Appendix J

GEOTECHNICAL DESKTOP STUDY

Lost City Renewables LLC

Muhlenberg County, Kentucky

GEOTECHNICAL DESKTOP STUDY

Lost City Solar Site
Muhlenberg County, Kentucky

January 27, 2025

Prepared for:
Lost City Renewables LLC

Prepared by:
Stantec Consulting Services Inc.

Project Number:
2057322000

Revision	Description	Author	Date	Quality Check	Date	Independent Review	Date
0	Draft	N. Meador	4/15/24	K. Blakley	4/16/24	E. Kistner	4/18/24
1	Issued for Information	G. Khatri	1/27/25	K. Blakley	1/27/25	E. Kistner	1/27/25

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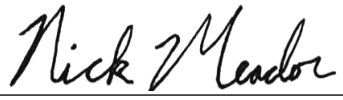
Prepared by: 
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1 Introduction

Stantec understands that the Lost City solar site in Muhlenberg County, Kentucky is planned for solar energy development. The Lost City solar site is located on the east side of US 431, approximately 1 mile north of the town of Dunmor, and southeast of the intersection of US 431 and State Route 949 in Western Kentucky. See Figure 1 in Appendix A for a location map. Stantec was requested to provide an assessment of known geotechnical and geologic information within the site limits and surrounding vicinity. The proposed Lost City solar site is approximately 1,300 acres, currently purposed as forest and agricultural land. Stantec reviewed available online geographic information system (GIS) mapping and topographical and geological data to summarize general subsurface conditions at the site.

2 Results of Study

2.1 GIS Mapping

A review of the site using available GIS mapping layers was performed. GIS maps showing the site limits, site vicinity, and various available online data are provided in Appendix A. The maps provided in Appendix A are:

- Figure 1 – Project Overview
- Figure 2 – Topography
- Figure 3 – Soil and Bedrock Geology
- Figure 4 – Land Use Mapping
- Figure 5 – Mining Activity
- Figure 6 – Karst Potential
- Figure 7 – Faults and Earthquake Activity
- Figure 8 – Oil and Gas Wells
- Figure 9 – Federal Emergency Management Agency (FEMA) Flood Insurance Maps

The GIS maps, along with other published maps and online resources, were used to review the topography, past mining, karst potential, seismic considerations, soil and bedrock geology, and hydrogeology within the site limits and surrounding vicinity.

2.2 Topography

The proposed site is currently forested and agricultural property with widely varying topography consisting of slopes ranging from 0 to 50 percent according to the Natural Resource Conservation Service (NRCS) web soil survey application (NRCS 2024). The custom web soil survey report for the project site is provided in Appendix B. The elevation at the site ranges from approximately 440 to 680 feet (NAVD 88), with several ridges through the site as shown on Figure 2 in Appendix A.

Detailed in the web soil survey (NRCS, 2024, and portions presented in Appendix B), 53% of the project area consists of soil groups described as having slopes greater than 12%. Due to most of the site being topographically steep, the need for grading and slope stability should be considered while evaluating site development.

2.3 Soils

Based on review of available water well logs (KGS 2024), depth to bedrock ranges from 2 to 14 feet in the project area. The soil thickness will vary based on the topographic conditions throughout the site. A geotechnical exploration for the project should include bedrock soundings to assist in foundation design considerations.

The web soil survey (NRCS, 2024) indicates that the project site is underlain by several soil types. Those soil types consisting of 5% or more of the project area include: Frondorf-Lenberg complex, Belknap silt loam complex, Wellston silt loam complex, and Zanesville silt loam complex. The typical soil profiles of these soils are included in Table 1. The soils are somewhat poorly drained to well drained with a very low to high capacity to transmit water.

The web soil survey shows that the proposed site is chiefly underlain by clay, characterized as lean clay (CL) and silt (ML) according to the Unified Soil Classification System (USCS). Portions of the web soil survey report are included in Appendix B, showing the various soil types identified across the site. Table 1 shows a summary of the soils identified within the site limits.

