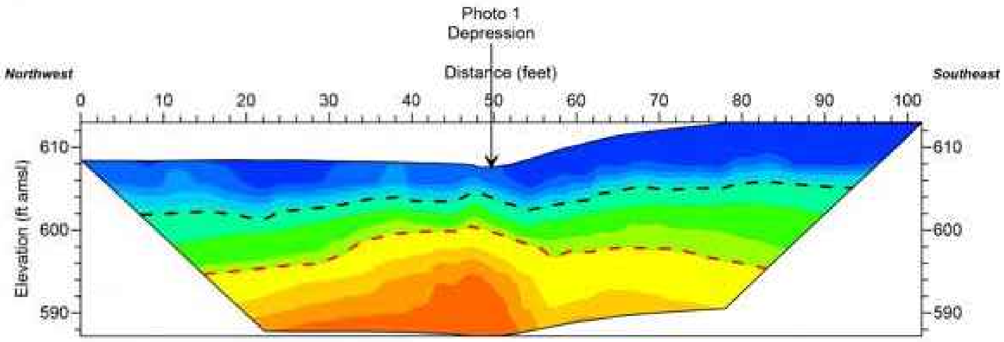
DRAWING NO.: **Figure 19** Electrical Imaging Data Area 3, Profile E-14

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F19

EI Profile E-15

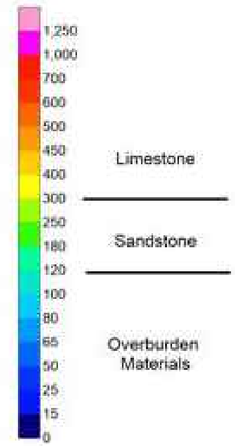


EI Profile Description:

The top of both interpreted sandstone and limestone are well-displayed along this profile. Although the bedrock profiles are variable, indicating differential weathering of the limestone, likely near the contact of the two units, no indications of air- or clay-filled voids are present in the data. The somewhat irregular and hummocky top of limestone surface is consistent with limestone pinnacle formation.

Photo 1

Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

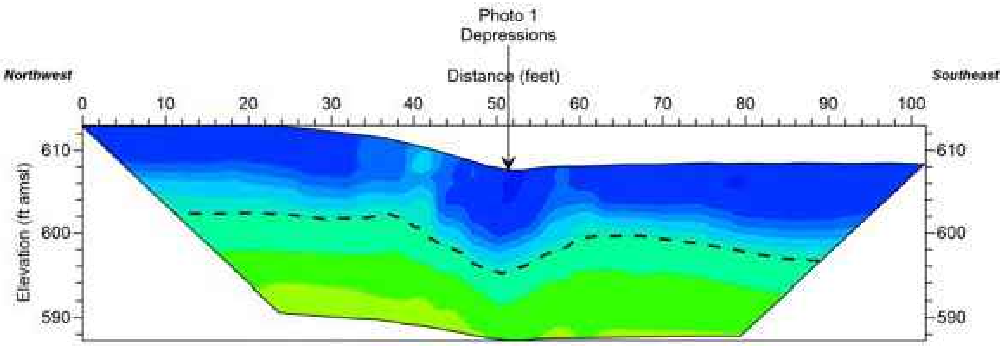
DRAWING NO.: **Figure 20** Electrical Imaging Data Area 3, Profile E-15

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F20

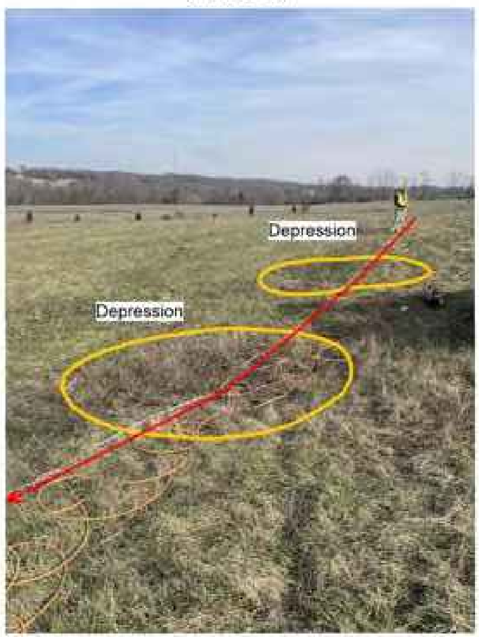
EI Profile E-16



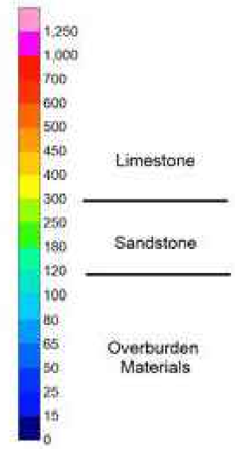
EI Profile Description:

The top of sandstone rock is well-imaged in this profile and displays significant sagging from approximately 42 to 60 feet along the profile. This sag is likely the source of the depressions and is interpreted to be caused by differential settlement from dissolution of deeper limestone. No air- or clay-filled voids are identified in this EI profile.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI Earthimager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

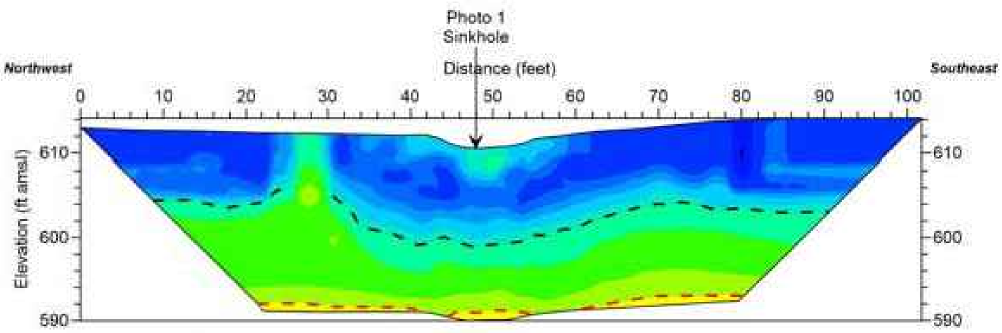
DRAWING NO.: **Figure 21** Electrical Imaging Data Area 3, Profile E-16

PREPARED FOR: edp

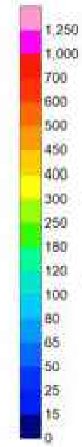
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F21

EI Profile E-17



Apparent Resistivity (Ohm-m)



EI Profile Description:

The top of sandstone is well-displayed along this profile, and some sections of interpreted top of limestone are imaged along the base of the profile. A resistive column extends towards the surface at approximately 28 feet along the profile, and is similar to interpreted sinkhole throats containing poorly consolidated soils imaged in other profiles. No depression or sinkhole was identified on the surface near this feature; therefore, this resistive feature may be indicative of an increased potential for sinkhole development in its vicinity. Additionally, a dip in the sandstone bedrock beneath the location of the observed sinkhole likely indicates dissolution or collapse of limestone beneath this interval. No air- or clay-filled voids are evident in this EI profile.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet; No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

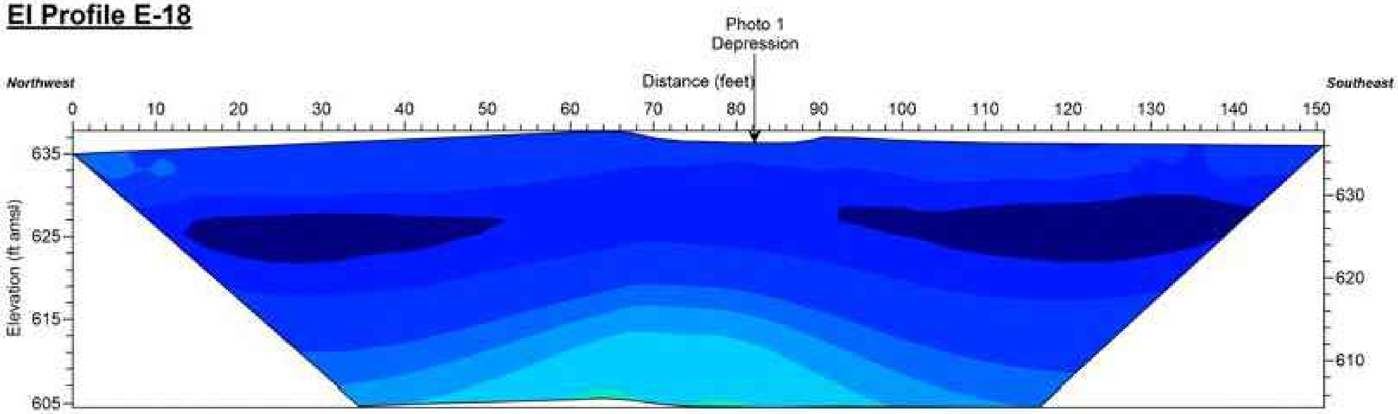
DRAWING NO.: **Figure 22** Electrical Imaging Data Area 3, Profile E-17

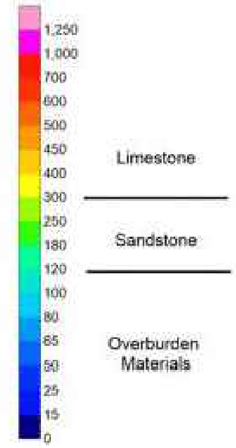
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F22

EI Profile E-18

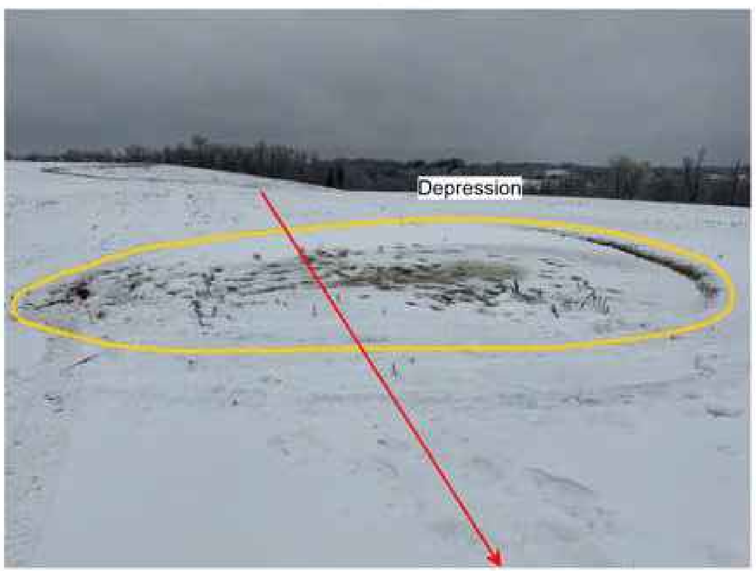




EI Profile Description:

This profile images very low apparent resistivities to depth interpreted as thick, saturated soils. No rock is interpreted from this profile. The source of the depression is likely related to deeper differential settlement due to karst within underlying limestone.

Photo 1



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

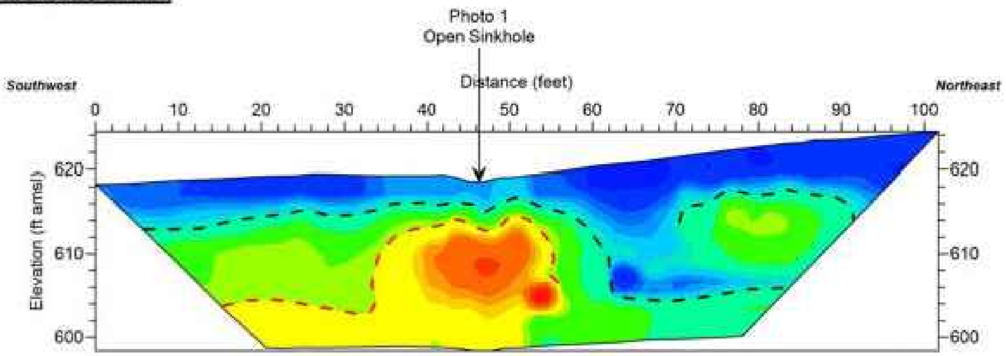
DRAWING NO.: **Figure 23** Electrical Imaging Data Area 3, Profile E-18

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F23

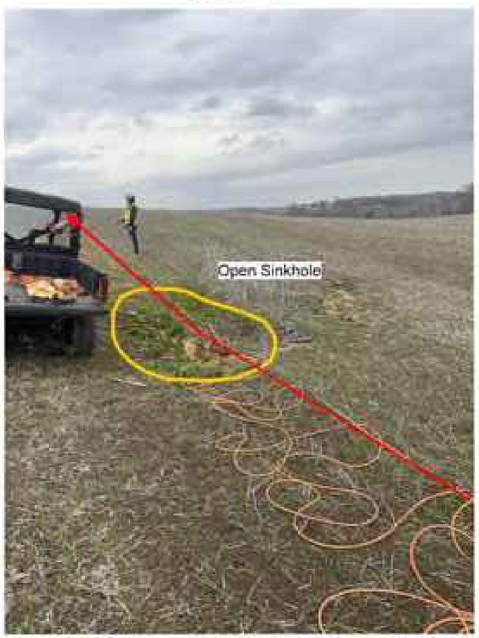
EI Profile E-19



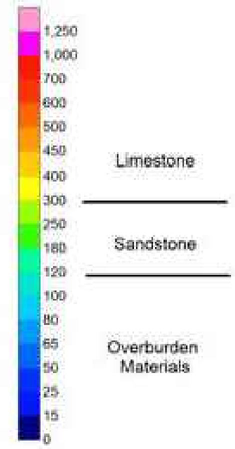
EI Profile Description:

The apparent resistivity values measured along this profile indicate a highly variable bedrock surface, both in the sandstone and limestone. A very resistive pocket located within the interpreted limestone, from approximately 40 to 54 feet along the profile and 8 to 12 feet bg, is interpreted as a section of partially air-filled fractures or small voids and is located directly below the open sinkhole. Additionally, from approximately 60 to 94 feet along the profile, no limestone is present and the interpreted top of sandstone becomes highly irregular suggesting severe differential settlement from karst within the limestone below.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI Earthimager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

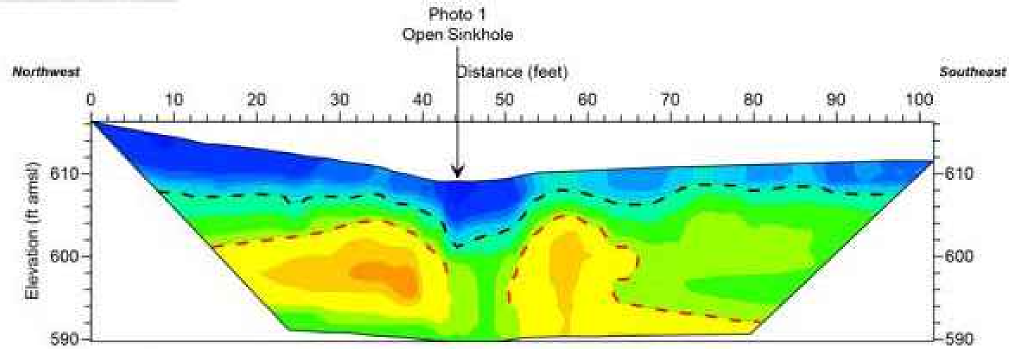
DRAWING NO.: **Figure 24** Electrical Imaging Data Area 3, Profile E-19

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F24

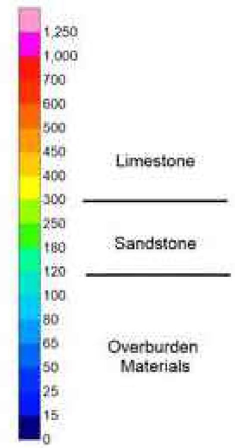
EI Profile E-20



EI Profile Description:

The interpreted top of sandstone mapped along this profile is irregular and hummocky. The underlying interpreted top of limestone is also highly variable. Near the center of the profile directly beneath the open sinkhole, a vertical discontinuity within the EI data is interpreted as a throat feature related to the open sinkhole above. This feature is interpreted as a pathway to a deep void through which sediment is moving vertically downward, causing the formation of the open sinkhole and likely contains clay-filled or saturated voids or fracture zones. The limestone imaged in this EI profile appears to be severely differentially weathered and is likely prone to further karst development.

Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Photo 1

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

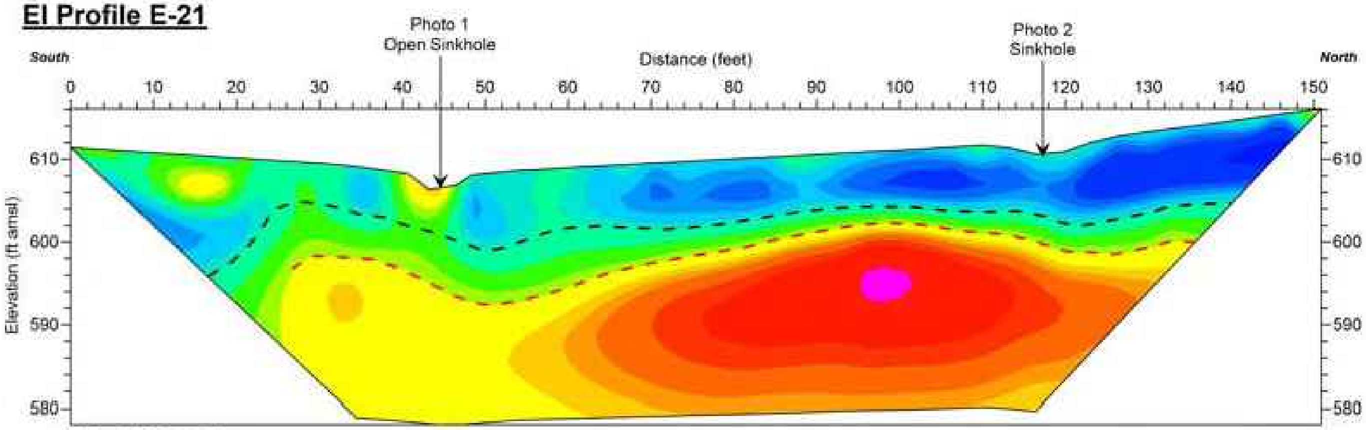
DRAWING NO.: **Figure 25** Electrical Imaging Data Area 3, Profile E-20

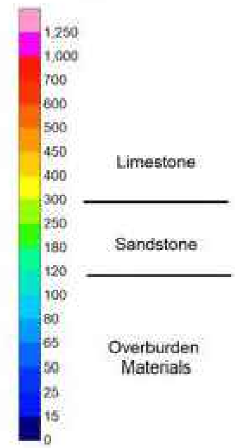
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F25

EI Profile E-21





EI Profile Description:

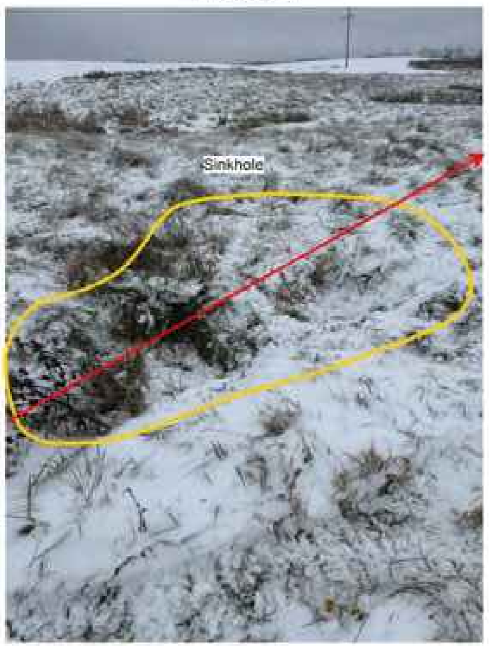
Both the interpreted top of sandstone and limestone are well-imaged within this profile and display irregular and hummocky surfaces consistent with differential dissolution of the limestone. The interpreted limestone also displays variable apparent resistivities indicating a range of competency within the rock. Beneath both surficial karst features, the interpreted limestone dips suggesting that these intervals of limestone may contain clay-filled fractures and vuggs. The limestone appears to be most compromised beneath the open sinkhole feature where a vertical column of elevated apparent resistivities may represent a throat permitting the downward movement of sediments and increasing the potential for continued karst development.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

Photo 2



Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

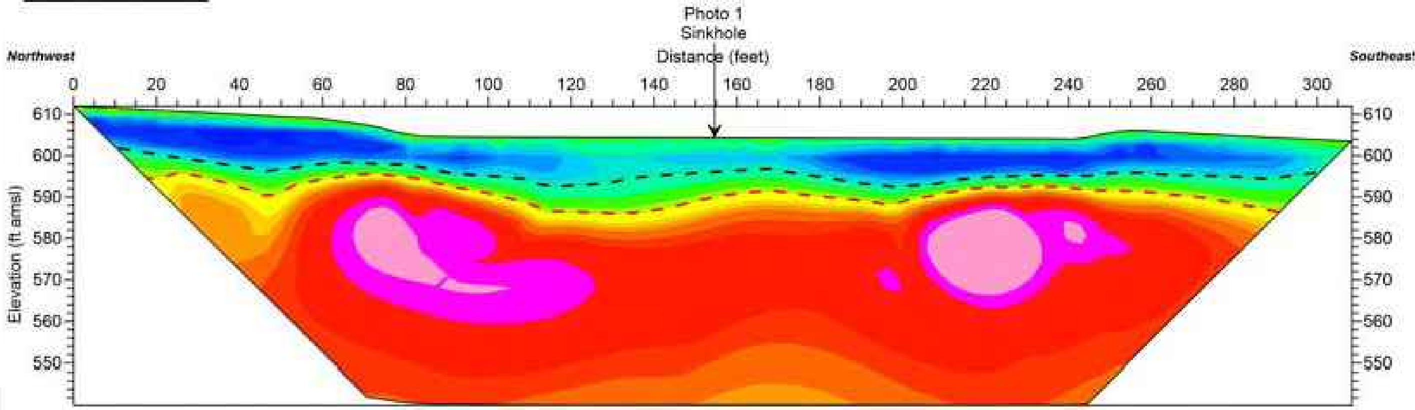
DRAWING NO.: **Figure 26** Electrical Imaging Data Area 3, Profile E-21

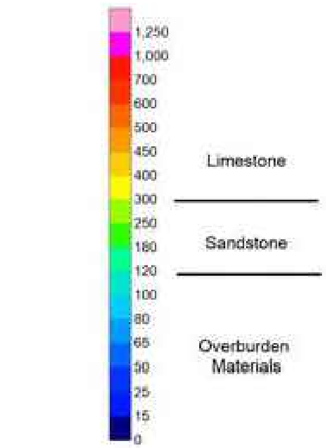
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F26

EI Profile E-22

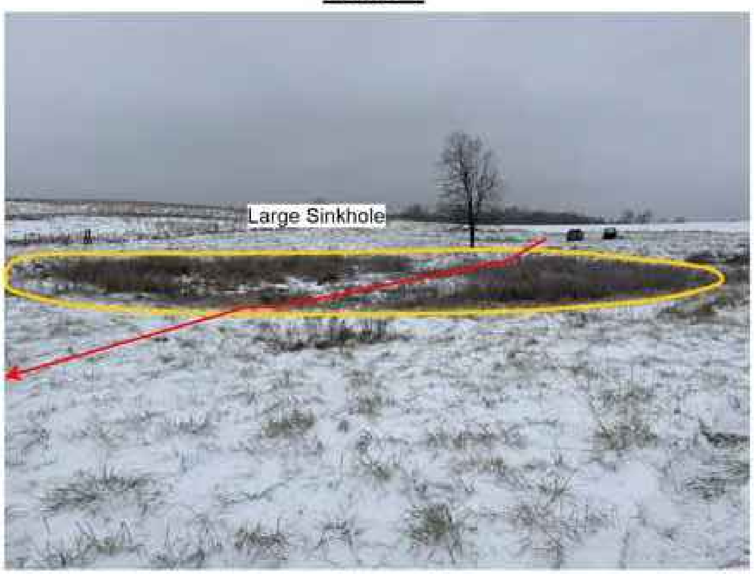




EI Profile Description:

Both the interpreted top of sandstone and limestone are mapped within this profile and are much less irregluar than imaged in other profiles collected in this area. The interpreted limestone predominantly displays elevated apparent resistivities indicating it is likely competent.
Two very resistive pockets are imaged within the limestone from 65 to 125 feet and 205 to 255 feet along the profile, both between 15 to 35 feet bg. These very resistive pockets are interpreted as very competent sections of limestone. Beneath the interpreted limestone, apparent resistivities begin decreasing, suggesting that deeper limestone is less competent and the source of the large sinkhole is likely related to karst within deeper rock. No air- or clay-filled/saturated voids or fractures are interpreted within this profile.

Photo 1



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 30 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

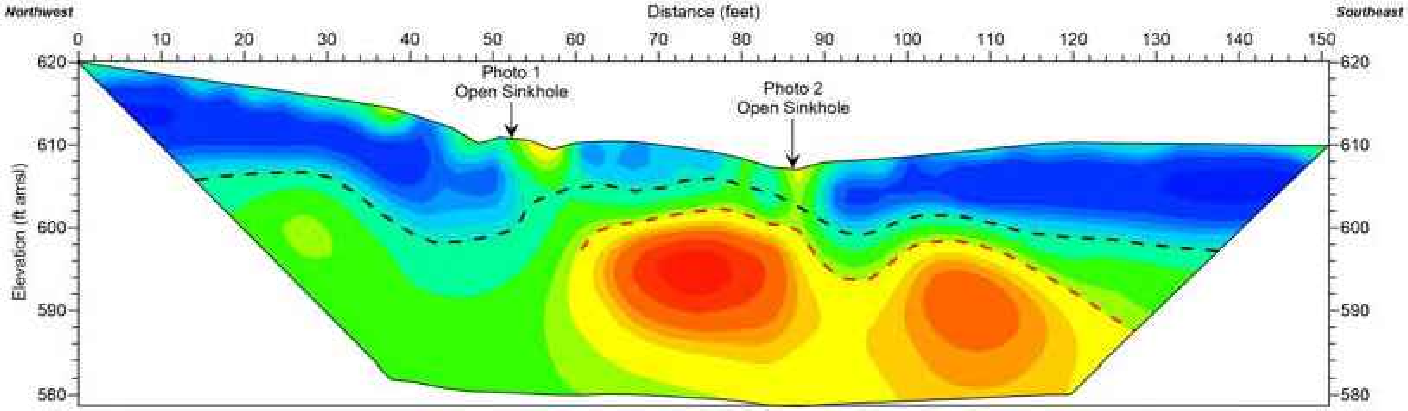
DRAWING NO.: **Figure 27** Electrical Imaging Data Area 3, Profile E-22

PREPARED FOR: edp

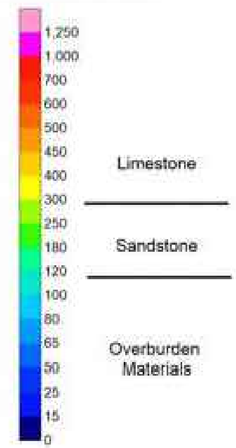
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F27

EI Profile E-23



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of sandstone and limestone are both well-imaged in this profile and display very irregular and hummocky profiles consistent with limestone pinnacles. Vertical columns of elevated apparent resistivities are imaged beneath each open sinkhole, indicating poorly consolidated soils and possible throats extending into deeper limestone voids. Limestone is only imaged from 60 to 125 feet along the profile and displays highly variable apparent resistivities indicating a range of competency within the rock. If limestone is present along the first half of the profile, it is displaying anomalously low apparent resistivities and is severely weathered and weak. It is likely that both open sinkholes imaged along this profile will continue to develop.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

Photo 2

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet
No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

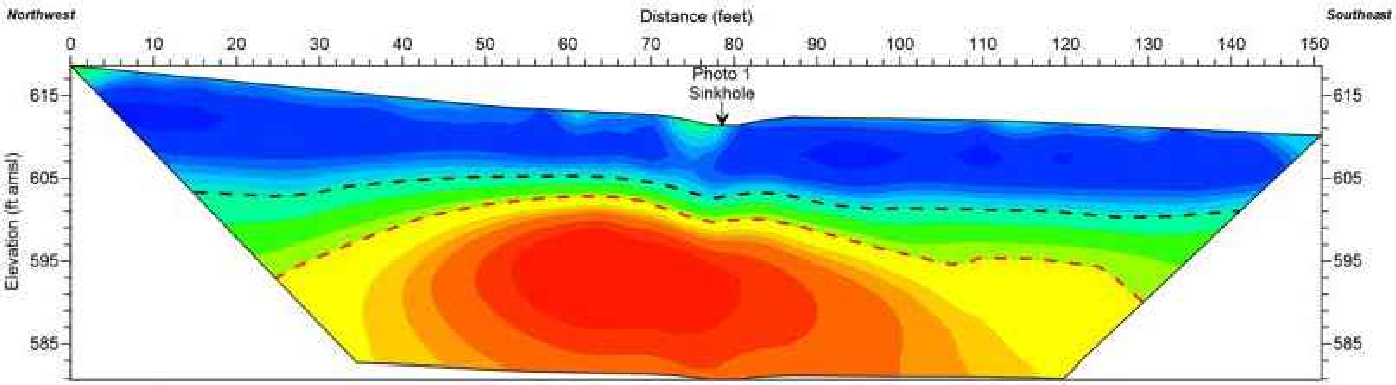
DRAWING NO.: **Figure 28**
Electrical Imaging Data
Area 3, Profile E-23

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F28

EI Profile E-24

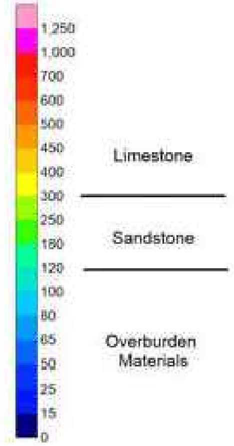


EI Profile Description:

The interpreted top of sandstone and limestone are both well-imaged in this profile and are mapped along relatively uniform elevations. A pocket of slightly elevated apparent resistivities directly beneath the sinkhole is interpreted as poorly consolidated sediments due to differential settlement into fractures within deeper limestone. The limestone imaged within this profile displays somewhat variable apparent resistivities indicating a range of rock competency. No voids are interperted within this profile.

Photo 1

Apparent Resistivity (Ohm-m)



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

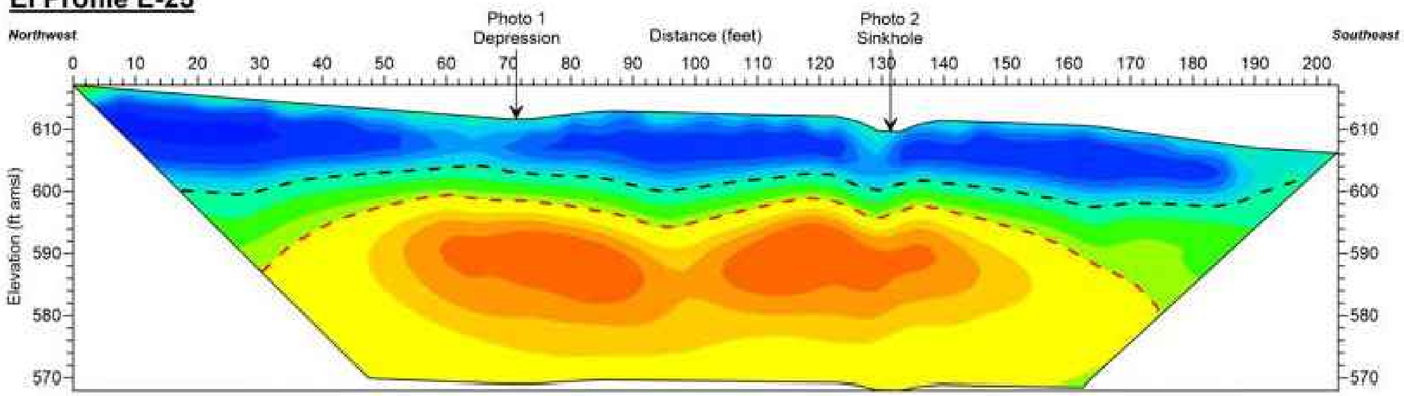
DRAWING NO.: **Figure 29** Electrical Imaging Data Area 3, Profile E-24

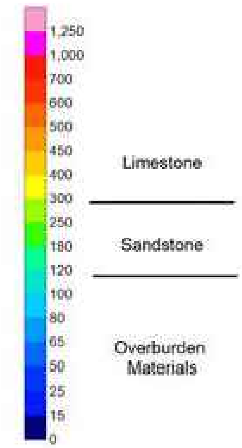
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F29

EI Profile E-25





EI Profile Description:

The interpreted top of sandstone and limestone are both well-imaged in this profile and display some irregularity most noticeable beneath the sinkhole feature and near the edges of the profile. Slightly elevated apparent resistivities are imaged beneath both surficial karst features indicating poorly consolidated soils due to differential settlement into deeper karst voids and fractures. The limestone imaged within this profile displays variable apparent resistivities indicating a range of competency. Additionally, deeper portions of the interpreted limestone display lower apparent resistivities than imaged above indicating that deeper sections of the rock are less competent. No voids are interpreted within this profile.

Photo 1

Photo 2

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT:
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

SCALE: 1 inch = 30 feet
No vertical exaggeration

SOURCE: AGI EarthImager 2D

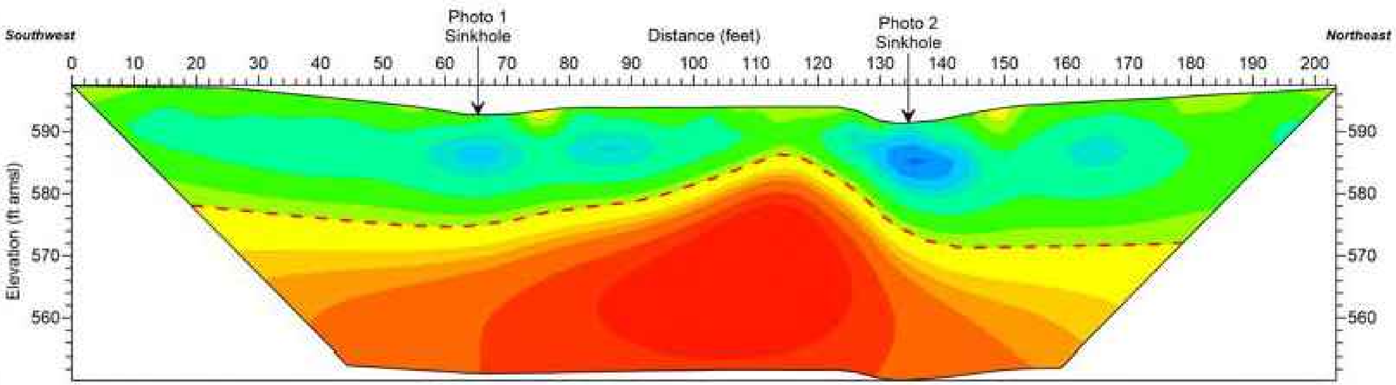
DRAWING NO.:
Figure 30
Electrical Imaging Data
Area 3, Profile E-25

PREPARED FOR: edp

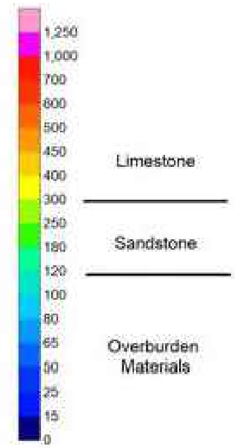
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F30

EI Profile E-26



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of limestone is well-imaged in this profile; however, the top of sandstone appears to be at or near the surface, if present at all. The limestone imaged within this profile displays an irregular interpreted top of rock surface consistent with limestone pinnacles. The highest apparent resistivities measured within the limestone occur near 115 feet along the profile and correspond to an interpreted pinnacle that extends towards the surface. No vertical resistivity features are imaged beneath either sinkhole; however, pockets of low apparent resistivities suggest that soils are more saturated beneath each feature which likely indicates that water and sediments are draining downward at each sinkhole. Additionally, the limestone imaged beneath each feature displays lower apparent resistivities than the interpreted pinnacle suggesting lower competency in these intervals and likely the presence of clay-filled fractures and vuggs.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

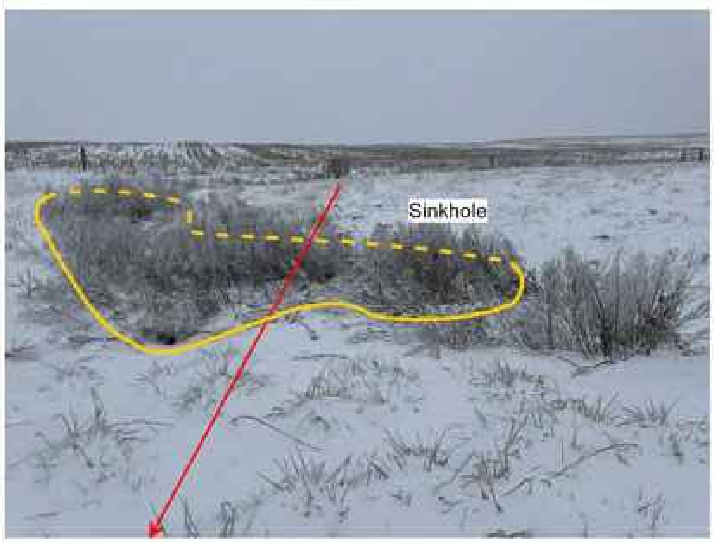
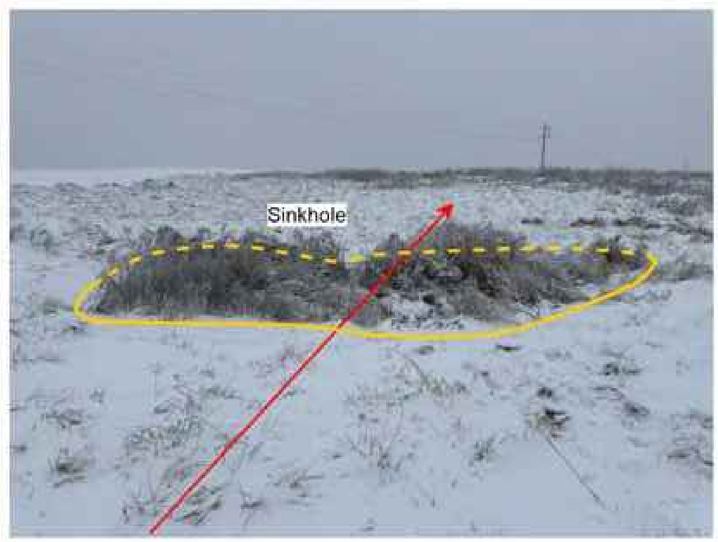


Photo 2



Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 20 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

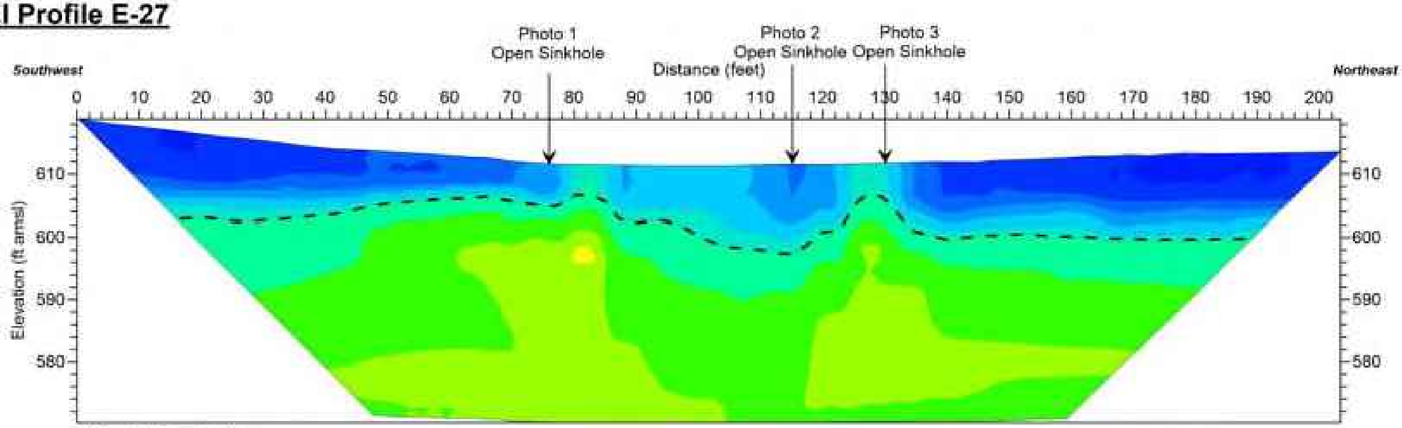
DRAWING NO.: **Figure 31** Electrical Imaging Data Area 3, Profile E-26

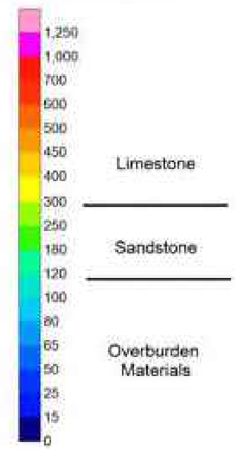
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F31

EI Profile E-27





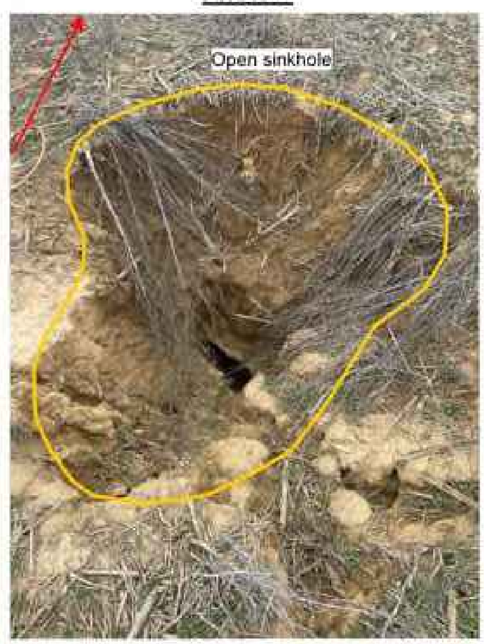
EI Profile Description:

The interpreted top of sandstone is well-imaged in this profile and the underlying sandstone displays highly variable apparent resistivities indicative of fractures. The mapped top of rock surface displays variable elevations suggesting differential weathering and dissolution settlement within deeper limestone. Two elevated resistivity pockets within the interpreted sandstone bedrock are positioned just below open sinkhole features at approximately 80 feet and 126 feet along the profile. Both features are interpreted as sandstone fracture zones. These likely extend down into deeper limestone providing a pathway for sediment movement, thus forming the open sinkholes observed at the surface. No air-filled voids are interpreted in this EI profile.

Photo 1

Photo 2

Photo 3



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 20 feet No vertical exaggeration

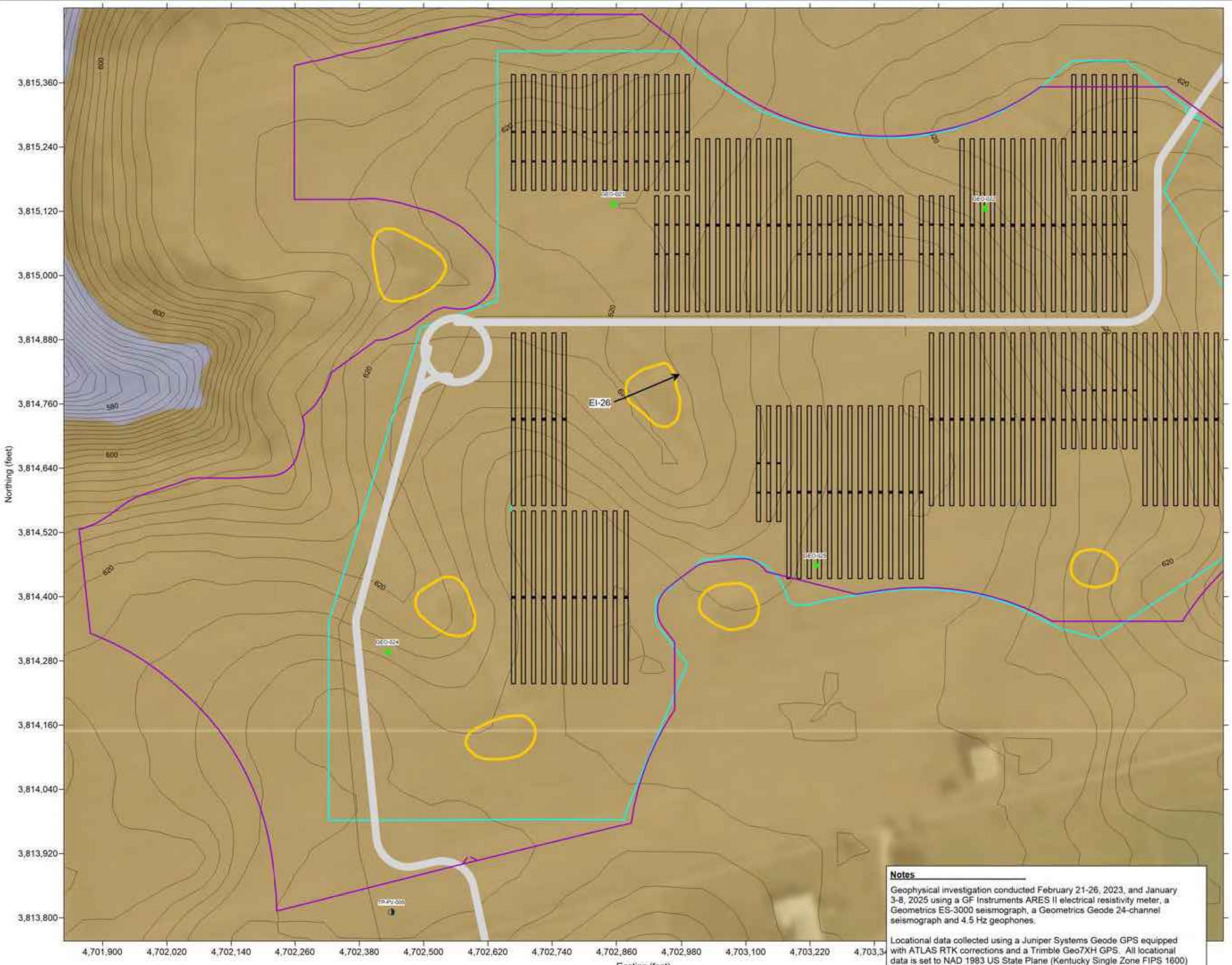
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 32** Electrical Imaging Data Area 3, Profile E-27

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET FILE: DWG12051F32



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)
- Man-made Drainage Ditch

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

DRN	MLT	01/30/25
DES	MLT	01/24/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

GEOPHYSICS

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 120 feet

SOURCE: Google Earth, 2023 KGS, 2018

DRAWING NO.: **Figure 33**

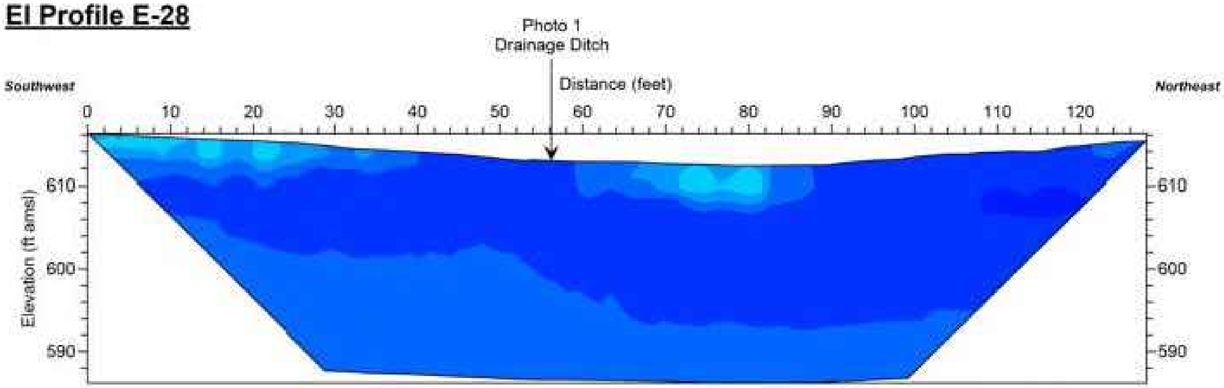
Area 4 Geophysical Survey Map

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F33

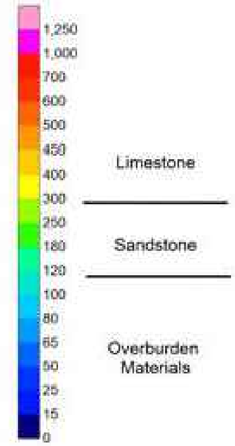
EI Profile E-28



EI Profile Description:

This profile was collected over a suspected man-made drainage ditch to confirm that karst features were not related to the formation of the ditch. The profile maps very low apparent resistivities to depth interpreted as saturated soils to depth. Rock is not imaged in the profile. No karst is identified within the profile.

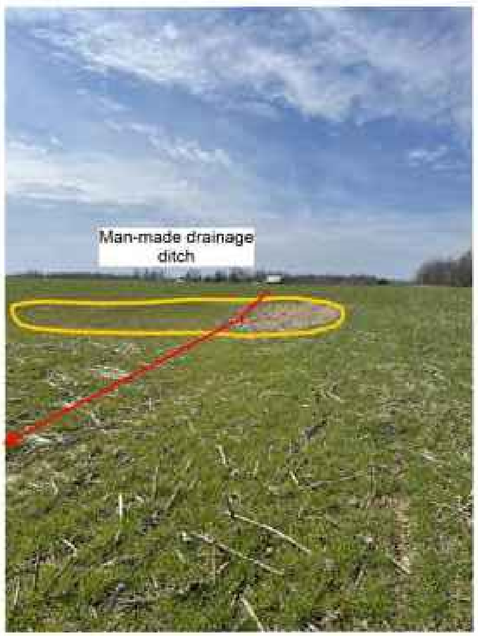
Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1



Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/30/25
DES	MLT	03/07/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet
No vertical exaggeration

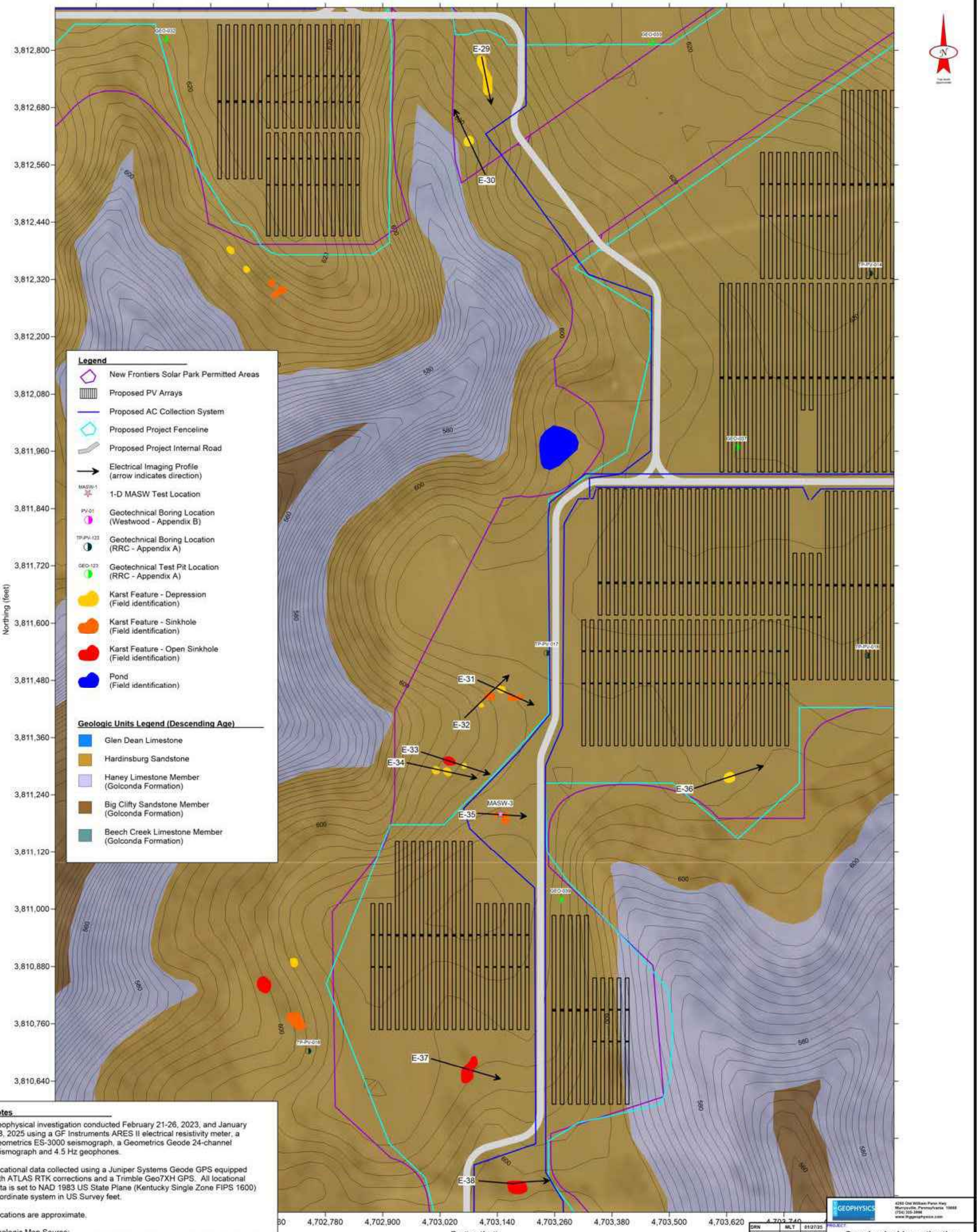
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 34**
Electrical Imaging Data
Area 4, Profile E-28

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F34



Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

DRN	MLT	01/27/25
DES	MLT	01/27/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 120 feet

SOURCE: Google Earth, 2023; KGS, 2016

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

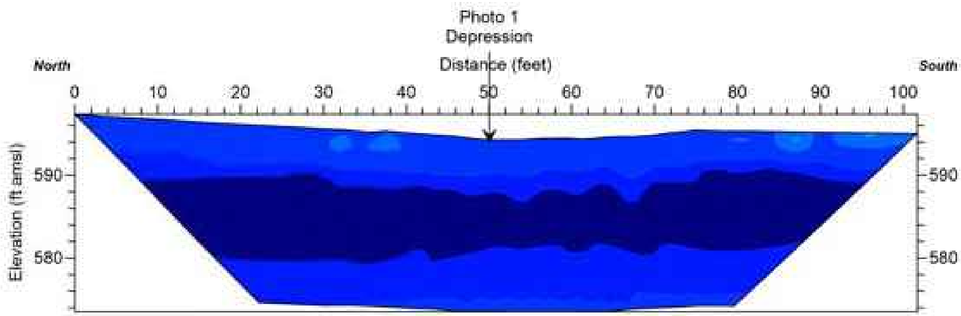
DRAWING NO: **Figure 35** Area 5 Geophysical Survey Map

PREPARED FOR: edp

PROJECT NO: 847-12051

SHEET TITLE: DWG12051F35

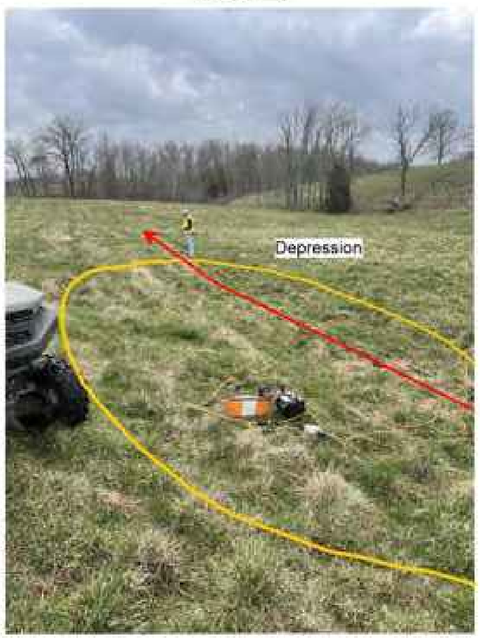
EI Profile E-29



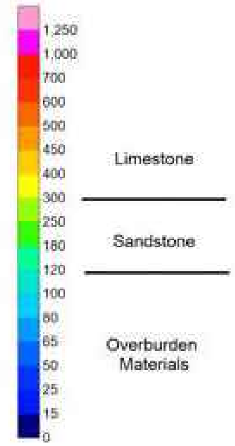
EI Profile Description:

This profile displays very low resistivities to depth, indicating deep saturated soils. No rock is imaged in this profile and no indications of karst are interpreted from the profile. The source of the depression is assumed to be related to karst within deeper limestone.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	02/02/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

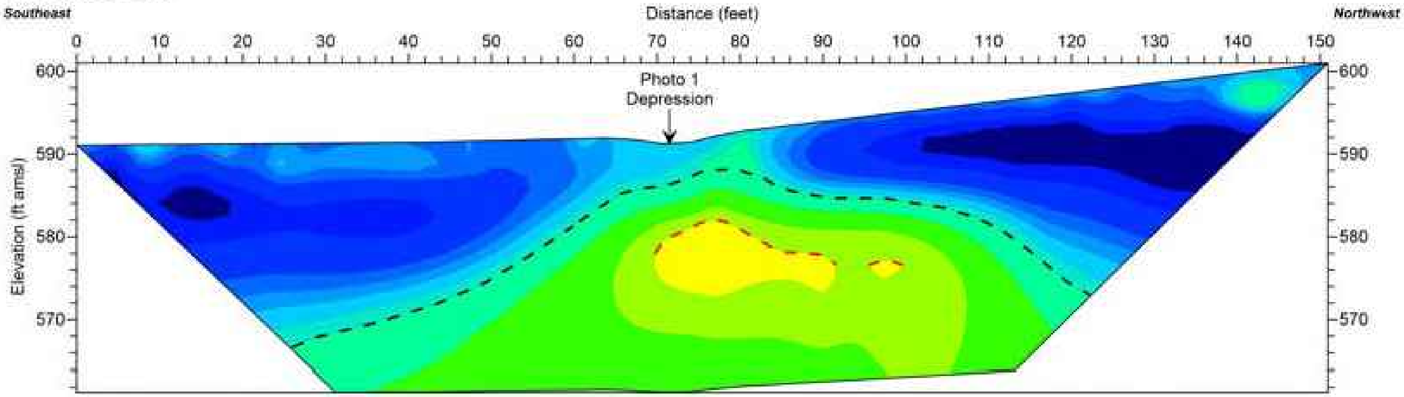
DRAWING NO.: **Figure 36** Electrical Imaging Data Area 5, Profile E-29

PREPARED FOR: edp

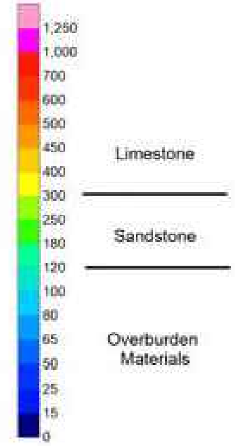
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F36

EI Profile E-30



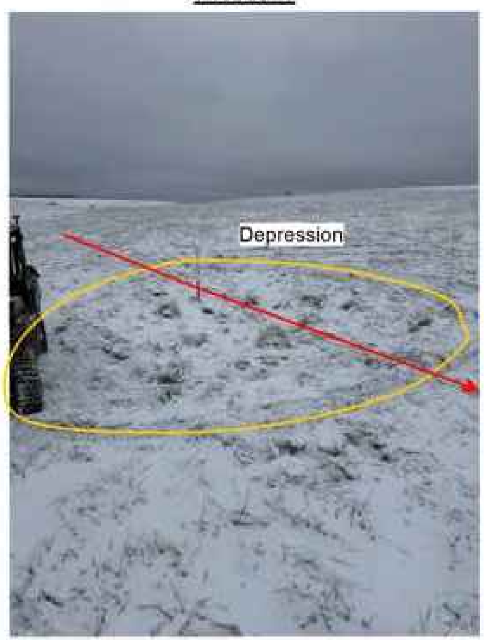
Apparent Resistivity (Ohm-m)



EI Profile Description:

The location of this profile is within the limits of the documented Hardinsburg Sandstone; however it is located very close to the contact with the Haney Limestone. The profile imaged an irregular interpreted top of sandstone surface that reaches its shallowest point near the depression. Directly beneath the depression, a small section of interpreted limestone is mapped within the profile. Additionally, a small pocket of elevated apparent resistivities beneath the depression is interpreted as poorly consolidated sediments due to differential settlement within deeper karst features. The interpreted limestone is likely present throughout the entire profile, but is displaying highly variable apparent resistivities suggesting that limestone is severely weathered and competency is highly variable. The limestone imaged within this profile likely contains numerous saturated and clay-filled fractures and vugs. No air-filled voids or fractures are interpreted from this profile.

Photo 1



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

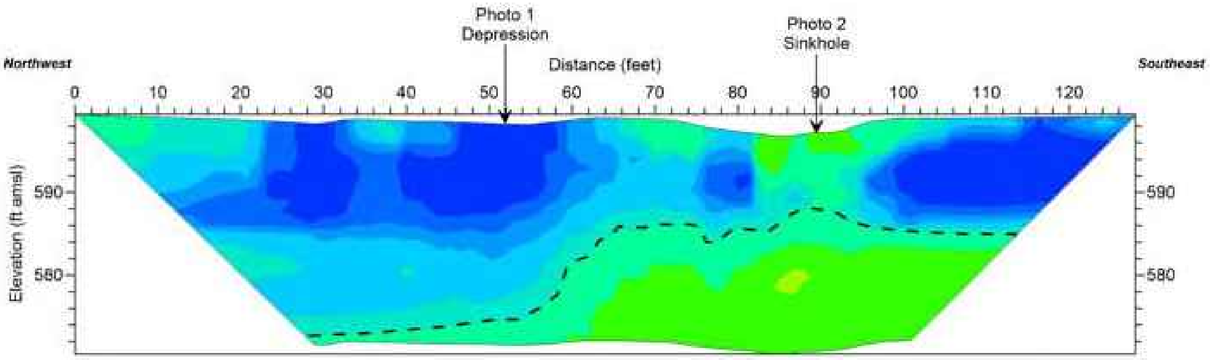
DRAWING NO.: **Figure 37** Electrical Imaging Data Area 5, Profile E-30

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F37

EI Profile E-31



EI Profile Description:

The interpreted top of sandstone mapped in this profile is uneven, indicative of karst features, such as pinnacles, within deeper limestone. This is especially notable where the sandstone surface is at a significantly different elevation than the second half of the profile and suggests potential collapse of karst features below. A pockets of very low resistivities is observed beneath the depression from 78 to 82 feet along the profile and is confined to the upper 10 feet of the profile. This low-resistive pocket suggests an increased degree of saturation related to the downward movement of moisture and sediment. Beneath the sinkhole is a shallow pocket of slightly elevated apparent resistivities interpreted as poorly consolidated soils related to differential settlement within deeper karst features as sediments and moisture move down into open spaces.

Photo 1

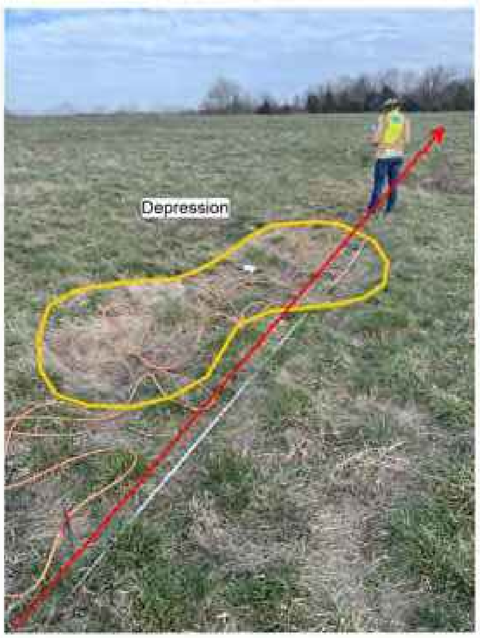
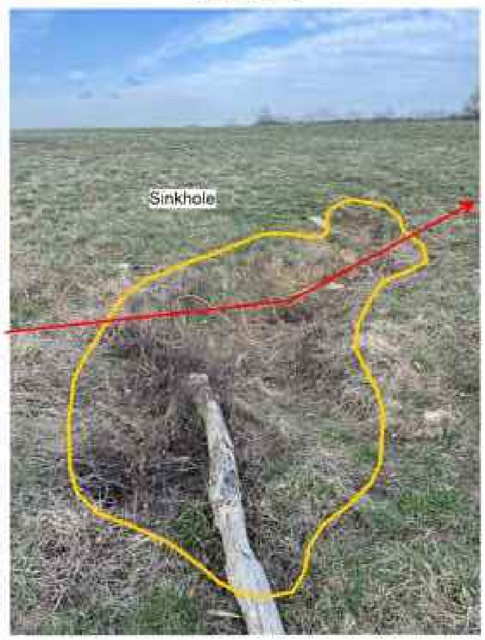
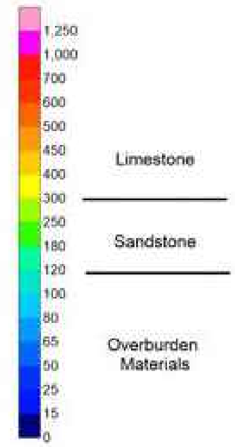


Photo 2



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PREPARED FOR: edp

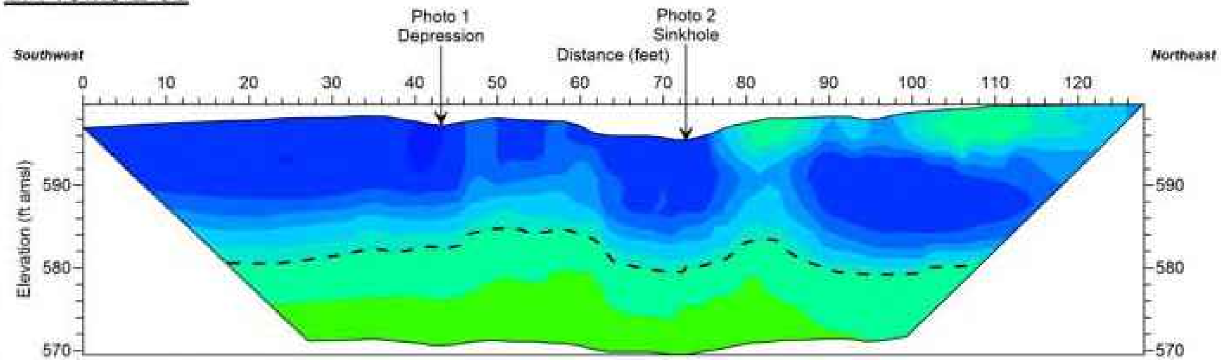
PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO.: **Figure 38** Electrical Imaging Data Area 5, Profile E-31

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F38

El Profile E-32



El Profile Description:

This profile is located very close to E-31 and maps similar subsurface conditions. The interpreted sandstone top of rock is well-imaged across the profile and undulates indicating that the limestone below contains karst conditions such as pinnacles or collapsed voids. Beneath the depression is a thick section of very low apparent resistivities interpreted as saturated sediments. The source of the depression is assumed to be related to differential settlement of deeper limestone karst features beneath the sandstone. The sagging observed in the interpreted sandstone profile is likely the source of the sinkhole observed on the surface. Additionally, a vertical column of slightly elevated apparent resistivities extends from the interpreted sandstone to the surface near the sinkhole and is interpreted to represent poorly consolidated soils related to differential settlement within deeper karst voids and fractures. No air-filled voids or fractures are interpreted from this profile.

Photo 1

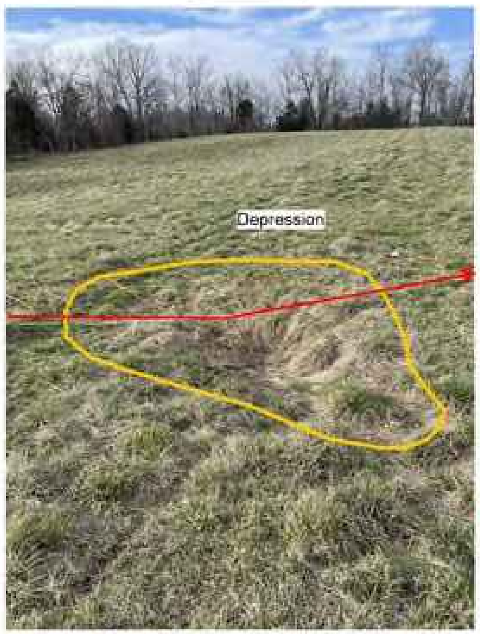
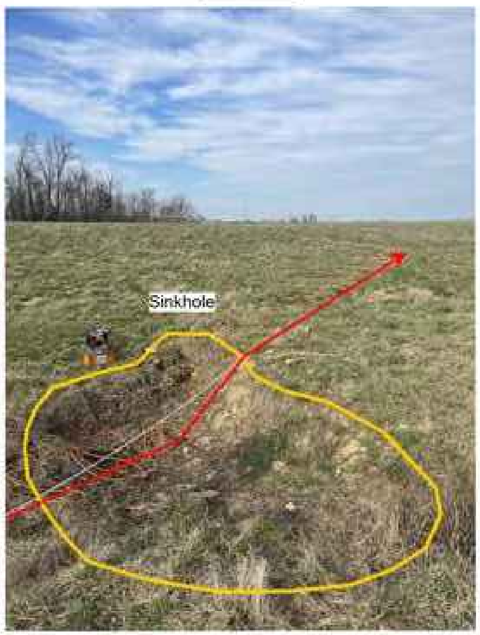
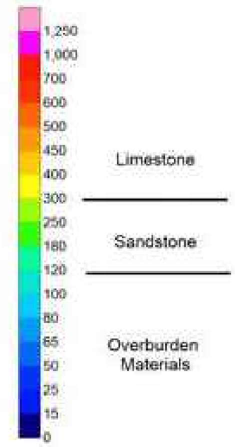


Photo 2



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- El Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI Earthimager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

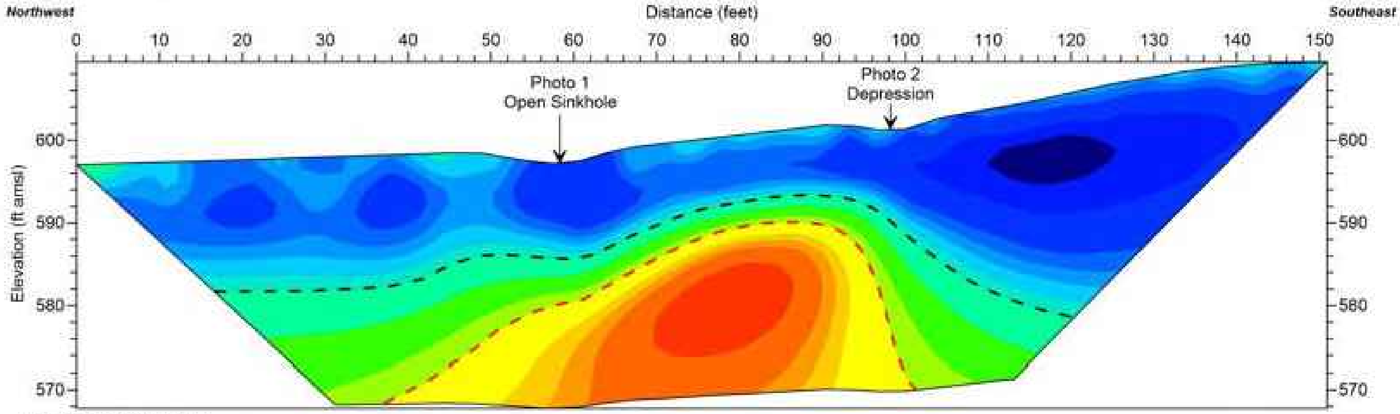
DRAWING NO.: **Figure 39** Electrical Imaging Data Area 5, Profile E-32

PREPARED FOR: edp

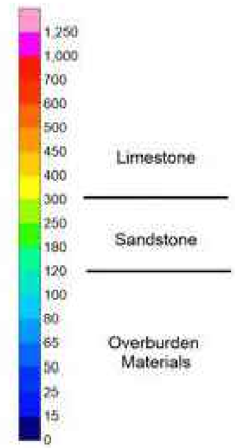
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F39

EI Profile E-33



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of sandstone and limestone are both well-displayed within this profile and follow a similar pattern of undulation, consistent with karst pinnacles or collapse features. Beneath both the sinkhole and depression are thick sections of very low apparent resistivities that are interpreted as highly saturated sediments due to water and sediments draining down through the surficial karst features into deeper karst features. The interpreted limestone imaged in this profile displays variable apparent resistivities suggesting variable rock competency. The portions of the interpreted limestone below the surficial karst features display decreased and variable apparent resistivities indicating the likely presence of saturated and clay-filled fractures or vugs. The sudden loss of the limestone near the begging and end of the profile likely indicates collapse of deeper karst features below those intervals. No air-filled voids or fractures are interpreted from this profile.

Photo 1

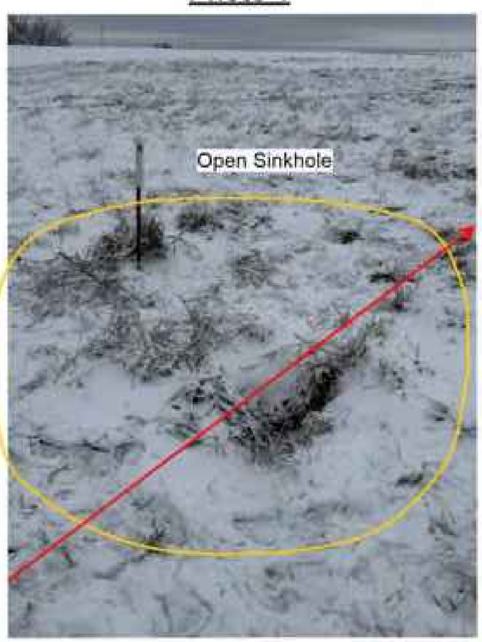
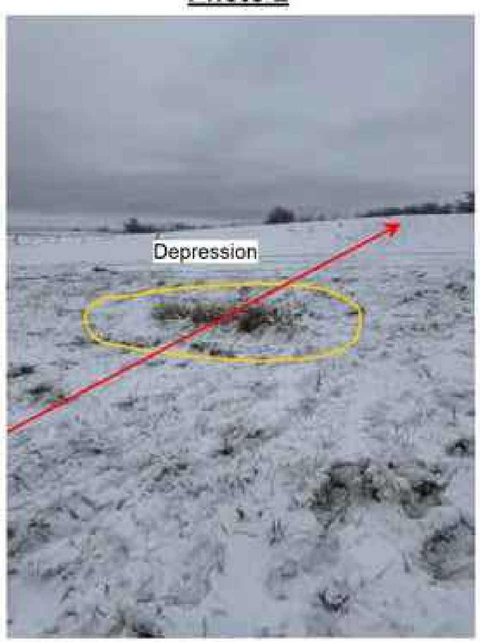


Photo 2



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/22/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

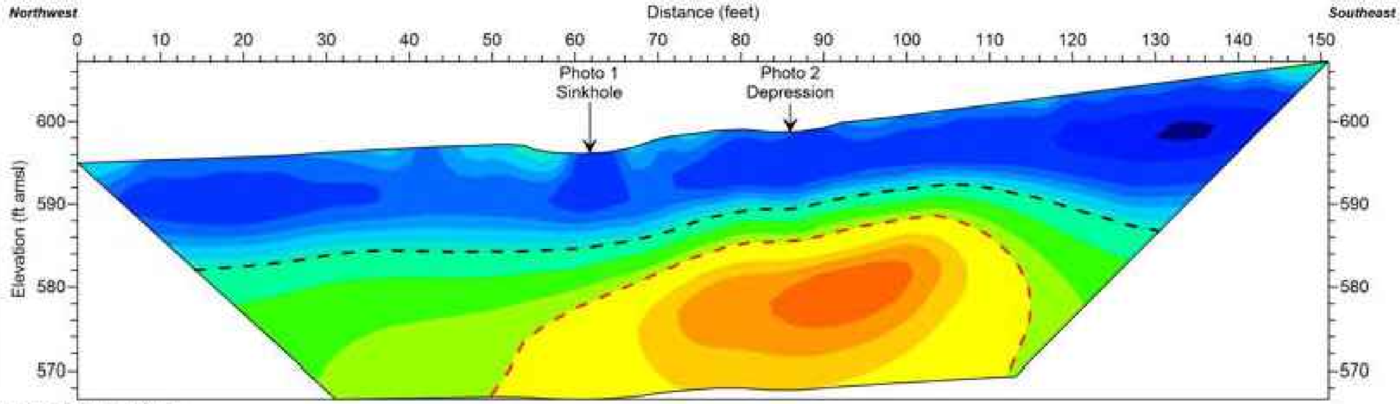
DRAWING NO.: **Figure 40** Electrical Imaging Data Area 5, Profile E-33

PREPARED FOR: edp

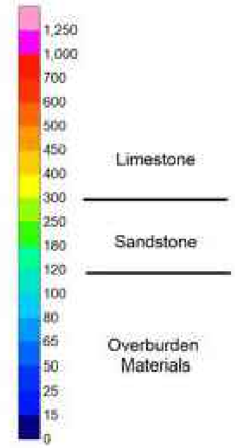
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F40

EI Profile E-34



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of sandstone and limestone are both well-displayed within this profile. The interpreted sandstone surface undulates much less than the deeper limestone, suggesting that the limestone may extend further than interpreted; however, that implies that the limestone is displaying anomalously low apparent resistivities and contains numerous saturated and clay-filled fractures or vugs. Beneath both surficial karst features are somewhat thick pockets of low apparent resistivities interpreted to be saturated sediments related to water carrying sediments draining into deeper karst features such as voids or fractures. No air-filled voids are interpreted within this profile.

Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Photo 1

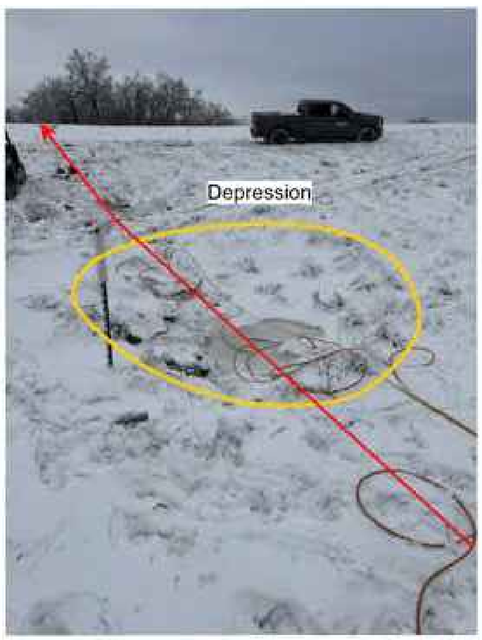


Photo 2

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet
No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

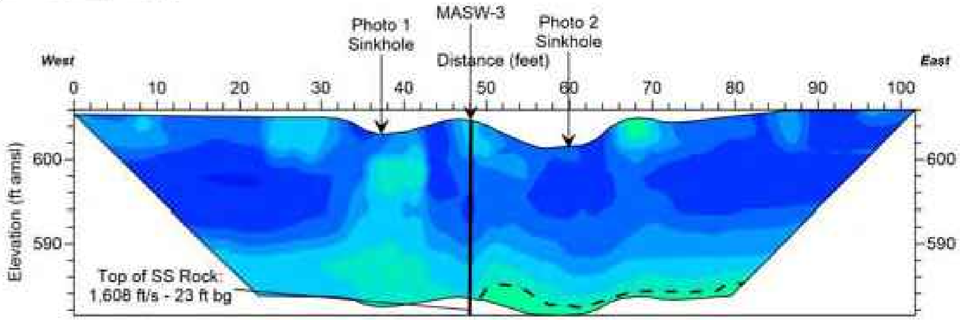
DRAWING NO.: **Figure 41**
Electrical Imaging Data
Area 5, Profile E-34

PREPARED FOR:

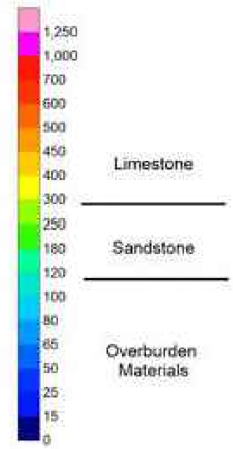
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F41

EI Profile E-35



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of sandstone is mapped only along the second half of the profile near its maximum imaging depth. This section of sandstone undulates, suggesting karst development in deeper limestone. The mechanism for the formation of the first sinkhole, at approximately 40 feet along the profile, is not evident in the EI data; however, the absence of sandstone bedrock along this section suggests that deeper limestone may have a well-developed karst feature that is impacting the overlying materials. A column of slightly elevated resistivities extends upward from this interval to the first sinkhole, interpreted as poorly consolidated sediments, and may provide additional evidence to support the downward movement of materials into a deeper void feature. A sag in the interpreted sandstone profile is present directly beneath the center of the second sinkhole, at approximately 60 feet along the profile, and is likely the source of this surficial karst feature. No air- or clay-filled or saturated fractures or voids are interpreted within this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

Photo 2

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

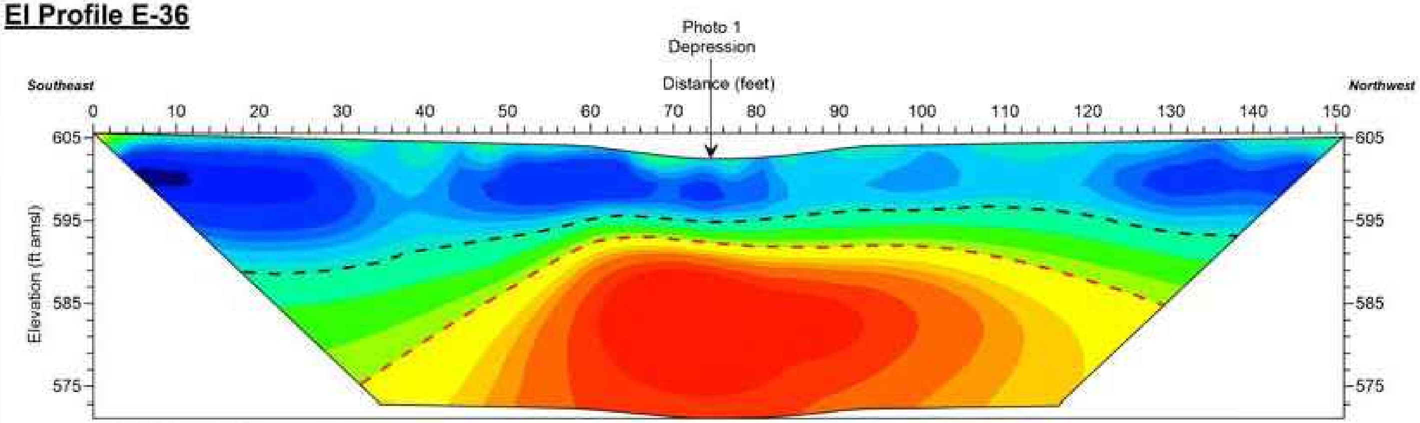
DRAWING NO.: **Figure 42** Electrical Imaging Data Area 5, Profile E-35

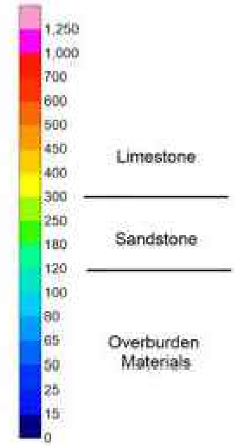
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F42

EI Profile E-36





EI Profile Description:

The interpreted top of sandstone and limestone are well-imaged in this profile. The sandstone surface is relatively flat-lying while the underlying limestone is more irregular and undulating. The profile appears to map a deep collapse feature near the beginning of the profile that is below a vertical column of slightly elevated apparent resistivities interpreted as poorly consolidated sediments extends to the surface; however, no surficial karst feature was identified in that location indicating the potential for a surficial karst feature to form. Beneath the depression, the interpreted limestone appears to be competent suggesting that the source of the depression is related to deeper limestone karst features not imaged in the profile. No air- or clay-filled or saturated voids or fractures are interpreted within this profile.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

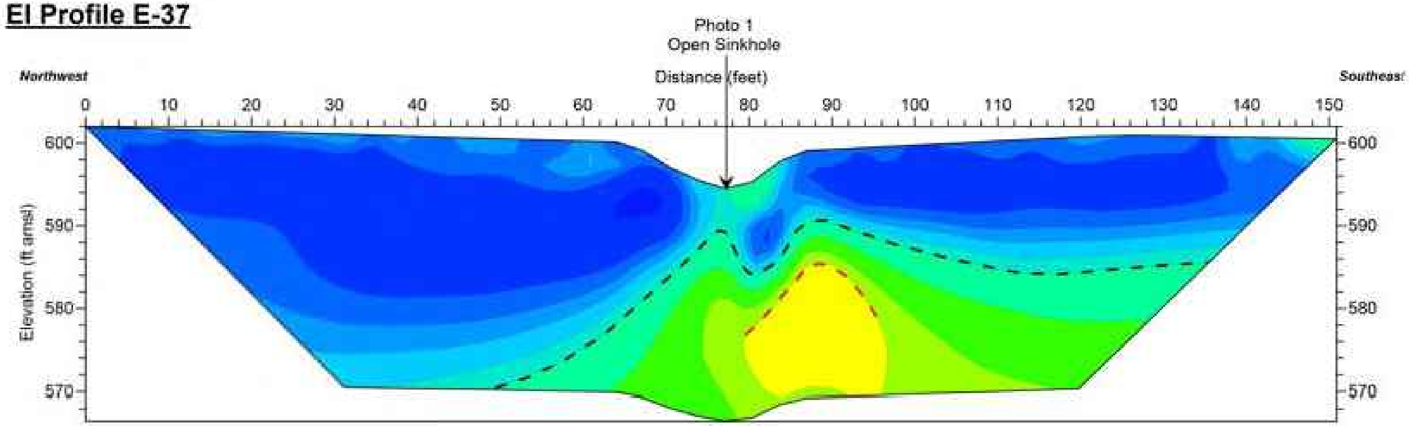
DRAWING NO.: **Figure 43** Electrical Imaging Data Area 5, Profile E-36

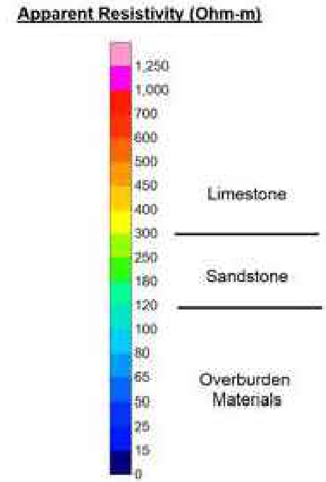
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F43

EI Profile E-37

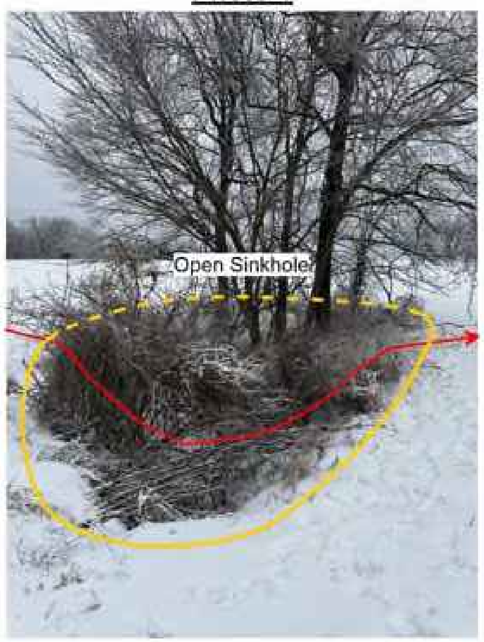




EI Profile Description:

This profile imaged a very deep open sinkhole. The interpreted top of sandstone is mapped across the profile and displays highly variable elevations suggesting severe karst within the deeper limestone. Beneath the open sinkhole, the interpreted sandstone appears to dip sharply which is interpreted as severely weathered and fractured rock. Below this zone of fractured sandstone is a small pocket of apparent resistivities consistent with limestone; however, this interpreted limestone does not appear to continue laterally and displays lower apparent resistivities beneath it. It is likely that this portion of limestone is a severely weathered limestone pinnacle situated within a section of very low competency limestone. Additionally, a vertical column of elevated apparent resistivities extends to the surface near the base of the open sinkhole indicating that sediments are poorly consolidated and continuing to move downard into deeper karst voids and fractures. No air-filled voids or fractures are interpreted from this profile.

Photo 1



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

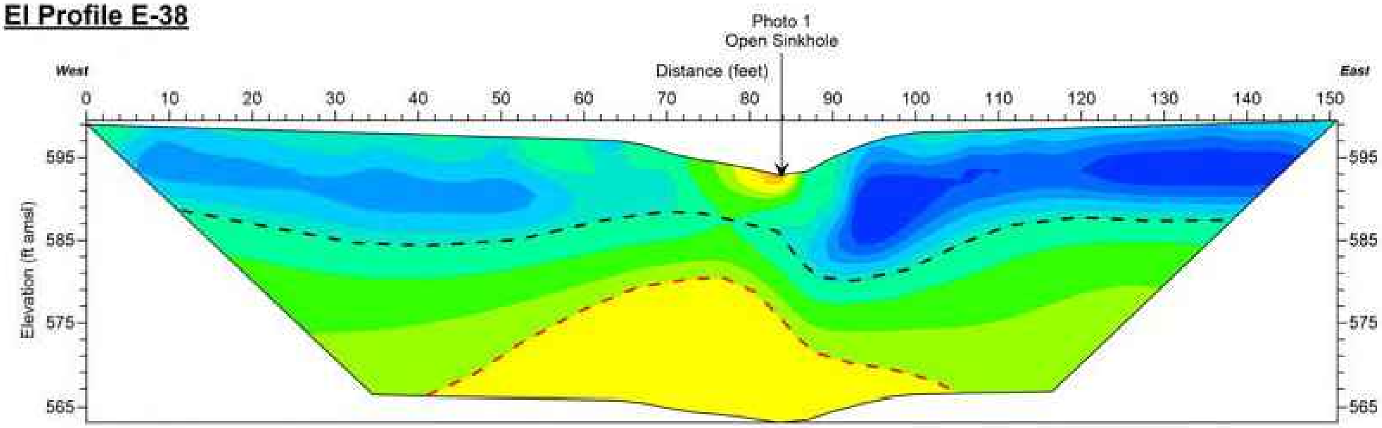
DRAWING NO.: **Figure 44** Electrical Imaging Data Area 5, Profile E-37

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F44

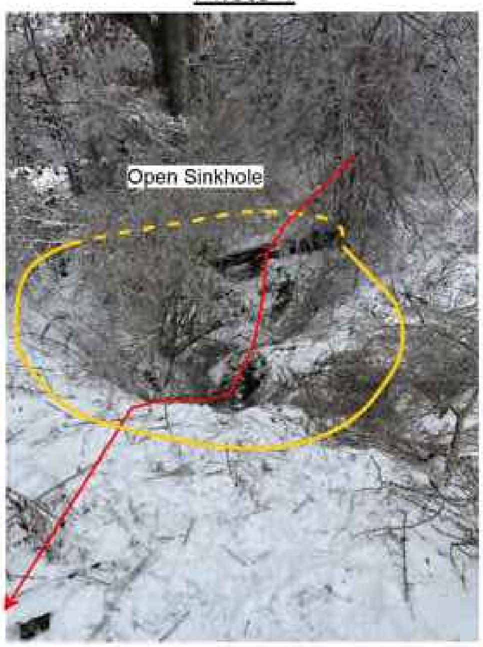
El Profile E-38



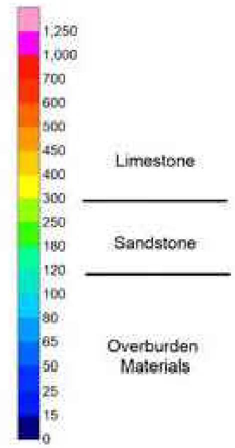
El Profile Description:

This profile imaged a very deep open sinkhole. The interpreted top of sandstone and limestone are mapped across the profile and display variable elevations suggesting severe differential dissolution of the limestone, consistent with deeper collapse or pinnacle formation. Directly beneath the open sinkhole is a pocket of elevated apparent resistivities that are interprted as poorly consolidated sediments related to the sinkhole throat that are continuously moving downward into deeper karst voids or fractures. The abrupt dip in both interpreted top of rock surfaces is likely the source of the sinkhole formation and both rock types are interpreted to contain clay-filled and saturated fractures. No air-filled voids or fractures are imaged in this profile.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- El Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

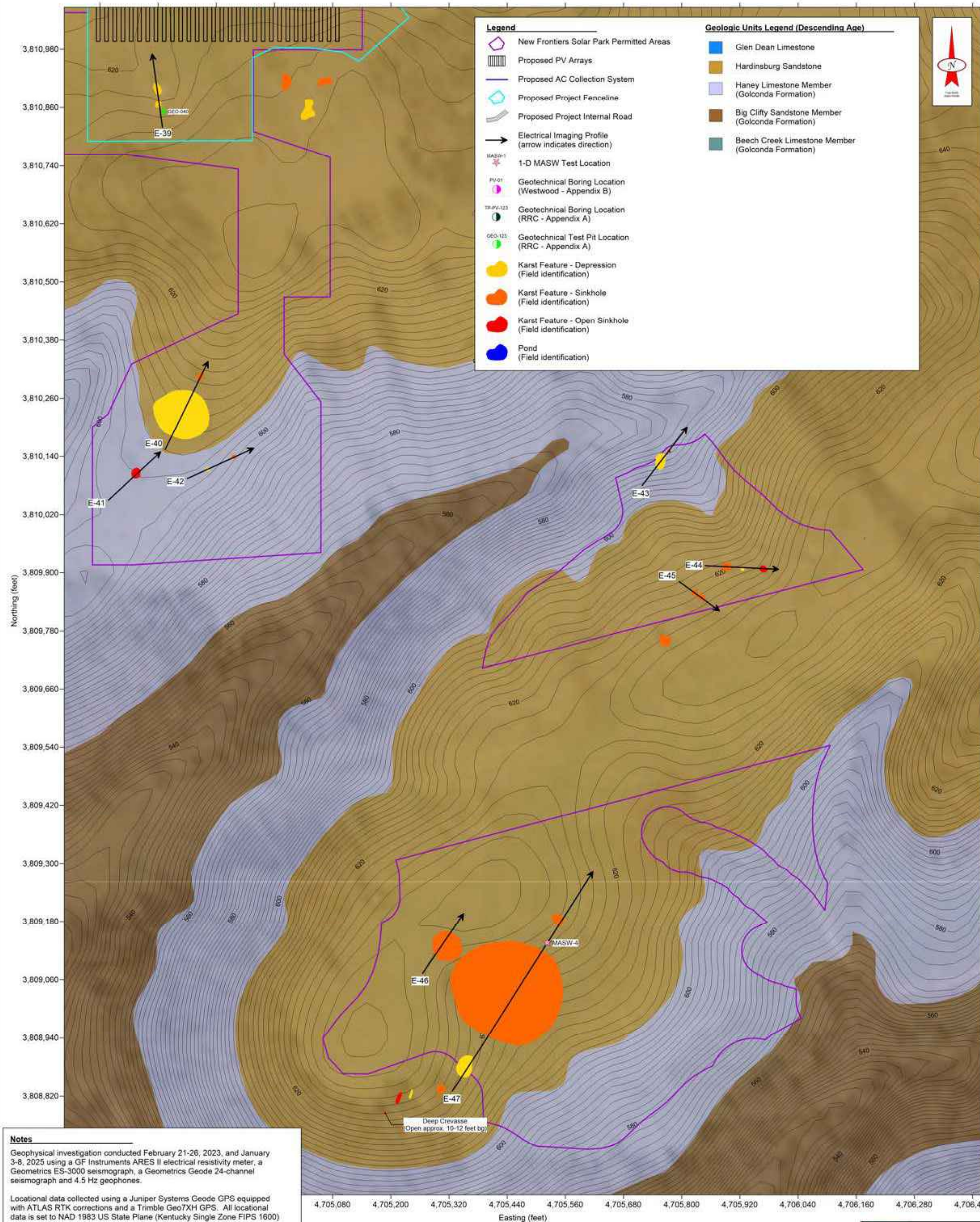
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 45** Electrical Imaging Data Area 5, Profile E-38

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F45



Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

DRN	MLT	01/27/25
DES	MLT	01/27/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 120 feet

SOURCE: Google Earth, 2023; KGS, 2016

PROJECT:
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

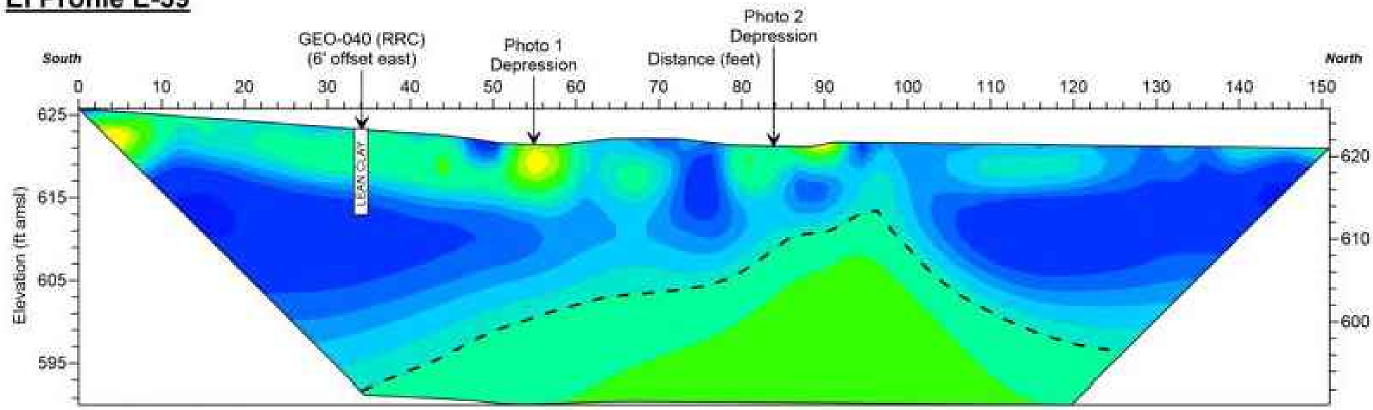
DRAWING NO.:
Figure 46
Area 6 Geophysical Survey Map

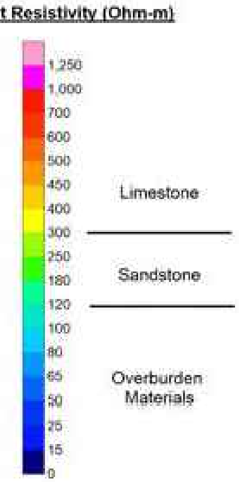
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F46

EI Profile E-39





EI Profile Description:

The interpreted top of sandstone is well-imaged in this profile and displays highly variable elevations indicating differential weathering and dissolution of deeper limestone units. No limestone is imaged within this profile. Beneath both depressions are small pockets of elevated apparent resistivities that somewhat extend downwards. These features are interpreted as poorly consolidated sediments related to differential settling of materials into deeper karst voids and fractures. No air- or clay-filled voids or fractures are interpreted from this profile.

Photo 1

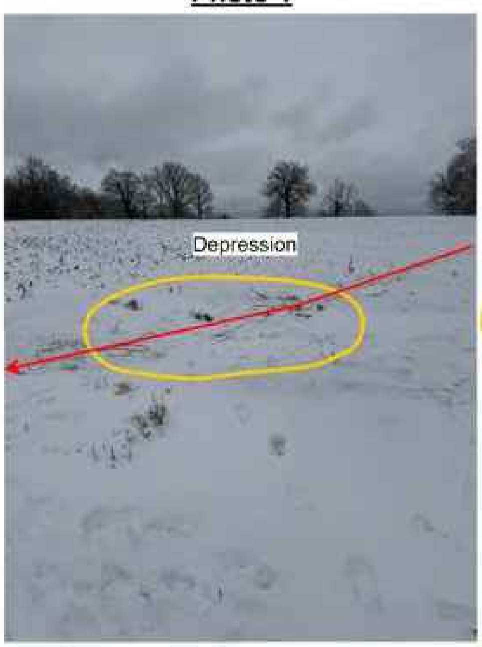


Photo 2

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/22/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

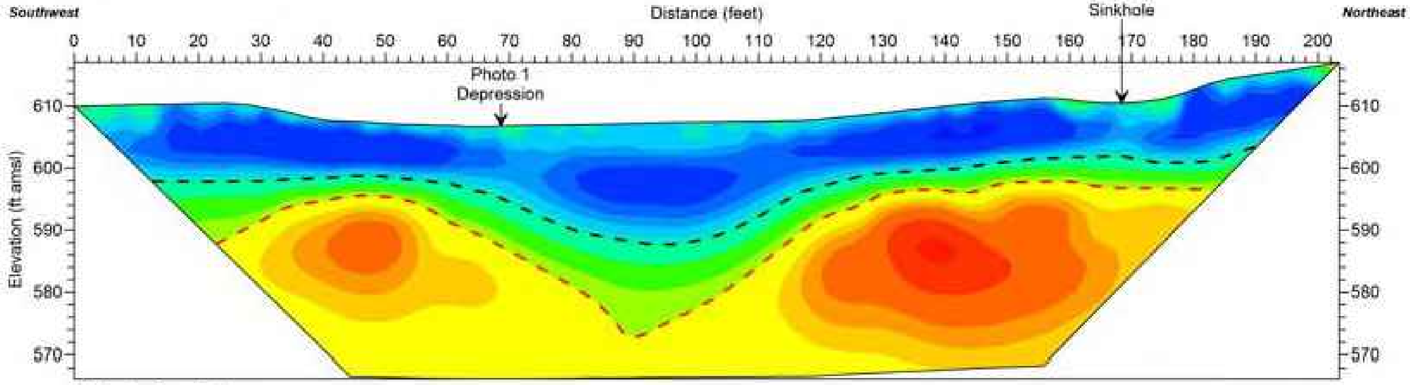
DRAWING NO.: **Figure 47** Electrical Imaging Data Area 6, Profile E-39

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F47

EI Profile E-40



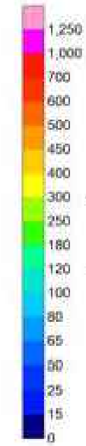
EI Profile Description:

The interpreted top of sandstone and limestone are well-imaged in this profile and display highly variable elevations indicating differential weathering and dissolution of the limestone. Beneath the depression is a significant dip in the interpreted rock surfaces and may indicate a deeper collapse feature. Additionally, near 70 feet along the profile, a vertical column of slightly elevated apparent resistivities beneath the depression could indicate poorly consolidated soils or well-drained soils as materials move downwards into karst voids and fractures. Beneath the sinkhole feature, rock is relatively shallow and limestone appears to be competent. A similar vertical column of slightly elevated apparent resistivities is imaged directly beneath the sinkhole and may indicate similar conditions as described above. The interpreted limestone imaged in this profile displays variable apparent resistivities indicating a range of rock competency. No air-filled voids or fractures are interpreted from this profile.

Photo 1

Photo 2

Apparent Resistivity (Ohm-m)



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 20 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

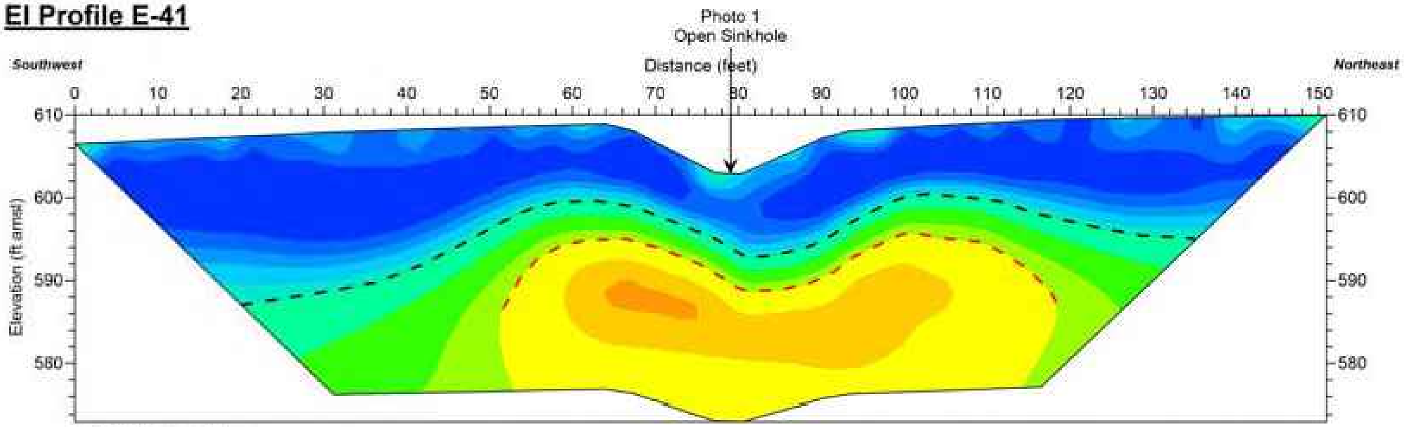
DRAWING NO: **Figure 48** Electrical Imaging Data Area 6, Profile E-40

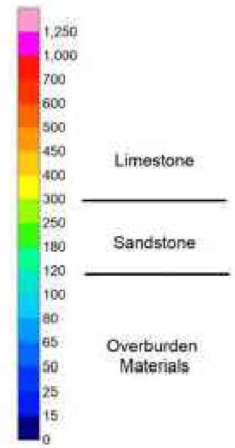
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F48

EI Profile E-41





EI Profile Description:

Both the interpreted top of sandstone and limestone are well-imaged in this profile and both display highly variable elevations consistent with differential dissolution of limestone and pinnacle formation. Directly beneath the open sinkhole is a section of slightly elevated apparent resistivities that are interpreted to represent poorly consolidated sediments or dryer sediments due to the downward movement of water and materials as they differentially settle into karst features such as fractures and voids within the limestone. Both interpreted top of rock surfaces display a dip below the sinkhole suggesting that either a deeper portion of limestone has collapsed here or the rock is severely weathered and fractured. Additionally, limestone is not imaged near the beginning or end of the profile suggesting that significant karst development is present in the subsurface along those intervals. No air-filled voids or fractures are interpreted from this profile.

Photo 1

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJN	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

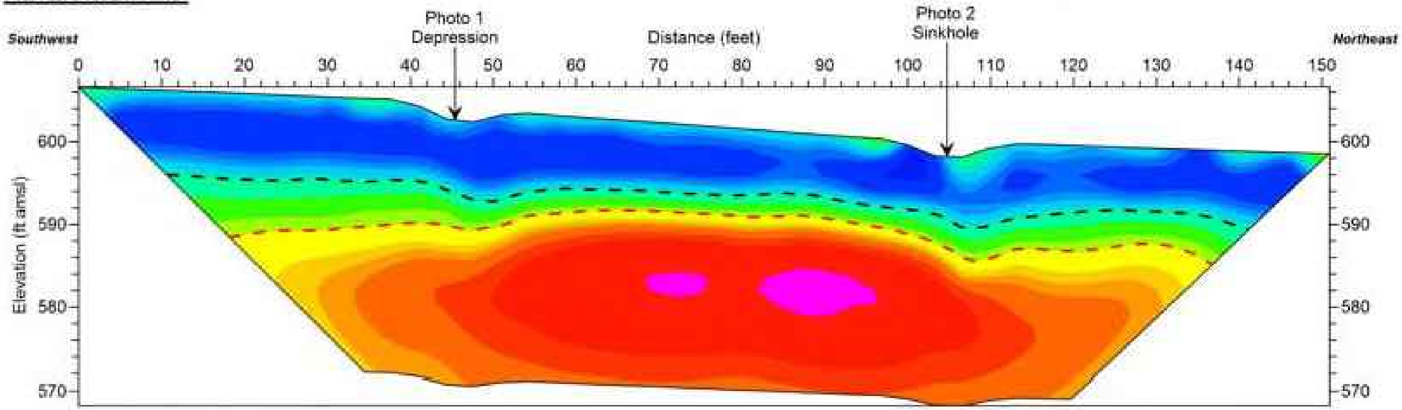
DRAWING NO.: **Figure 49** Electrical Imaging Data Area 6, Profile E-41

PREPARED FOR: edp

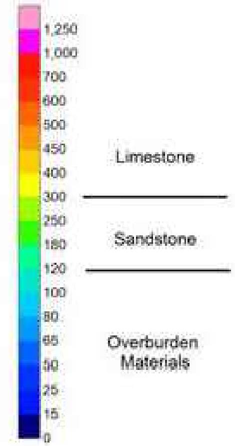
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F49

EI Profile E-42



Apparent Resistivity (Ohm-m)



EI Profile Description:

Both the interpreted top of sandstone and limestone are well-imaged in this profile and both appear to be relatively flay-lying. Beneath the depression, the EI profile images a section of saturated soils overlying a slight dip in both interpreted rock surfaces. The dip in the rock surfaces is interpreted to be related to differential dissolution of the limestone along this interval and may contain clay-filled fractures or vugs. Beneath the sinkhole is a shallow pocket of slightly elevated apparent resistivities that is interpreted as poorly consolidated sediments or slightly dryer sediments related to the downward movement of water and materials into deeper limestone fractures or vugs. A dip in both rock surfaces is also imaged directly beneath the sinkhole and is interpreted to be related to differential dissolution of the limestone along this interval and may contain clay-filled fractures or vugs. The interpreted limestone imaged along this profile appears to be predominantly competent, but shows some variability near the begging and end of the profile suggesting that rock competency varies somewhat within the unit. No air-filled voids or fractures are interpreted within this profile.

Photo 1

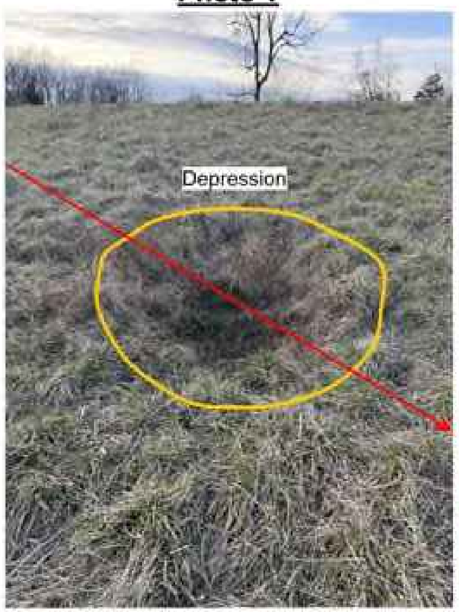


Photo 2

Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

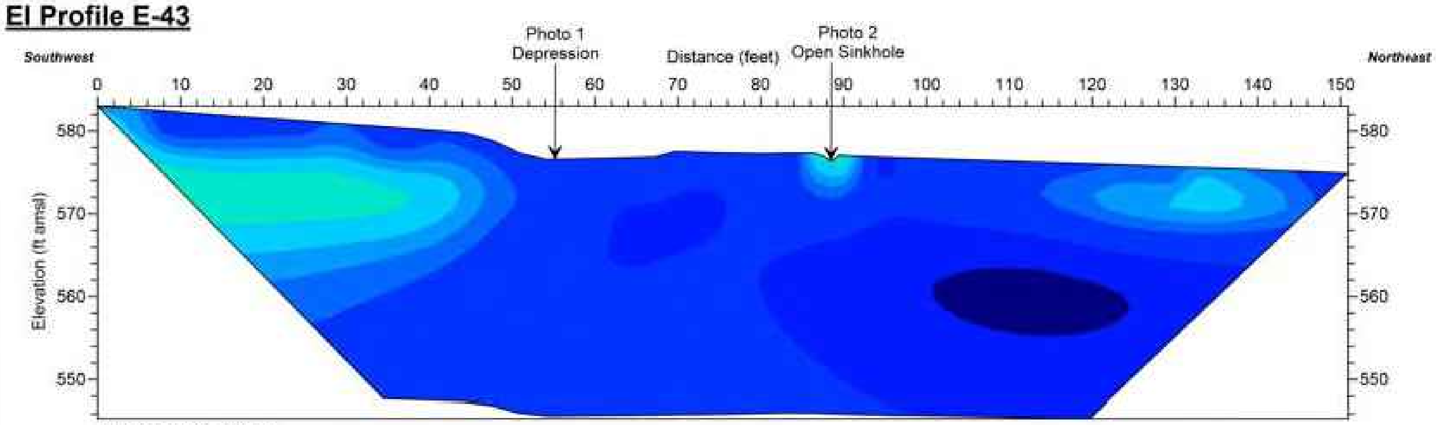
DRAWING NO: **Figure 50** Electrical Imaging Data Area 6, Profile E-42

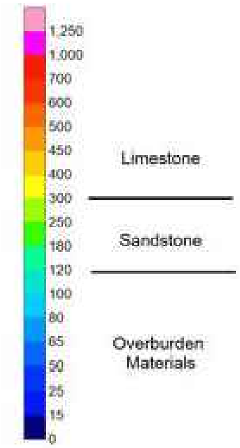
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F50

EI Profile E-43





EI Profile Description:

This profile images very low apparent resistivities to depth, interpreted as thick, saturated soils. If rock is present, it is highly saturated. The source of the depression and open sinkhole are interpreted to be related to karst within deeper limestone not imaged within the profile. No air- or clay-filled voids or fractures are interpreted within this profile.

Photo 1

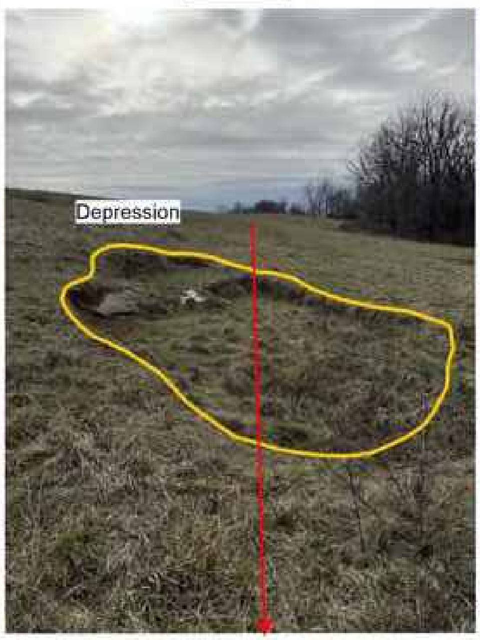
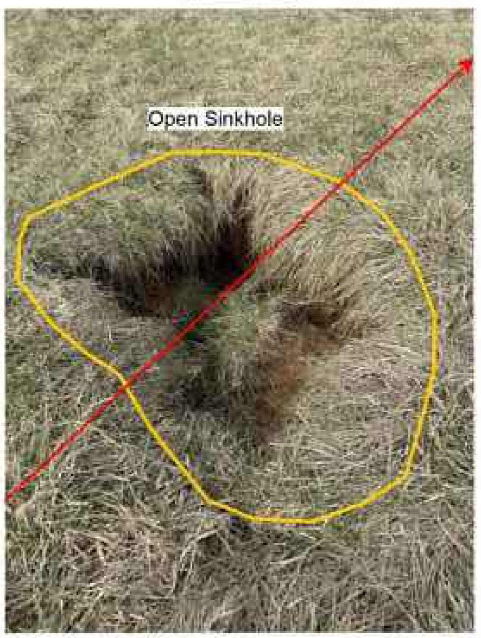


Photo 2



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

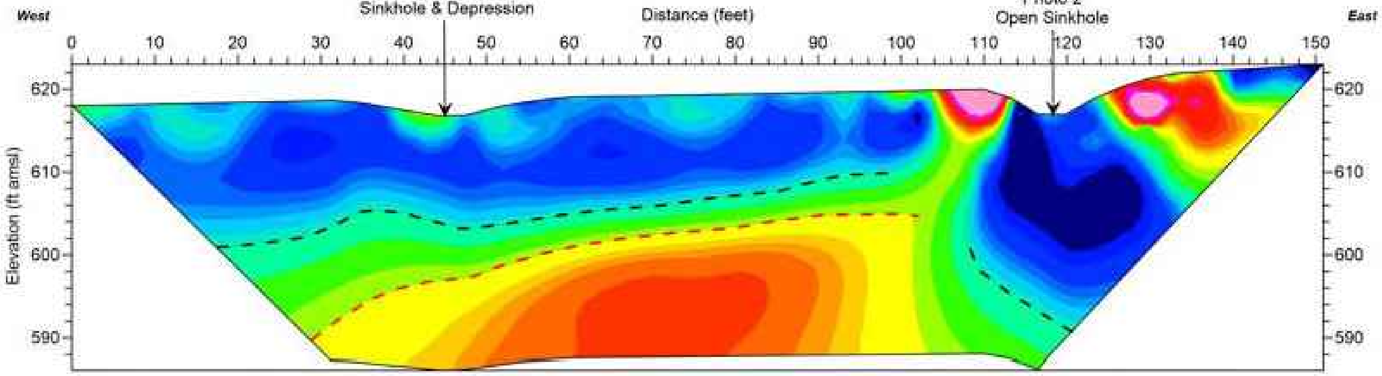
DRAWING NO: **Figure 51** Electrical Imaging Data Area 6, Profile E-43

PREPARED FOR: edp

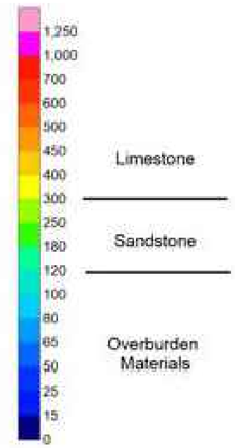
PROJECT NO. 847-12051

SHEET TITLE: DWG12051F51

EI Profile E-44



Apparent Resistivity (Ohm-m)



EI Profile Description:

Both the interpreted top of sandstone and limestone are well-imaged by this profile and appear to be relatively flat-lying for the majority of the profiles length. Beneath the sinkhole and depression at 45 feet along the profile, the interpreted rock surfaces slightly dip and the underlying limestone displays slightly decreased apparent resistivities suggesting a fracture zone or interval of vuggy rock. Beneath the open sinkhole, the EI data maps several very resistive pockets interpreted as air-filled cavities within the soils, one of which appears to extend downward towards the interpreted limestone and may be a partially air-filled sinkhole throat. Additionally, from 110 to 130 feet along the profile, no limestone is imaged and the interpreted sandstone abruptly dips suggesting that deeper limestone collapse may be present.

Photo 1

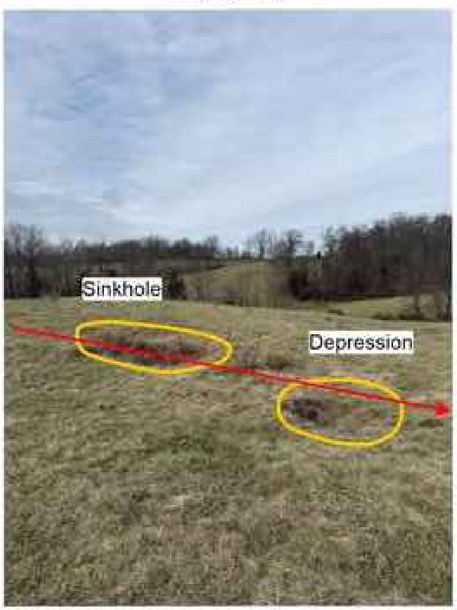
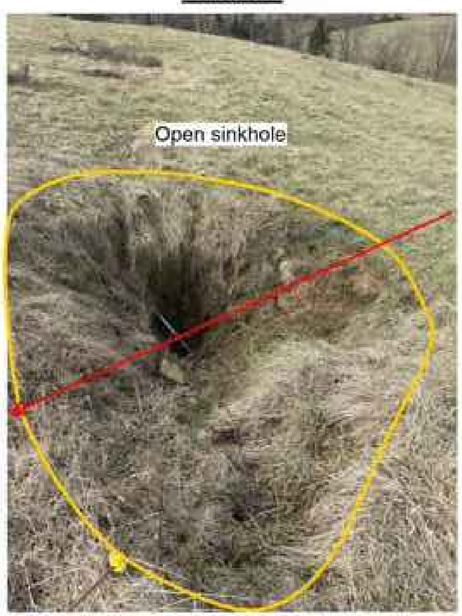


Photo 2



Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

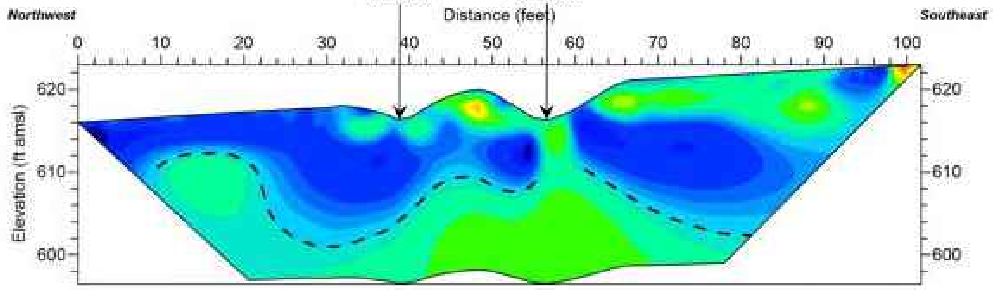
DRAWING NO: **Figure 52** Electrical Imaging Data Area 6, Profile E-44

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F52

EI Profile E-45



EI Profile Description:

This profile images a highly variable interpreted top of sandstone surface across the profile. The variability in the top of rock elevations are attributed to differential dissolution and potential collapse of deeper limestone units. Limestone is not imaged in this profile. Beneath both sinkholes are shallow pockets of slightly elevated apparent resistivity that are interpreted as poorly consolidated or dry soils related to the downward movement of water and materials into deeper karst features such as voids, vuggs, or fractures. Additionally, a vertical column of elevated apparent resistivities is imaged beneath the sinkhole at 56 feet along the profile indicating that a partially air-filled sinkhole throat may be present into fractures within the interpreted sandstone.

Apparent Resistivity (Ohm-m)

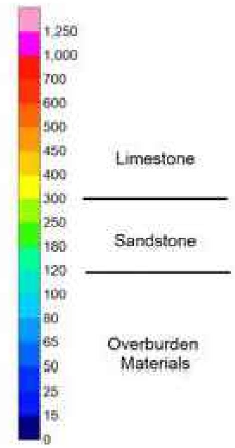


Photo 1

Photo 2

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI Earthimager 2D

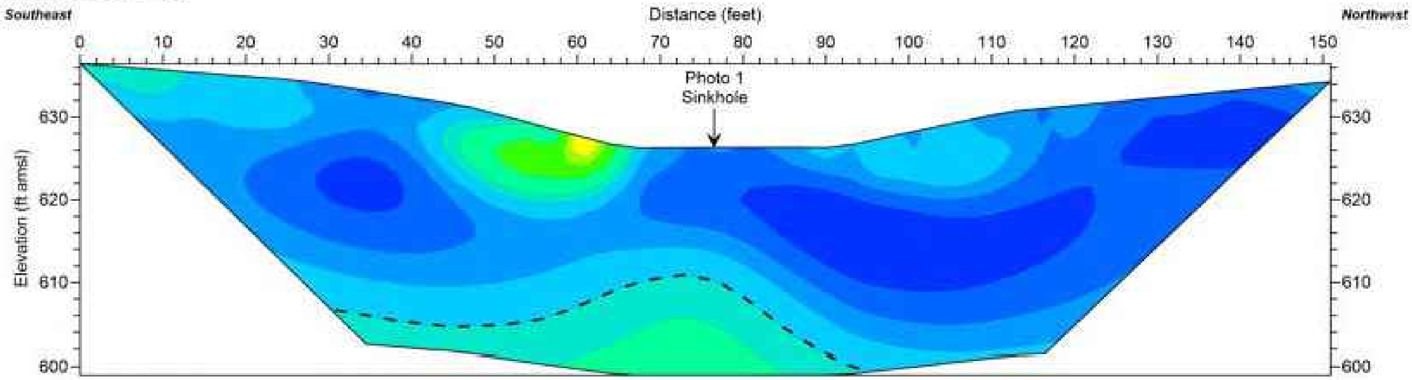
DRAWING NO.: **Figure 53** Electrical Imaging Data Area 6, Profile E-45

PREPARED FOR: edp

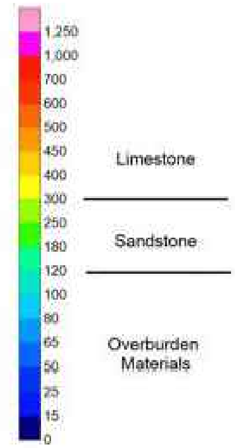
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F53

EI Profile E-46



Apparent Resistivity (Ohm-m)



EI Profile Description:

The interpreted top of sandstone is partially imaged near the base of the profile and is absent by 100 feet along the profile. The interpreted rock surface is undulating indicating differential dissolution and potential collapse of deeper limestone units and is likely the source of the sinkhole. No limestone is imaged in this profile. No air- or clay-filled voids or fractures are interpreted from this profile.

Photo 1

Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PREPARED FOR: edp

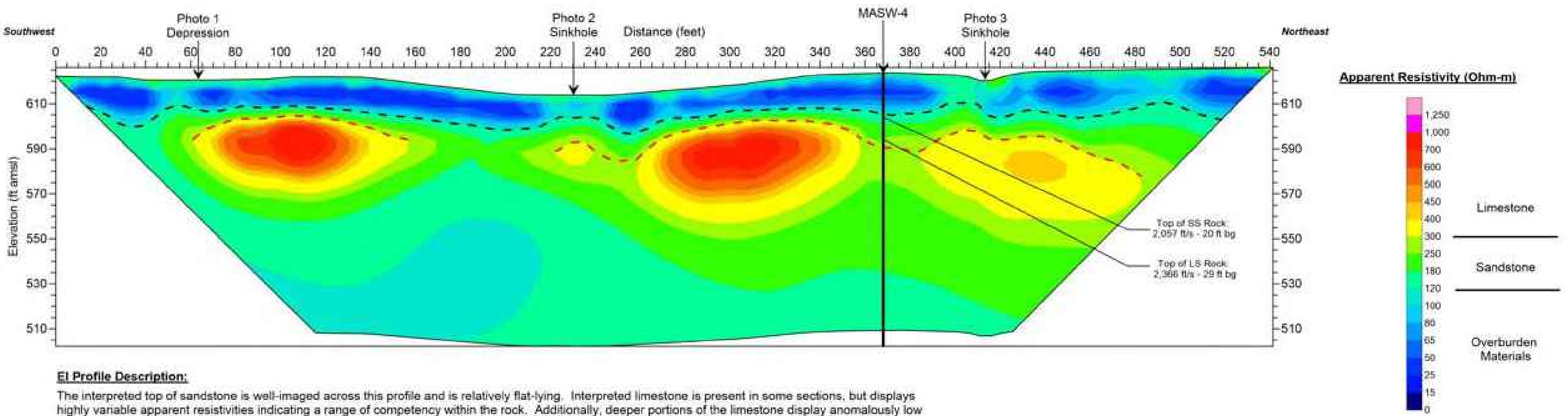
PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO.: **Figure 54** Electrical Imaging Data Area 6, Profile E-46

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F54

EI Profile E-47



EI Profile Description:

The interpreted top of sandstone is well-imaged across this profile and is relatively flat-lying. Interpreted limestone is present in some sections, but displays highly variable apparent resistivities indicating a range of competency within the rock. Additionally, deeper portions of the limestone display anomalously low apparent resistivities suggesting that the rock is highly weathered and fractured, porous or vuggy, and saturated at these depths. This is most prominent beneath the sinkhole mapped from 140 to 340 feet along the profile where almost no competent limestone is imaged. All three surficial karst features are interpreted to be caused by the downward movement of materials and subsequent differential settlement of near surface materials into fractures, voids, and vugs within the limestone. No air-filled voids or fractures are interpreted from this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1

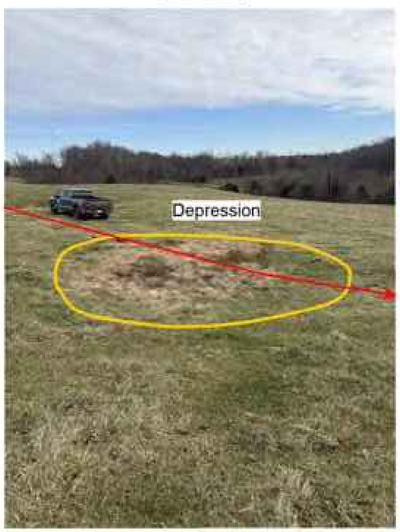


Photo 2

Photo 3

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/27/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 40 feet, No vertical exaggeration

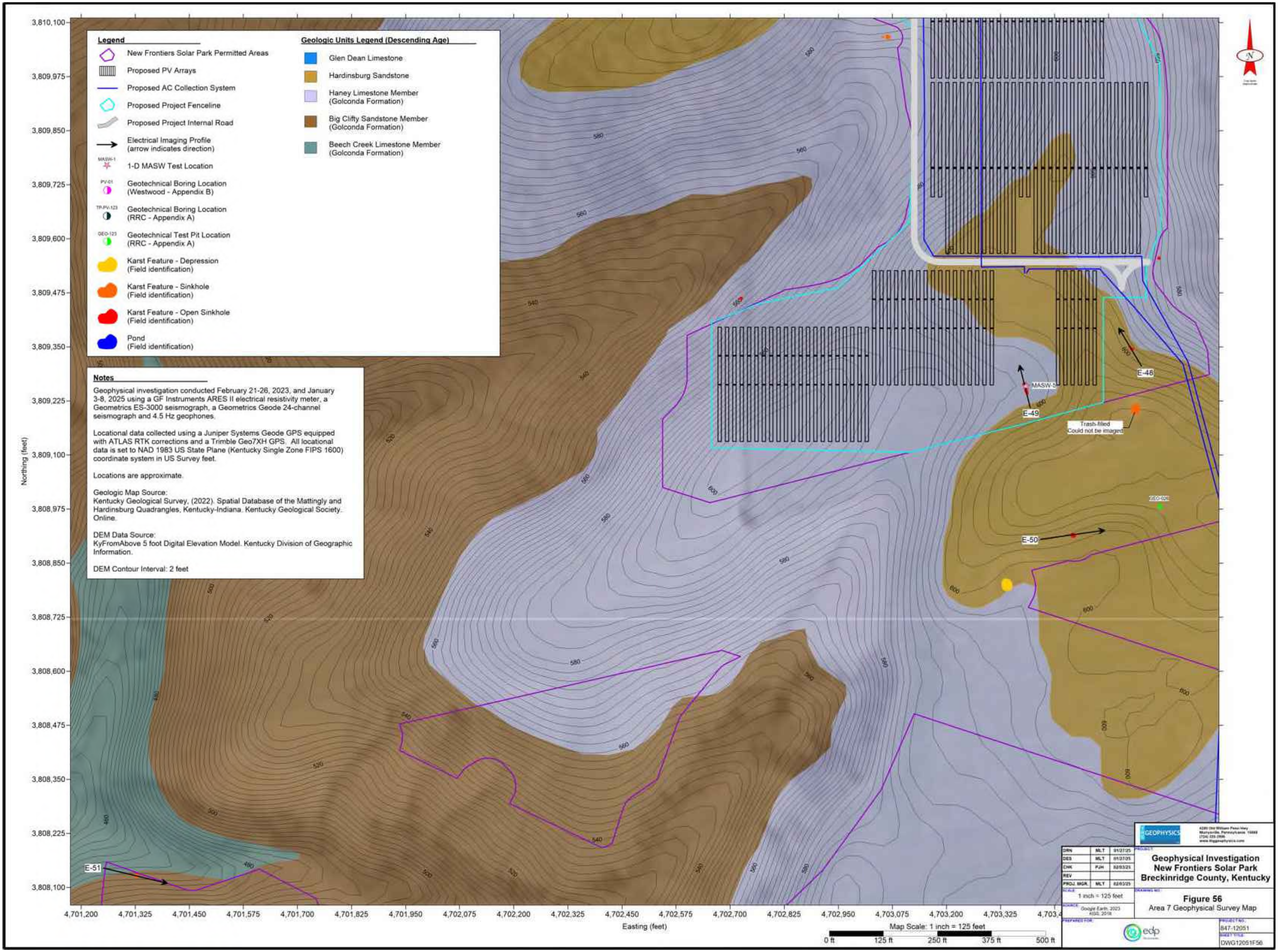
SOURCE: AGI EarthImager 2D

DRAWING NO.: **Figure 55** Electrical Imaging Data Area 6, Profile E-47

PREPARED FOR: edp

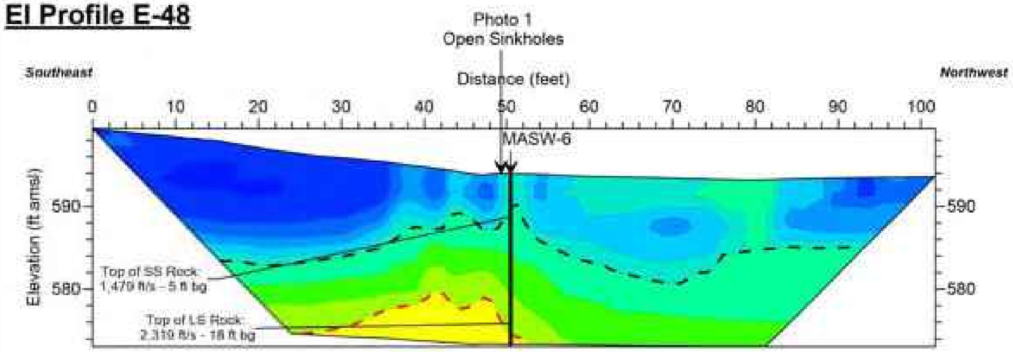
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F55



Legend
New Frontiers Solar Park Permitted Areas
Proposed PV Arrays
Proposed AC Collection System
Proposed Project Fenceline
Proposed Project Internal Road
Electrical Imaging Profile (arrow indicates direction)
1-D MASW Test Location
Geotechnical Boring Location (Westwood - Appendix B)
Geotechnical Boring Location (RRC - Appendix A)
Geotechnical Test Pit Location (RRC - Appendix A)
Karst Feature - Depression (Field identification)
Karst Feature - Sinkhole (Field identification)
Karst Feature - Open Sinkhole (Field identification)
Pond (Field identification)
Geologic Units Legend (Descending Age)
Glen Dean Limestone
Hardinsburg Sandstone
Haney Limestone Member (Golconda Formation)
Big Clifty Sandstone Member (Golconda Formation)
Beech Creek Limestone Member (Golconda Formation)
Notes
Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.
Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.
Locations are approximate.
Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.
DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.
DEM Contour Interval: 2 feet
E-48
E-49
MASW-5
E-50
E-51
GEO-026
Trash-filled
Could not be imaged
Northing (feet)
Easting (feet)
Map Scale: 1 inch = 125 feet
0 ft
125 ft
250 ft
375 ft
500 ft
GEOPHYSICS
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky
1 inch = 125 feet
Figure 56
Area 7 Geophysical Survey Map
847-12051
DWG12051F56

EI Profile E-48

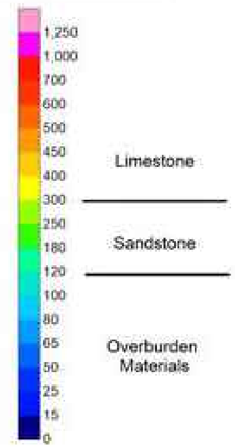


EI Profile Description:

Both the interpreted sandstone and limestone top of rock are imaged in this profile, which is consistent with this EI profiles proximity to the documented geologic contact. Both bedrock profiles are inconsistent and uneven, suggesting differential settlement from weathering and dissolution of the Haney Limestone member below. Just below the open sinkholes, three slightly resistive columns extend towards the surface from the interpreted sandstone. These columns may represent pathways through which sediment is migrating downward into karst features within the Haney Limestone member. No air-filled voids or fractures are interpreted in this EI profile.

Photo 1

Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI Earthimager 2D

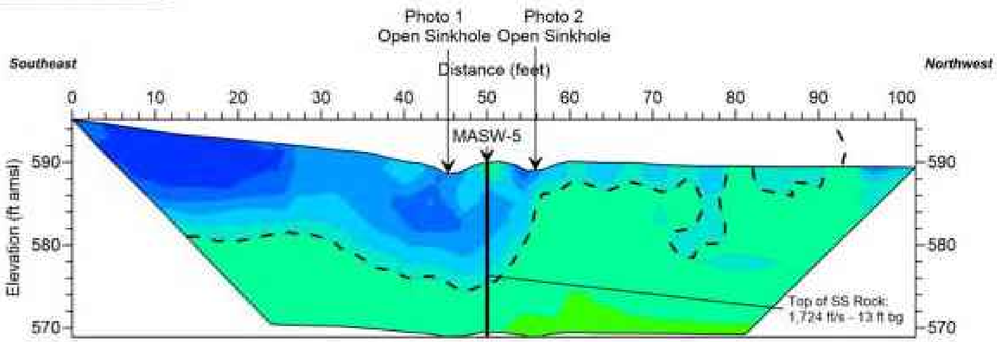
DRAWING NO.: **Figure 57** Electrical Imaging Data Area 7, Profile E-48

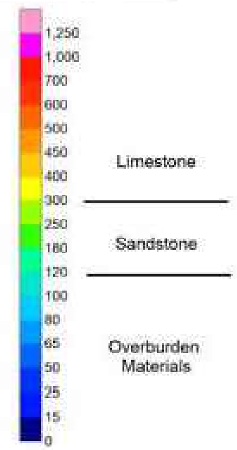
PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F57

EI Profile E-49





EI Profile Description:

Based on the geologic map, this profile appears to be located within the Haney Limestone; however, no limestone is imaged in the EI data. The top of sandstone is mapped across the profile and is highly irregular. Towards the end of the EI profile, the interpreted sandstone appears to be at or very near the ground surface. Beneath the open sinkholes, a relatively deep sag is present in the interpreted sandstone rock surface suggesting settlement from karst feature collapse in the deeper Haney Limestone member. The highly irregular sandstone imaged at approximately 78 feet along the profile, appears to show a small section of isolated collapse and may serve as a future pathway for the downward movement of sediment. This feature is interpreted as a clay-filled void or fracture zone within the sandstone; however, the mechanism for the interpreted sandstone collapse lies in the deeper soluble limestone. No air-filled voids or fractures are interpreted from this profile.

Photo 1

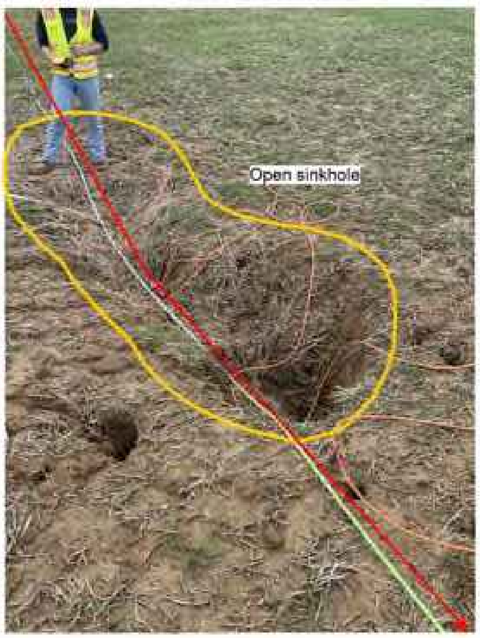
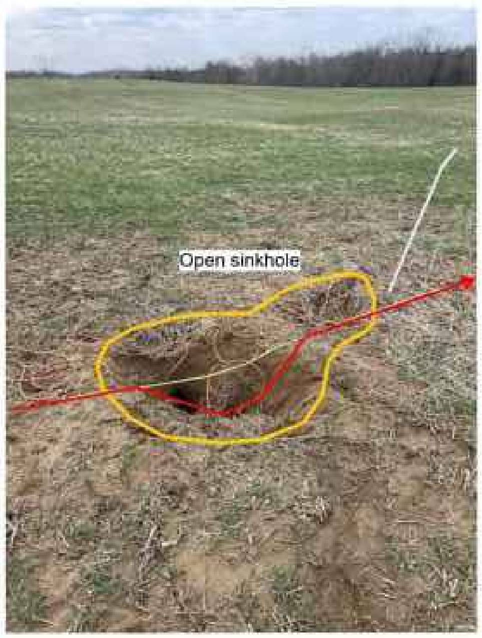


Photo 2



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/27/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

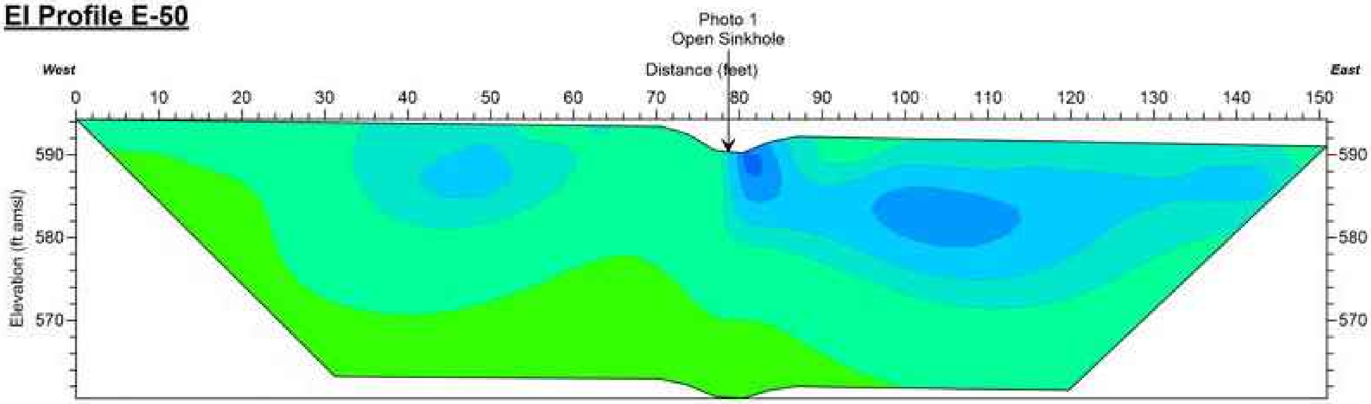
DRAWING NO.: **Figure 58** Electrical Imaging Data Area 7, Profile E-49

PREPARED FOR: edp

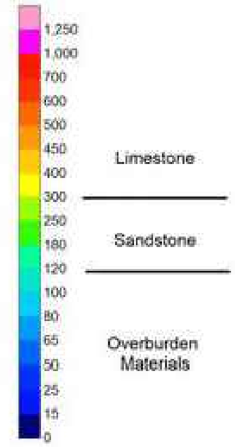
PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F58

EI Profile E-50



Apparent Resistivity (Ohm-m)



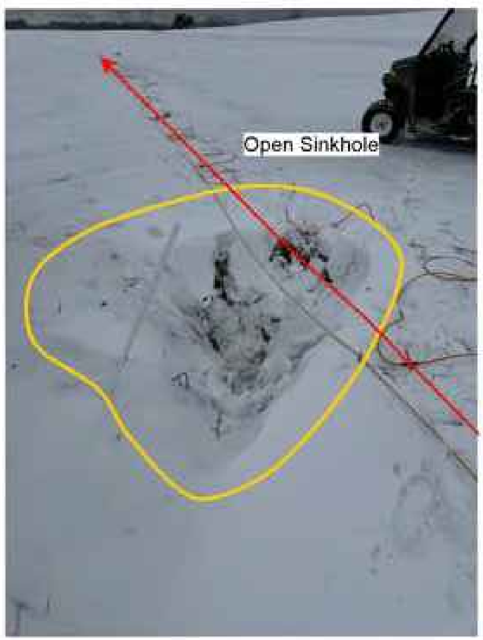
EI Profile Description:

The apparent resistivities measured in this profile are consistent with interpreted sandstone indicating that sandstone is present at or near the surface. No limestone is imaged in this profile. Directly beneath the open sinkhole, a pocket of very low apparent resistivities is interpreted as a saturated, clay-filled through feature and appears to connect to a larger feature that extends towards the end of the profile. This extended low-resistivity feature is interpreted as a section of sandstone containing clay-filled/saturated fractures. Although limestone is not imaged, this sandstone fracture zone is likely related to deeper karst within underlying limestone. No air-filled voids or fractures are interpreted from this profile.

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Photo 1



Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/28/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI Earthimager 2D

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

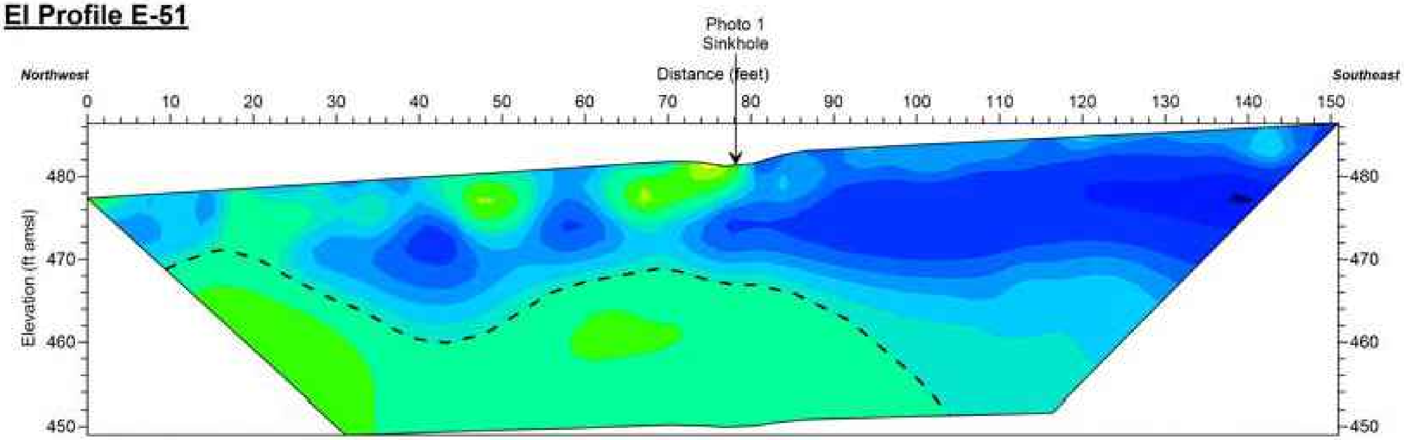
DRAWING NO.: **Figure 59** Electrical Imaging Data Area 7, Profile E-50

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F59

EI Profile E-51



EI Profile Description:

The interpreted top of sandstone is imaged by this profile and displays highly variable elevations and appears to dip deeper than the profile imaging depth by 110 feet along the profile. Limestone is not imaged in this profile. The variability of the sandstone elevation is indicative of deeper limestone collapse or differential dissolution. Beneath the sinkhole is a pocket of slightly elevated apparent resistivities interpreted as poorly consolidated or dryer sediments related to differential settlement into sandstone fractures. No air-filled voids or fractures are interpreted from this profile.

Apparent Resistivity (Ohm-m)

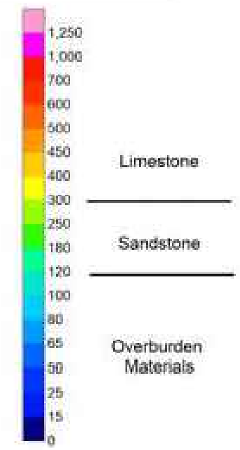


Photo 1

Legend

Surficial Karst Feature (approximate)

EI Profile Alignment (approximate)

Interpreted Top of Sandstone

Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/28/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

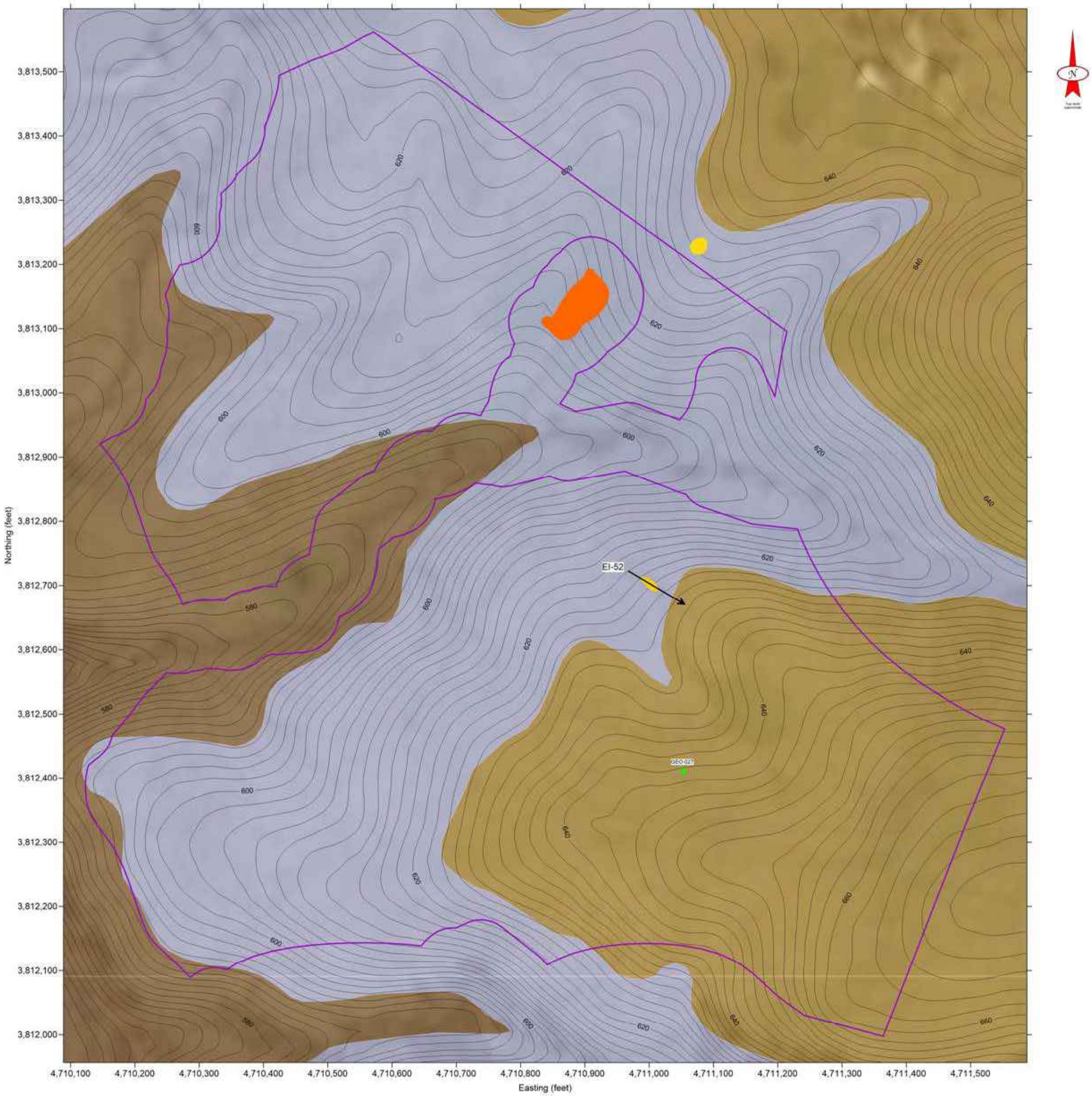
PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO.: **Figure 60** Electrical Imaging Data Area 7, Profile E-51

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F60



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Map Scale: 1 inch = 100 feet

0 ft 100 ft 200 ft 300 ft 400 ft

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

DRN	MLT	01/28/25
DES	MLT	01/27/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 100 feet

SOURCE: Google Earth, 2023; KGS, 2016

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

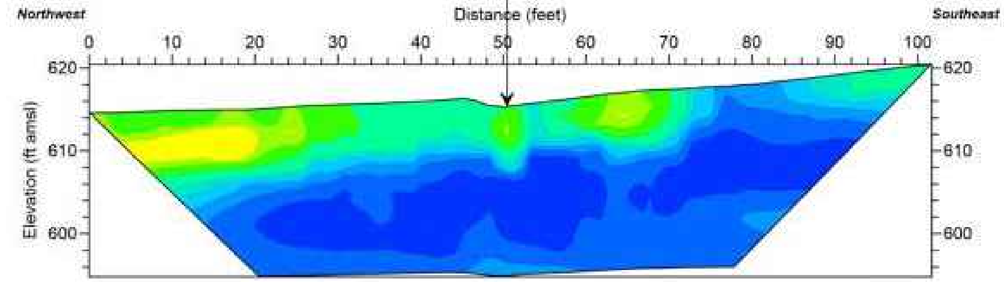
DRAWING NO.: **Figure 61** Area 8 Geophysical Survey Map

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F61

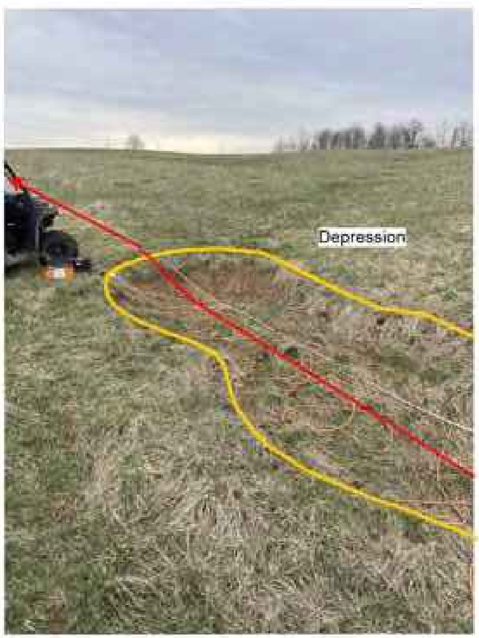
EI Profile E-52



EI Profile Description:

No rock is imaged in this EI profile and the profile is interpreted to map saturated soils to depth. No air- or clay-filled voids or fractures are interpreted in this EI profile and the source of the depression is likely related to karst within deeper limestone units.

Photo 1



Apparent Resistivity (Ohm-m)

Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted February 21-26, 2023 using a GF Instruments ARES II electrical resistivity meter and a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Trimble Geo7XH GPS, post-processing differential corrections, and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

DRN	MLT	01/29/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: 1 inch = 15 feet, No vertical exaggeration

SOURCE: AGI EarthImager 2D

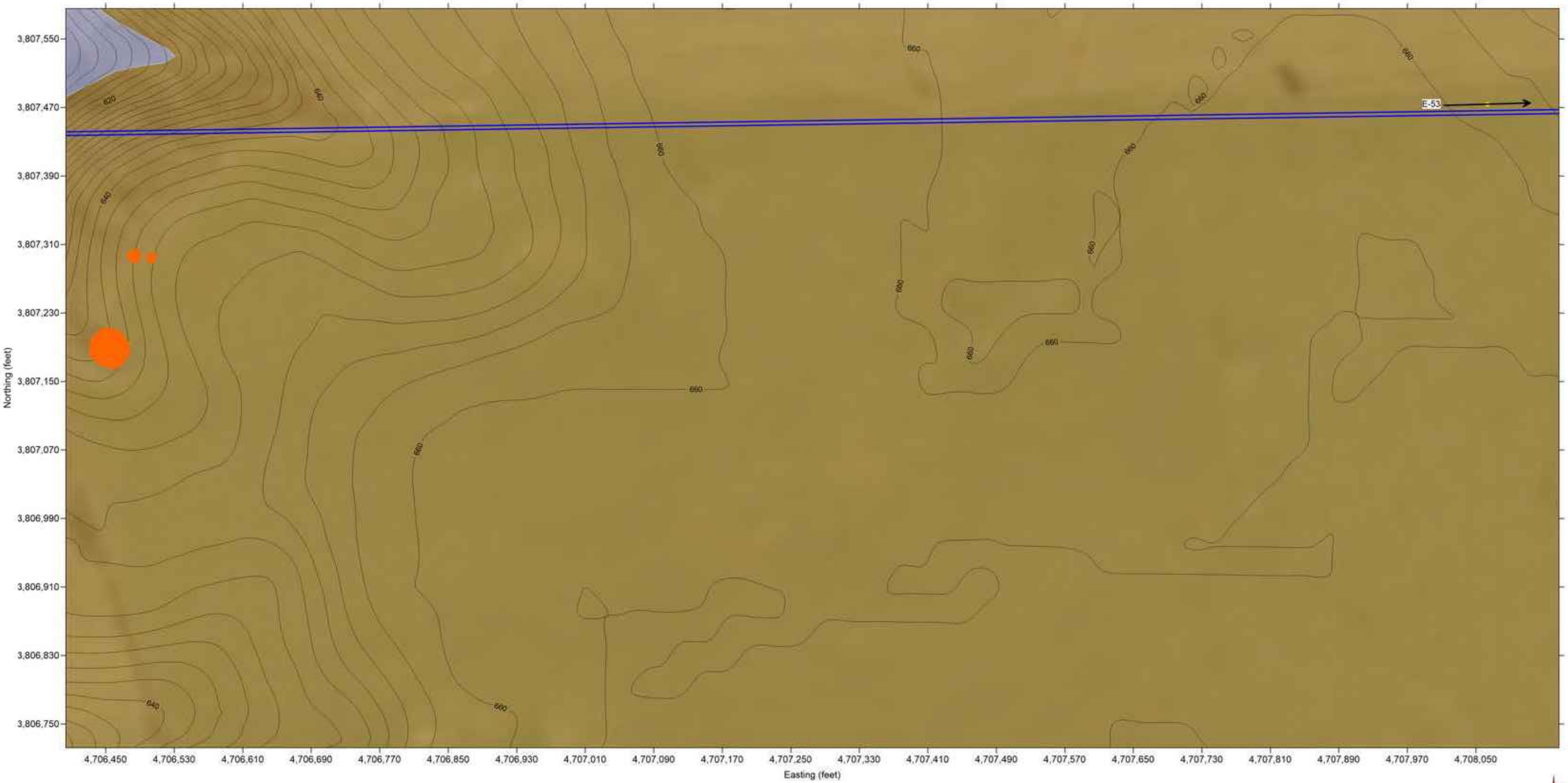
PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO.: **Figure 62** Electrical Imaging Data Area 8, Profile E-52

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F62



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

Map Scale: 1 inch = 80 feet

0 ft | 80 ft | 160 ft | 240 ft | 320 ft

DRN	MLT	01/26/25
DES	MLT	01/27/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 80 feet

SOURCE: Google Earth, 2023 KGS, 2018

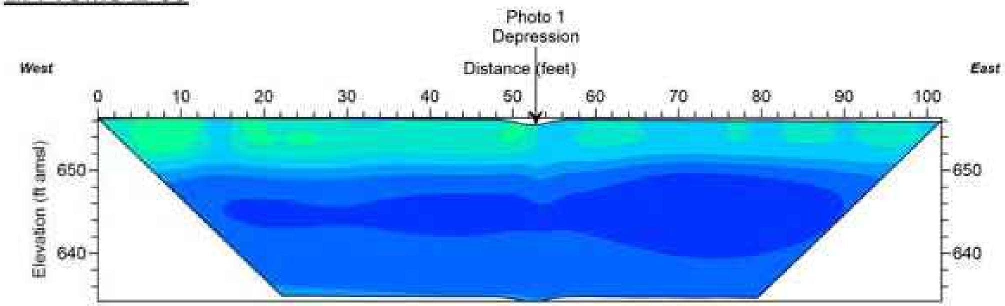
DRAWING NO.: **Figure 63** Area 9 Geophysical Survey Map

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F63

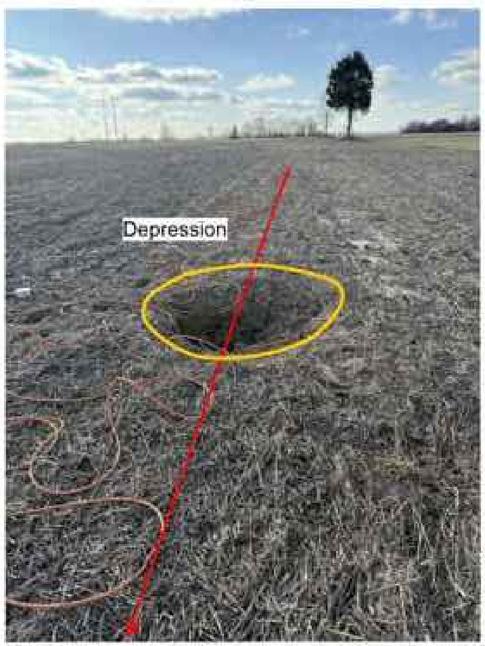
EI Profile E-53



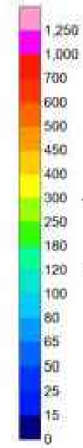
EI Profile Description:

This profile measured very low apparent resistivities to depth interpreted as saturated soils. No rock is imaged in this profile. If rock is present, it is interpreted to be highly saturated. The source of the depression is unclear as rock is not imaged; however, it is possible that this feature is related to sediment piping along potential drainage tile that may be within this agricultural field. No air- or clay-filled voids or fractures are interpreted from this profile.

Photo 1



Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/28/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT:
Geophysical Investigation
New Frontiers Solar Park
Breckinridge County, Kentucky

SCALE: 1 inch = 15 feet
No vertical exaggeration

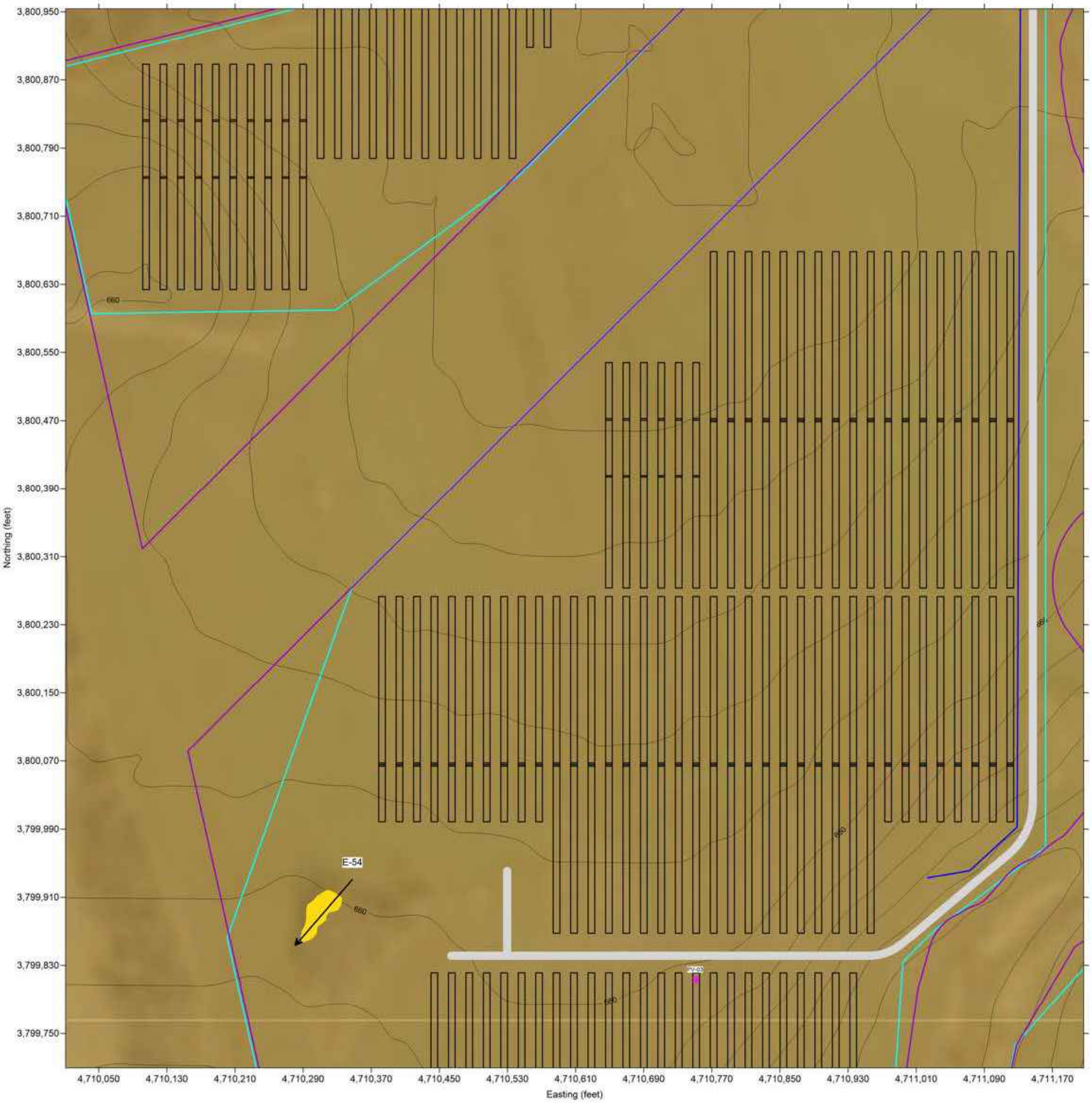
SOURCE: AGI EarthImager 2D

DRAWING NO.:
Figure 64
Electrical Imaging Data
Area 9, Profile E-53

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F64



Legend

- New Frontiers Solar Park Permitted Areas
- Proposed PV Arrays
- Proposed AC Collection System
- Proposed Project Fenceline
- Proposed Project Internal Road
- Electrical Imaging Profile (arrow indicates direction)
- MASW-1 — 1-D MASW Test Location
- PV-01 — Geotechnical Boring Location (Westwood - Appendix B)
- TP-PV-123 — Geotechnical Boring Location (RRC - Appendix A)
- GEO-123 — Geotechnical Test Pit Location (RRC - Appendix A)
- Karst Feature - Depression (Field identification)
- Karst Feature - Sinkhole (Field identification)
- Karst Feature - Open Sinkhole (Field identification)
- Pond (Field identification)

Geologic Units Legend (Descending Age)

- Glen Dean Limestone
- Hardinsburg Sandstone
- Haney Limestone Member (Golconda Formation)
- Big Clifty Sandstone Member (Golconda Formation)
- Beech Creek Limestone Member (Golconda Formation)

Notes

Geophysical investigation conducted February 21-26, 2023, and January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter, a Geometrics ES-3000 seismograph, a Geometrics Geode 24-channel seismograph and 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and a Trimble Geo7XH GPS. All locational data is set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

Locations are approximate.

Geologic Map Source:
Kentucky Geological Survey, (2022). Spatial Database of the Mattingly and Hardinsburg Quadrangles, Kentucky-Indiana. Kentucky Geological Society. Online.

DEM Data Source:
KyFromAbove 5 foot Digital Elevation Model. Kentucky Division of Geographic Information.

DEM Contour Interval: 2 feet

DRN	MLT	01/26/25
DES	MLT	01/27/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

GEOPHYSICS

SCALE: 1 inch = 80 feet

SOURCE: Google Earth, 2023; KGS, 2016

PREPARED FOR: edp

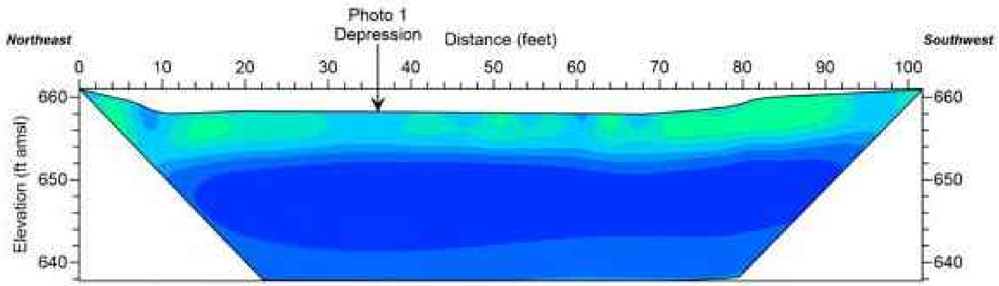
PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO.: **Figure 65**
Area 10 Geophysical Survey Map

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F65

EI Profile E-54

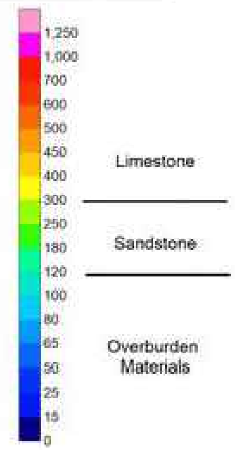


EI Profile Description:

This profile measured very low apparent resistivities to depth interpreted as saturated soils. No rock is imaged in this profile. If rock is present, it is interpreted to be highly saturated. The source of the depression is unclear as rock is interpreted to be related to collapse of deeper limestone units. No air- or clay-filled voids or fractures are interpreted from this profile.

Photo 1

Apparent Resistivity (Ohm-m)



Legend

- Surficial Karst Feature (approximate)
- EI Profile Alignment (approximate)
- Interpreted Top of Sandstone
- Interpreted Top of Limestone

Notes

Geophysical investigation conducted January 3-8, 2025 using a GF Instruments ARES II electrical resistivity meter and a Geometrics Geode seismograph equipped with 4.5 Hz geophones.

Locational data collected using a Juniper Systems Geode GPS equipped with ATLAS RTK corrections and set to NAD 1983 US State Plane (Kentucky Single Zone FIPS 1600) coordinate system in US Survey feet.

GEOPHYSICS

DRN	MLT	01/29/25
DES	MLT	01/23/25
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

SCALE: 1 inch = 15 feet. No vertical exaggeration

SOURCE: AGI EarthImager 2D

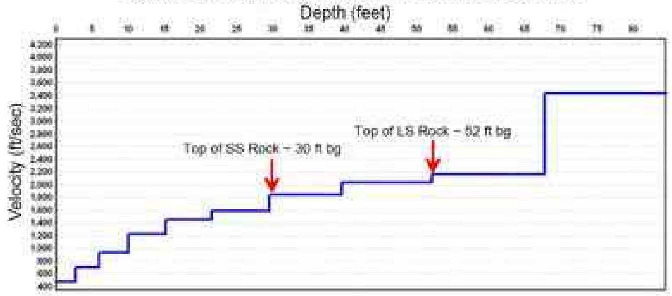
DRAWING NO.: **Figure 66** Electrical Imaging Data Area 10, Profile E-54

PREPARED FOR: edp

PROJECT NO.: 847-12051

SHEET TITLE: DWG12051F77

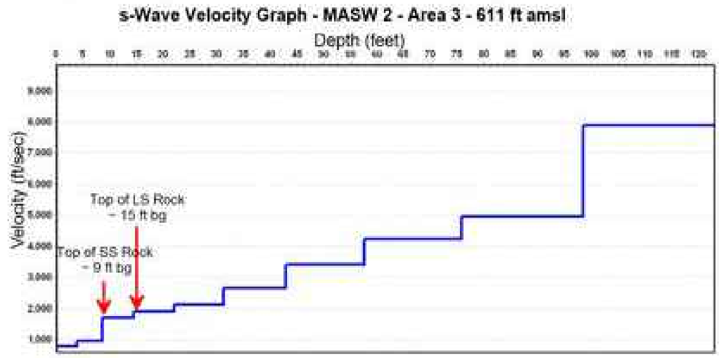
s-Wave Velocity Graph - MASW 1 - Area 2 - 613 ft amsl



s-WAVE VELOCITY

Layer Depth (ft)	Velocity (ft/s)
0-3	480
3-6	699
6-10	938
10-15	1,228
15-22	1,454
22-30	1,589
30-40	1,843
40-52	2,036
52-68	2,166
68-84	3,437

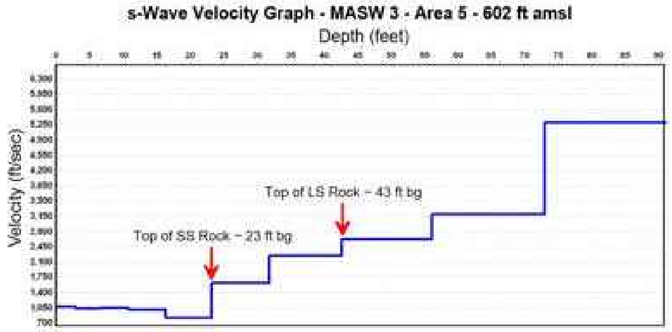
s-Wave Velocity Graph - MASW 2 - Area 3 - 611 ft amsl



s-WAVE VELOCITY

Layer Depth (ft)	Velocity (ft/s)
0-4	789
4-9	949
9-15	1,712
15-22	1,897
22-31	2,123
31-43	2,657
43-58	3,414
58-76	4,223
76-98	4,974
98-123	7,883

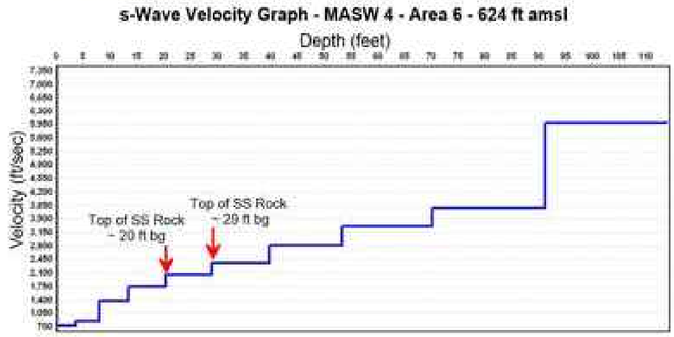
s-Wave Velocity Graph - MASW 3 - Area 5 - 602 ft amsl



s-WAVE VELOCITY

Layer Depth (ft)	Velocity (ft/s)
0-3	1,073
3-6	1,036
6-11	1,041
11-16	1,007
16-23	821
23-32	1,608
32-43	2,237
43-56	2,624
56-73	3,191
73-91	5,299

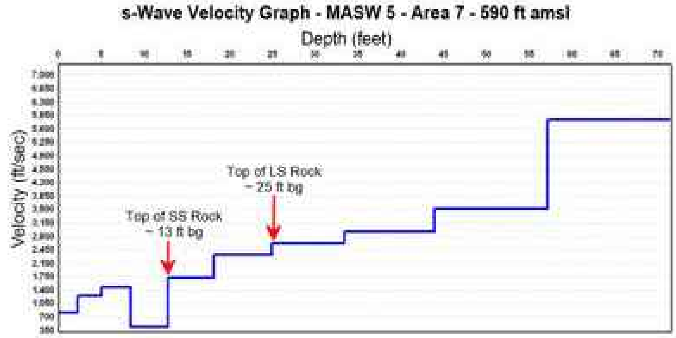
s-Wave Velocity Graph - MASW 4 - Area 6 - 624 ft amsl



s-WAVE VELOCITY

Layer Depth (ft)	Velocity (ft/s)
0-4	741
4-8	841
8-13	1,379
13-20	1,744
20-29	2,057
29-40	2,366
40-53	2,819
53-70	3,306
70-91	3,779
91-114	5,988

s-Wave Velocity Graph - MASW 5 - Area 7 - 590 ft amsl



s-WAVE VELOCITY

Layer Depth (ft)	Velocity (ft/s)
0-2	818
2-5	1,257
5-8	1,479
8-13	437
13-18	1,724
18-25	2,319
25-33	2,608
33-44	2,924
44-57	3,525
57-71	5,840

Notes

Geophysical investigation conducted February 21-26, 2023 using a Geometrics ES-3000 seismograph equipped with 4.5 Hz geophones.

DRN	MLT	01/29/25
DES	MLT	03/02/23
CHK	PJH	02/03/25
REV		
PROJ. MGR.	MLT	02/03/25

SCALE: As Shown

SOURCE: Surfseis 6.0.1.46

PREPARED FOR: edp

PROJECT: **Geophysical Investigation New Frontiers Solar Park Breckinridge County, Kentucky**

DRAWING NO: **Figure 67**

1-D Shear-wave Velocity Profiles MASW Tests 1 through 5

PROJECT NO: 847-12051

SHEET TITLE: DWG12051F67

Request No. 42:

Provide a map highlighting all construction entrances to the Project site and all roads proposed to be used.

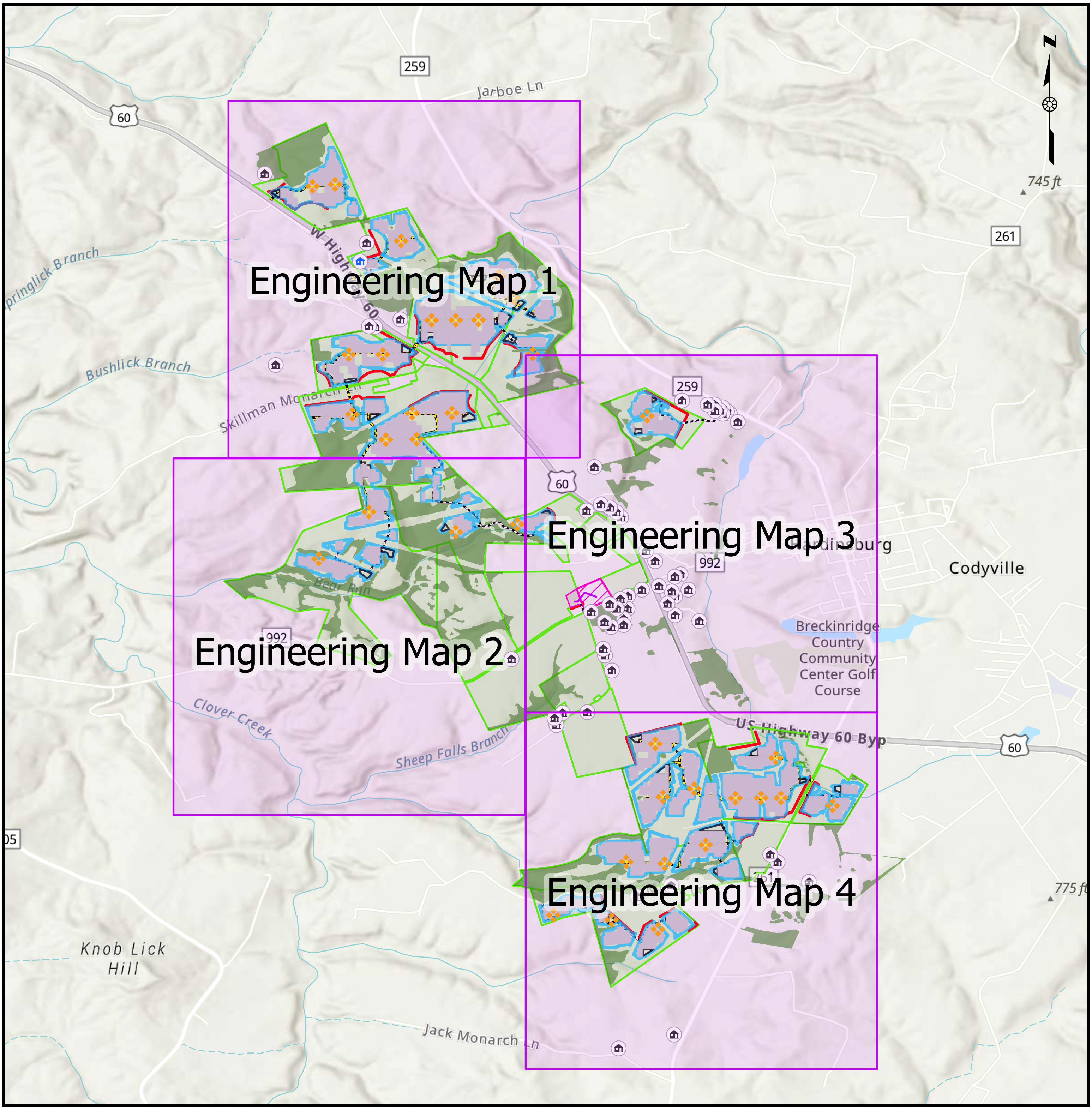
Original Response to Request No. 42:

Please see the attached map showing proposed construction entrances and roads.

Supplemental Response to Request No. 42:

Please find the updated construction roads and entrances map attached, depicting access roads unintentionally omitted in the map submitted as part of Original Response to Request No. 42.

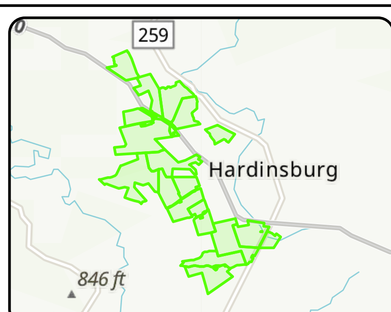
Responding Witness: Jesse Eick



Clover Creek Solar dba New Frontiers Solar

Date: 2/14/2025

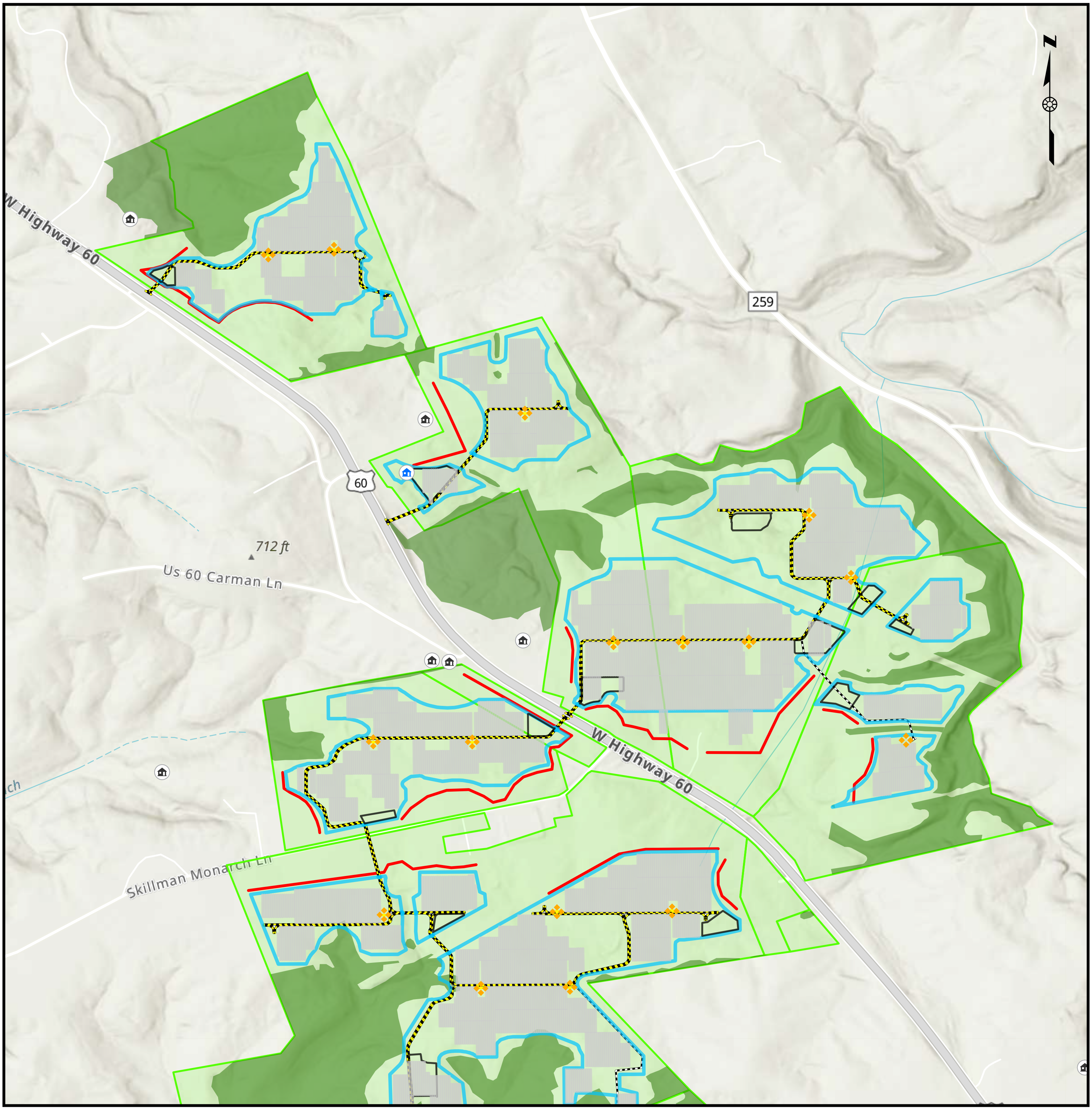
Engineering Map



0 2,000 4,000 6,000 8,000

Feet

- Project Boundary
- Solar Panel
- Transmission Line
- Laydown Yard
- Access Roads, Updated
- Access Road, Original
- Fence
- Project Substation
- BREC Substation
- Neighbor House
- Proposed Vegetative Buffer
- Existing Vegetative Buffer
- Operations & Maintenance Building
- Inverter

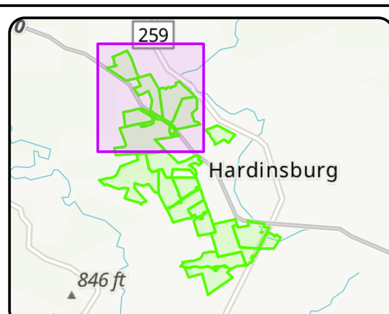


edp Renewables

Clover Creek Solar dba New Frontiers Solar

Date: 2/14/2025

Engineering Map 1



0 750 1,500 2,250 3,000

Feet

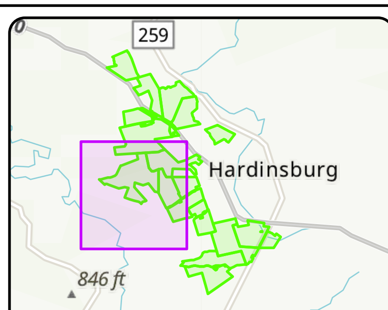
- Project Boundary
- Solar Panel
- Transmission Line
- Laydown Yard
- Access Roads, Updated
- Access Road, Original
- Fence
- Project Substation
- BREC Substation
- Neighbor House
- Proposed Vegetative Buffer
- Existing Vegetative Buffer
- Operations & Maintenance Building
- Inverter

edp Renewables

Clover Creek Solar dba New Frontiers Solar

Date: 2/14/2025

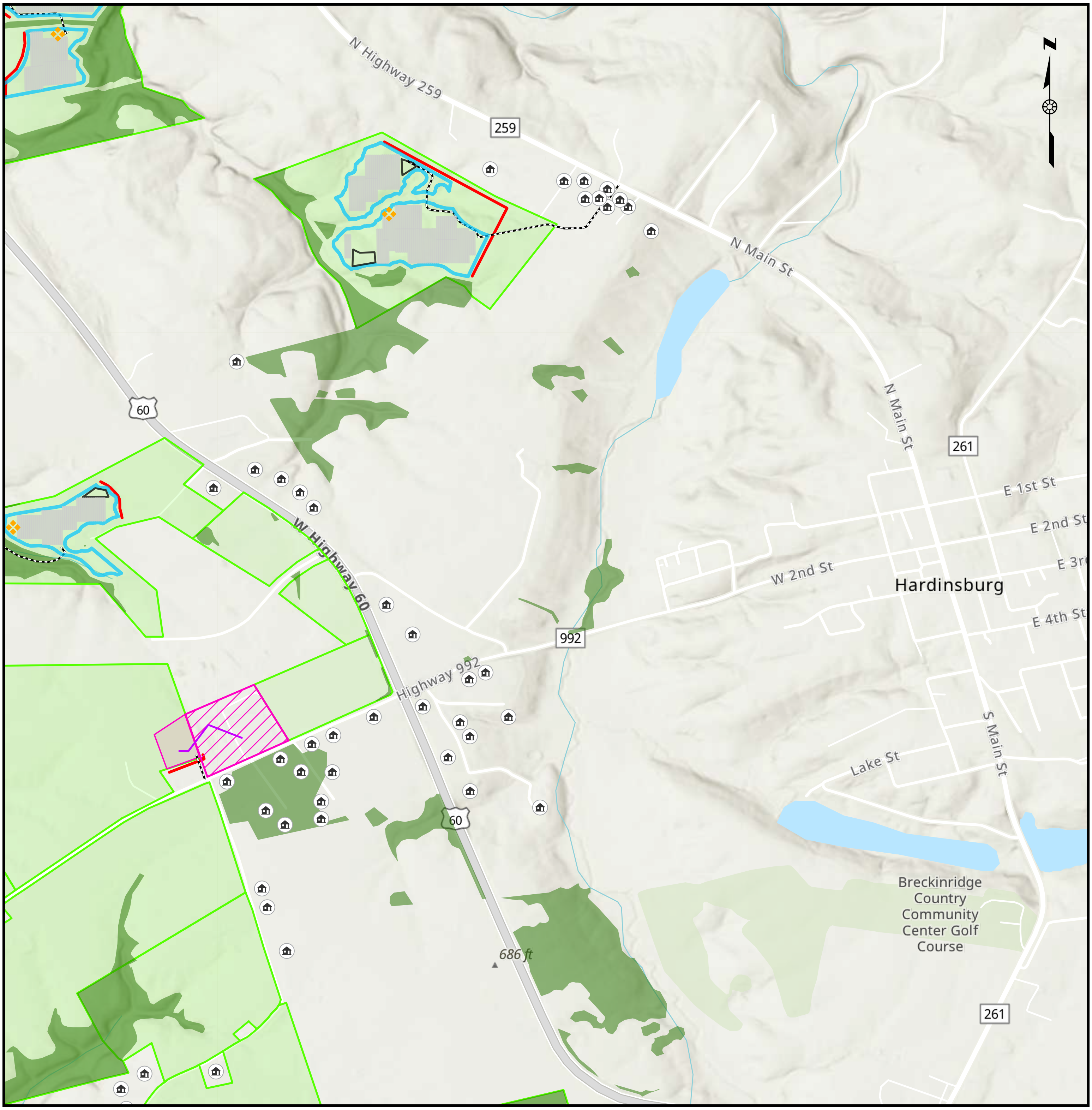
Engineering Map 2



0 750 1,500 2,250 3,000

Feet

- Project Boundary
- Solar Panel
- Transmission Line
- Laydown Yard
- Access Roads, Updated
- Access Road, Original
- Fence
- Project Substation
- BREC Substation
- Neighbor House
- Proposed Vegetative Buffer
- Existing Vegetative Buffer
- Operations & Maintenance Building
- Inverter

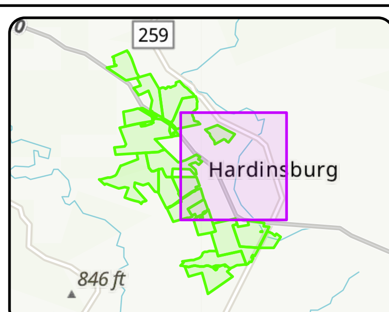


edp Renewables

Clover Creek Solar dba New Frontiers Solar

Date: 2/14/2025

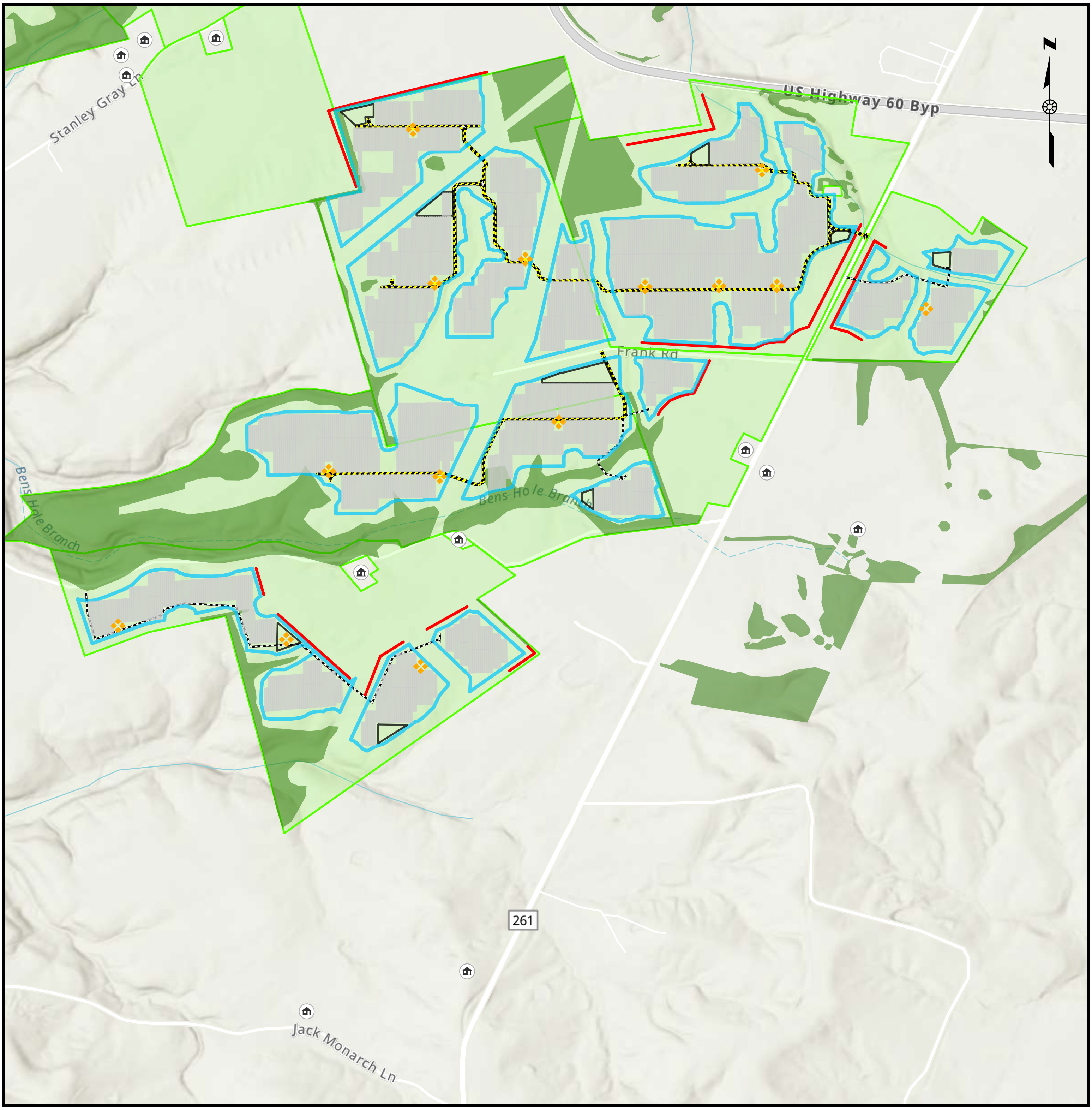
Engineering Map 3



0 750 1,500 2,250 3,000

Feet

- Project Boundary
- Solar Panel
- Transmission Line
- Laydown Yard
- Access Roads, Updated
- Access Road, Original
- Fence
- Project Substation
- BREC Substation
- Neighbor House
- Proposed Vegetative Buffer
- Existing Vegetative Buffer
- Operations & Maintenance Building
- Inverter

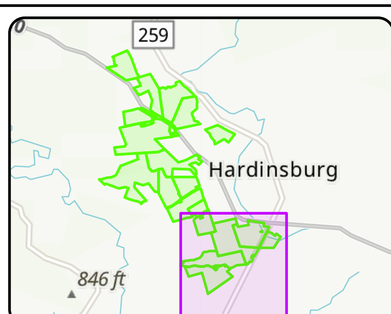


edp
Renewables

Clover Creek Solar dba New Frontiers Solar

Date: 2/14/2025

Engineering Map 4



0 750 1,500 2,250 3,000
Feet

- Project Boundary
- Solar Panel
- Transmission Line
- Laydown Yard
- Access Roads, Updated
- Access Road, Original
- Fence
- Project Substation
- BREC Substation
- Neighbor House
- Proposed Vegetative Buffer
- Existing Vegetative Buffer
- Operations & Maintenance Building
- Inverter

Request No. 53(a):

The proposed project site is transected by multiple pipelines, including: A Texas Gas 26" natural gas main pipeline, a Texas Gas 16" natural gas pipeline, and an Owensboro, Catlettsburg Crude 24" crude oil pipeline. Provide:

a. Any communication with the owners of these pipelines and any concerns that were raised.

Original Response to Request No. 53(a):

a. Project representatives communicated with pipeline owners regarding proposed encroachment agreements and setbacks for the Project, including representatives of Marathon Pipe Line LLC and Boardwalk (Texas Gas) Pipelines. Communications included details regarding pipeline locations and possible terms for encroachment agreements. Communications with the pipelines are currently being reviewed for confidentiality under federal and state laws and will be produced at a later date.

Supplemental Response to Request No. 53(a):

a. Please see attached.

Responding Witness: Jesse Eick

Jeanne Brehm
EDPR
Execution Civil Engineering
1501 McKinney Street, Suite 1300, Houston, TX 77010, United States
T +1(832)840-5285

Please reply during your own working hours and consider the environment before printing.

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Wednesday, November 6, 2024 1:33 PM
To: JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: Fw: Marathon Pipe Line-Breckinridge county, KY Skillman property

Here is the Marathon email chain. requirements are at the bottom.

Chase Glotfelty
EDPR
PD - IN & KY I

1501 McKinney Street, Suite 1300, Houston, TX 77010, United States
T +1(346)353-4273

Please reply during your own working hours and consider the environment before printing.

From: Durnal, Dennis W. <[illegible]
Sent: Friday, October 18, 2024 2:57 PM
To: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: Marathon Pipe Line-Breckinridge county, KY Skillman property

Chase,

Attached is a word version of the Encroachment Agreement per your request. If your team makes any changes for our review and possible consideration please make sure they are redlined/tracked for efficiency.

Thanks,

Dennis Durnal III

Marathon Pipe Line LLC

Senior Right-of-Way Specialist
Marathon Pipe line LLC

C

"Short term thinking has long term consequences"

From: Durnal, Dennis W. <
Sent: Thursday, October 10, 2024 11:02 AM
To: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: Marathon Pipe Line-Breckinridge county, KY Skillman property

Thank you Chase, if you have a copy of the memorandum and could share I would appreciate it. In our agreements we define how the counterparty has property rights in a certain parcel of land. If it's the landowner, then we would reference the deed and recording information etc. if it's a counterparty that doesn't own the land but owns the "encroachment" then we reference their easement or their lease/what gives them their rights etc to prove that they have the right to enter into the agreement with us. Any information you can provide would help, however I wont let that hold me up from drafting this and getting it submitted today to keep the process moving. We can continue to work through those details.

Thanks,

Dennis Durnal III

Marathon Pipe Line LLC

Senior Right-of-Way Specialist
Marathon Pipe line LLC

C

"Short term thinking has long term consequences"

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Thursday, October 10, 2024 10:56 AM
To: Durnal, Dennis W. <
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: [EXTERNAL] Re: Marathon Pipe Line-Breckinridge county, KY Skillman property

Good Morning Dennis,

I will get the address over to you shortly.

As for the agreement on this property. Yes, this property is under a lease with us. I can't share the full lease as it contains language that is private between EDPRNA and the Landowner. Alternatively, if you tell me what information you need from the agreement, I can ask our legal team if its okay to share. There is also a Memorandum that is recorded with the county and is public information if that would be helpful.

Best,
Chase

Chase Glotfelty
EDPR
PD - IN & KY I

1501 McKinney Street, Suite 1300, Houston, TX 77010, United States
T +1(346)353-4273

Please reply during your own working hours and consider the environment before printing.

From: Durnal, Dennis W. <
Sent: Thursday, October 10, 2024 9:39 AM
To: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: Marathon Pipe Line-Breckinridge county, KY Skillman property

Chase,

Starting on the encroachment agreement, what is the mailing address for Clover Creek Solar Project LLC and also what are the property rights you hold in the property. Is it via a lease I assume? Are you able to provide any information on that lease so I can reference that in our agreement. Either by copy of the agreement, recording information, title of the agreement the landowner executed etc.

Thanks,

Dennis Durnal III

Marathon Pipe Line LLC

Senior Right-of-Way Specialist

Marathon Pipe line LLC

i

<u>"Short term thinking has long term consequences"</u>

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Tuesday, October 8, 2024 1:57 PM
To: Durnal, Dennis W. <
Cc: Hoffman, Brad < Wilson, Cory M.
< LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: [EXTERNAL] Re: Marathon Pipe Line-Breckinridge county, KY Skillman property

Hi Dennis,

Understood. The entity's name is "Clover Creek Solar Project LLC d\b\a New Frontiers Solar Park a Delaware limited liability company". As for the crossings, there will be underground collection crossings AND permanent access drive.

One I have more information on actual locations I will be sure to share that with you ASAP.

Best,
Chase

---

edp
Renewables

Chase Glotfelty
EDPR
PD - IN & KY I

1501 McKinney Street, Suite 1300, Houston, TX 77010, United States
T +1(346)353-4273

From: Durnal, Dennis W.
Sent: Tuesday, October 8, 2024 10:44 AM
To: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Cc: Hoffman, Brad < Wilson, Cory M.
< ; LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: Marathon Pipe Line-Breckinridge county, KY Skillman property

Chase,

We do have form but each agreement is situationally different due to each project/encroachments being different. I will have to draft the agreement and then route through my law team for review and approval before I send it to you. This can take +/- 30 days. Can you please supply me with the entity information that I can put on the agreement and I know you want to cross us with electric but will you need to be crossing us with a permanent access drive that will be utilized for the solar farm?

I go on vacation starting Friday for a week but can get the agreement drafted and submitted into the queue for my law group to review to get the process started.

Thanks,

Dennis Durnal III

Marathon Pipe Line LLC

Senior Right-of-Way Specialist
Marathon Pipe line LLC

"Short term thinking has long term consequences"

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Tuesday, October 8, 2024 11:37 AM
To: Durnal, Dennis W. <c
Cc: Hoffman, Brad < Wilson, Cory M.
LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: [EXTERNAL] Re: Marathon Pipe Line-Breckinridge county, KY Skillman property

Dennis,

I hope all is going well. Do you have a draft form of the crossing/encroachment agreement that you can send me? I would love for our Legal team and Engineering team to review that while we work to get the other information needed.

Once we have reviewed this in full, it might be helpful to set up a meeting for any questions we might have. Once I have more information on this, I will reach out to try to set something up.

Thank you for your help and talk soon.

Best,
Chase

edp Renewables

Chase Glotfelty
EDPR
PD - IN & KY I

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T +1(346)353-4273

Please reply during your own working hours and consider the environment before printing.

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Friday, September 27, 2024 1:05 PM
To: Durnal, Dennis W. <
Cc: Hoffman, Brad < · Wilson, Cory M.
< >; LANDON REDMON <LANDON.REDMON@EDP.COM>
Subject: Re: Marathon Pipe Line-Breckinridge county, KY Skillman property

Dennis,

Thanks so much for getting back to me with all this information , it is incredibly helpful. I am going to look through these requirements today and get them over to our engineering team.

I will have some full up questions once they review this, I assume, so I will reach back out early next week if that's okay.

Again, I appreciate this information and look forward to working with y'all. Have a great weekend.

Best,

Chase

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From: Durnal, Dennis W. ·
Sent: Friday, September 27, 2024 12:40 PM
Subject: Marathon Pipe Line-Breckinridge county, KY Skillman property

Chase and Landon,

As you're aware, Brad engaged me about your proposed work and development of a solar farm on lands where we have a 24" crude oil line (attached kmz) and easement. I will need to see your proposed plans to review any impacts to our pipeline and easement. It sounds like from Brad that the solar panel structures themselves will be at least +/-100' away from the pipeline which exceeds our minimum requirements of 50'. Any encroachments that impact our pipeline and easement such as road/access crossings and electrical crossings will require an encroachment agreement. Below are details pertinent to an encroachment agreement:

Encroachment Agreements

- For the agreement, I will need from you:
  - Full name or legal entity information of the landowner or owner of the encroachments, mailing address, if an LLC or corporation what state they are associated with etc. If the owner of the encroachment is not the landowner, then I will need to understand the dynamic the owner of the encroachment(s) has with the parcel of land. I assume your solar company executed a lease with the landowner, I will need some information of that lease so I can reference it in the encroachment agreement.
  - Detailed **Exhibit A:** depicting the crossings of the roadway and electrical lines crossing the pipeline. This needs to be specific for the road, electrical lines, and the pipeline and all other unneeded layers removed so the exhibit is clear, unobstructed, and easy to interpret.
    - Plan and profile cross section depicting the pipeline and its depth and the roadway crossing over it and the separation of the top of pipe and the top of the roadway and any current and proposed elevations.
    - Plan and profile cross section depicting the pipeline and its depth and the electrical crossings under it and the separation of the bottom of pipe and the top of the electrical and any current and proposed elevations.
    - I have attached an example of a satisfactory exhibit for reference.

Encroachment/Crossing Fee:

- We will assess a minimum fee of $7,500 for this agreement and the crossing of MPL's pipeline and easement with your encroachments. This fee assists in helping recover some of the costs that MPL will incur due to your project. Some of these items include the reviewing of plans and exhibits, MPL's time for corresponding ,drafting, facilitating, and administering of associated agreement, engineering review, and numerous onsite field inspections that will occur during your project. Our technician will periodically monitor the work around us and be onsite for any work that directly impacts us to ensure the safety of the pipeline and see that our requirements are being adhered to throughout the entirety of your project.
- The above fee assumes that this will cause us moderate labor burden. If for some reason your project changes and becomes more complex for MPL and causes excessive labor burden, then the fee may be reassessed and increased.

I don't believe I have spoken with anyone on this development prior to now, so below are our requirements for proposed Solar Farm Developments around Marathon Pipe Line assets:

- ***No solar panels, panel appurtenances, batteries, battery storage, tower foundations, equipment buildings, engineering works or permanent structures will be allowed within 50' either side of MPL***
  - ***We will have a clear and unobstructed easement for 50 feet either side so we can exercise our easement rights.***
- No electric lines to parallel within 50' of MPL
- Proposed electrical lines to maintain a separation of 24" below MPL pipelines for 25' either side of the pipeline if open trench excavated
  - The electrical lines will need to be placed in steel casing 10' either side of MPL **OR** placed in pvc conduits and covered in 4" of red dye concrete for 10' either side of MPL
  - caution tape placed 12" above the electric lines

    - lines shall cross at perpendicular angle of 90 degrees but in no event shall it be less than 60 degrees.
- 48" of separation below our pipelines if bored in
    - If installed via bore: the pipeline depth must be positively verified first and foremost and before the boring takes place a "sight" hole will need to be dug down 48" below the bottom of our pipeline depth at least 15' before our pipeline to ensure that the proper bore depth is obtained
    - lines shall cross at perpendicular angle of 90 degrees but in no event shall it be less than 60 degrees.
- No poles, guywires, splice boxes, anchors, ground rods, energized equipment, or mechanical supports within 50'
- Overhead electrical cables
    - must maintain a 60–90-degree perpendicular crossing angle
    - must maintain a minimum height of 20' above grade for 25' either side of pipeline
- After construction of any electric cables with greater than 13.8kV, MPL will investigate the possibility of induced current to the pipeline and if alternating current is evident, the crossing party is responsible for the cost of mitigating the AC interference
- **Proposed permanent driveways/roadways**
    - Permanent Roads/Drives will not be allowed to cross over MPL without executing an Encroachment Agreement
    - Our Region Integrity Engineer will perform an evaluation of the crossing design to verify that the proposed crossing will not cause an excessive amount of stress on the pipeline.
        - We require a minimum 48" of cover over our pipeline for any proposed road crossings, however the Region Integrity Engineer may determine that additional cover or other measures are necessary to provide adequate protection for the pipeline and that will be the responsibility of the crossing party to provide that additional protection and have it approved by MPL first.
    - Roadways shall not parallel within 50' of MPL.
- **Temporary Road Crossings axle loads less than 15,000 pounds**
    - Equipment with tracks is preferred over tires
    - In general vehicle crossings for axle loads up to 15,000 pounds a minimum of 48 inches of cover over the pipeline is required.
    - Site conditions(Such as damp soul), determined by an MPL Representative, may require matting the crossing location or providing additional cover to compensate for soil displacement due to subsidence of tires.
- **Temporary Road Crossings axle loads more than 15,000 pounds**
    - The crossing design requires evaluation by our MPL Integrity Engineer to verify that the installation/crossing will not cause an excessive amount of stress on the underlying pipeline
    - If the MPL Integrity Engineer determines that matting is required:
        - Mats should be placed on a minimum of 2 feet undistributed earth above the pipeline and oriented with the timbers perpendicular across the pipeline.
        - Mats are placed to cover the complete width of the proposed crossing.
        - MPL's pipeline should be protected from excessive stress by placing 1-foot thick mats over the line.
        - Crushed stone may be distributed over the mats to complete the crossing.
        - Or designed air bridge to mitigate stress on the pipeline.
        - Alternate means of protecting the pipeline shall be approved by the MPL Integrity Engineer.
        - We will need all equipment spec sheets for anything over 15,000 pounds for stress analysis calculations
- When any crossings are to take place over MPL, an MPL representative will need to be contacted and be onsite

- **No equipment or materials will be staged/stored within MPL's easement area without MPL's expressed written permission**
- **Proposed Fencing:**
  - Posts must be a minimum of 5 ft from pipeline
  - Must cross at a 60–90-degree perpendicular angle
  - Must not parallel any closer than 10 feet from MPL
  - MPL shall be allowed to daisy chain a lock onto a gate for access to our pipeline

Thanks,

Dennis Durnal III

Marathon Pipe Line LLC

Senior Right-of-Way Specialist
Marathon Pipe line LLC

"Short term thinking has long term consequences"

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Thursday, September 26, 2024 4:40 PM
To: Hoffman, Brad <kbhoffman@mplx.com>
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>
Subject: [EXTERNAL] Call Follow Up

Brad,

Thanks for taking the time to talk today, it was incredibly helpful.

All of my contact information is below, and I have CC'ed my colleague Landon on this email chain as well. When you get a chance, could you please forward my information along to Dennis so we can get the Encroachment Agreement started.

I am also working to follow up on the other questions you asked.

Thanks again and have a great day.

Best,
Chase

---

edp Renewables

Chase Glotfelty
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Outlook

Fw: New Frontiers Solar Project: Encroachment Agreement (Hardinsburg Operating Area)

From CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Date Thu 12/12/2024 8:03 AM
To JESSE EICK <JESSE.EICK@EDP.COM>

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Please reply during your own working hours and consider the environment before printing.

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Tuesday, December 3, 2024 10:27 AM
To: Carman,
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>; Childress, Jeffrey (Clyde) < >; Parrott, Joy : Wheeler, Bernice <
Subject: Re: New Frontiers Solar Project: Encroachment Agreement (Hardinsburg Operating Area)

Kevin,

Thank you for getting back to me with all of this information, it is incredibly helpful.

I will work directly with Clyde moving forward, but I will keep everyone CC'ed so that y'all are in the loop.

Have a good rest of your day.

Best,

Chase Glotfelty
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PD - IN & KY I

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T +1(346)353-4273

Please reply during your own working hours and consider the environment before printing.

From: Carman, Kevin <I .
Sent: Friday, November 8, 2024 10:30 AM
To: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>; Childress, Jeffrey (Clyde) < ; Parrott, Joy
Wheeler, Bernice <
Subject: RE: New Frontiers Solar Project: Encroachment Agreement (Hardinsburg Operating Area)

Chase,

Please work directly with our Operations Area Manager Clyde Childress going forward. His contact info is attached.

Things get initially kicked off by making an 811 call for design locates for any pipe crossings.

To answer your questions:

1. Will this agreement be executed with Boardwalk Pipelines or Texas Gas?........This will be a Texas Gas Level 2 permit for any road or utility crossings.
2. Do y'all have an application we will need to fill out?..........It is all initiated with 811 design one calls for any crossing where we can get the locations of the crossings, locate the pipe and provide probe depths, and establish contacts.
3. Do y'all have a form crossing agreement that you use, or would you like me to provide you with our master form that we can work off of?.........We utilize our own documents with general terms and special provisions for the specific crossing types.
4. Finally, what specific crossing requirements do y'all have? Is there a pdf or website that houses all of this information so that I can start populating it. This will help us provide any exhibits that are going to be needed........I have attached our Developer's Handbook and below is a summary of details:

a) For road crossings, we need to know what you will be crossing the pipelines with.........size, weight, specs, tracked or wheeled where load calculations can be performed on each specific pipe size (this determines the requirements for the road crossings). Provide drawings that clearly show the plan view with each crossing giving the Lat/Lon in decimal degrees and also show a profile drawing that clearly shows pipe depth of cover to the road surface. Depending on how the calculations play out with the loading, specific pipelines may require additional fill or even possibly 8" thick concrete slabs to carry the loading. I usually run the calculations on 90,000 lb tractor trailers (with a max axle of 25,000 lb) and the largest piece of tracked equipment that will be on the project during construction (typically a CAT 330 or a CAT D-6 Dozer).

b) For electrical crossings, provide the same plan and profile view with Lat/Lon in decimal degrees, provide the crossing type – Open Cut, Conventional Bore, or HDD. Provide the voltage.

1. Open Cut requires a minimum of 2' of clearance, crossing at a constant grade, wires be inside PVC, and the PVC encased in red dyed concrete at least 6" thick for the width of the trench.

2. Conventional Bore requires a minimum of 5' of clearance at a constant grade. Windows must be excavated on each side of the pipeline to verify the vertical separation.

3. Horizontal Directional Drill ("HDD") requires a minimum of 10' of clearance, crossing the easement at a constant grade with no vertical bends inside the ROW. Utilization of a magnetic tracking head on the pilot bit to verify the exact locations of the crossing vertically and horizontally.

4. Airial crossings require a minimum separation of 30' from the low wire to the natural ground.

5. Any communication line crossings would be the same requirements as above, but we would require orange dyed concrete if open cut.

Please reach back out to me if you have any other questions, but make sure to start the process with an 811 call for the crossing locations.

Kevin L. Carman
Encroachment Project Manager
Boardwalk Pipelines

Office Location:

From: CHASE GLOTFELTY <CHASE.GLOTFELTY@EDP.COM>
Sent: Thursday, November 7, 2024 5:06 PM
To: Carman, Kevin
Cc: LANDON REDMON <LANDON.REDMON@EDP.COM>; JESSE EICK <JESSE.EICK@EDP.COM>; JEANNE BREHM <JEANNE.BREHM@EDP.COM>
Subject: EXT: New Frontiers Solar Project: Encroachment Agreement

Afternoon Kevin,

I hope all is going well. As I previously mentioned, I am starting a new email chain to specifically talk about the encroachment agreement that we will need to execute with Texas Gas/Boardwalk Pipelines.

I have attached the same files Jesse sent over to you over earlier, for the sake of this email chain.

I also wanted to see if you could answer a few questions for me that would help me start to gather information.

1. Will this agreement be executed with Boardwalk Pipelines or Texas Gas?
2. Do y'all have an application we will need to fill out?
3. Do y'all have a form crossing agreement that you use, or would you like me to provide you with our master form that we can work off of?
4. Finally, what specific crossing requirements do y'all have? Is there a pdf or website that houses all of this information so that I can start populating it. This will help us provide any exhibits that are going to be needed.

Any information you can provide me with will be incredibly helpful to get this process started.

Thank you for your help and have a good evening.

Chase Glotfelty
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Request No. 64:

Provide any geotechnical reports for the project.

Original Response to Request No. 64:

A final geotechnical report is anticipated to be completed by February 2025 and will be submitted to the Siting Board upon completion.

Supplemental Response to Request No. 64:

The Project's final geotechnical report has been delayed. Clover Creek is currently in discussions its EPC contractor regarding a timeline to finalize the report, which is anticipated to be in the near term, and will file the final geotechnical report with the Siting Board upon completion.

Responding Witness: Jesse Eick