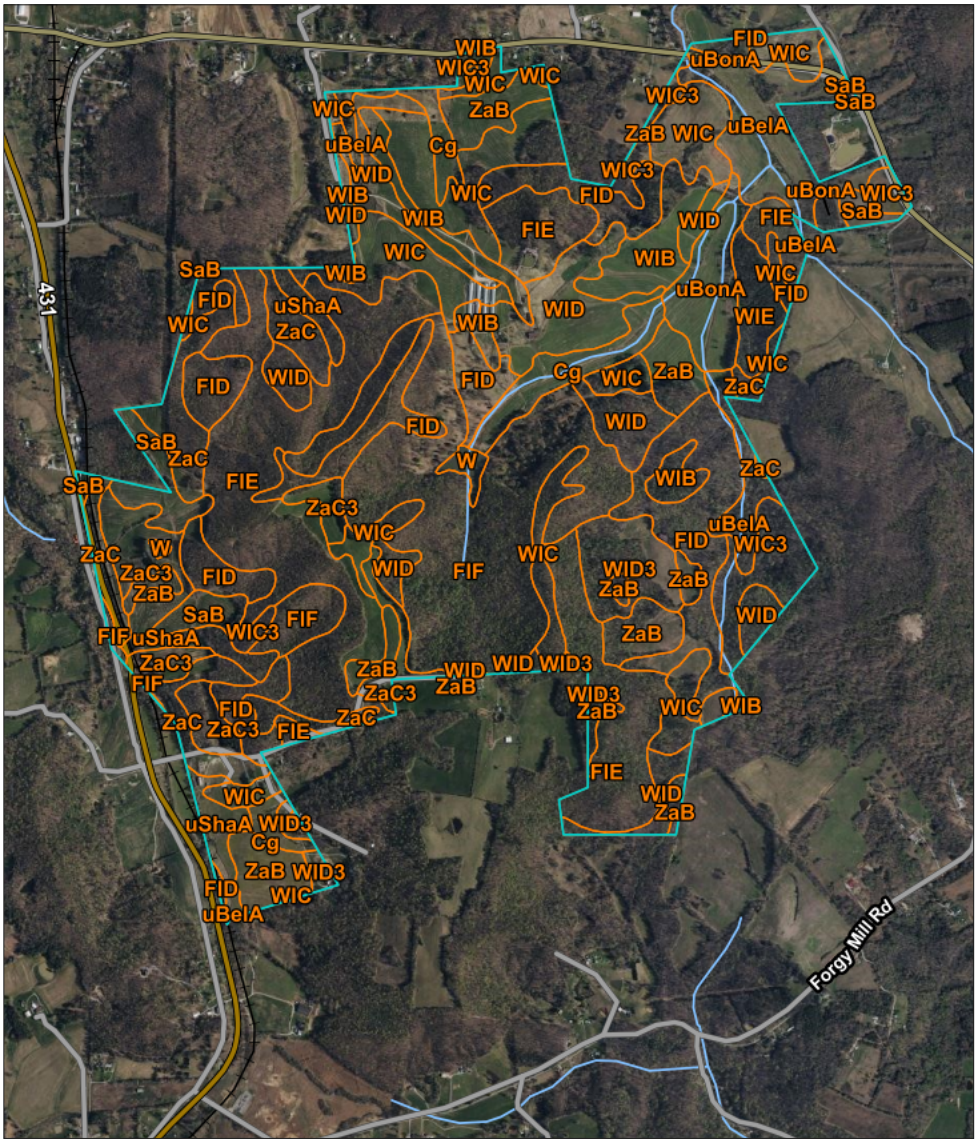

Figure 1. Web Soil Survey Map (from NRCS 2024)

Table 1. Summary of Web Soil Survey

Map Unit Symbol	Map Unit Name	USCS	Typical Profile	% of Project Area
Cg	Clifty Gravelly Silt Loam, 0-2% Slopes	CL	0-30" gravelly silt loam, and 30-80" gravelly loam	2.7
FID	Frondorf-Lenberg Loam, 12-20% slopes	CL	Frondorf: 0-20" silt loam, 20-32” channery silt loam, and 32-42" unweathered bedrock; Lenberg: 0-4” silt loam, 4-18” silt clay loam, 18-25” silty clay, 25-35” very gravelly silty clay, and 35-45” weathered bedrock	11.1
FIE	Frondorf-Lenberg Loam, 20-30% slopes	CL	Frondorf: 0-20" silt loam, 20-32” channery silt loam, and 32-42" unweathered bedrock; Lenberg: 0-4” silt loam, 4-18” silt clay loam, 18-25” silty clay, 25-35” very gravelly silty clay, and 35-45” weathered bedrock	16.5
FIF	Frondorf-Lenberg Loam, 30-50% slopes	CL	Frondorf: 0-20" silt loam, 20-32” channery silt loam, and 32-42" unweathered bedrock; Lenberg: 0-4” silt loam, 4-18” silt clay loam, 18-25” silty clay, 25-35” very gravelly silty clay, and 35-45” weathered bedrock	13.8
SaB	Sadler silt Loam, 2-6% slopes	CL	0-62" silt loam, 62-76” very gravelly fine sandy loam, and 76-86" bedrock	2.1
uBelA	Belknap Silt Loam, 0-2% slopes	CL	0-100" silt loam	5.2
uBonA	Bonnie Silt Loam, 0-2% slopes	CL	0-80" silt loam	2.6
uShaA	Sharon Silt Loam, 0-2% slopes	CL	0-80" silt loam	1.9
WIB	Wellston Silt Loam, 2-6% slopes	CL	0-40" silt loam, 40-52” loam, and 52-62” bedrock	4.4
WIC	Wellston Silt Loam, 6-12% slopes	CL	0-35" silt loam, 35-60” fine sandy loam, and 60-70” bedrock	10.9
WIC3	Wellston Silt Loam, 6-12% slopes	CL	0-40" silt loam, 40-52” loam, and 52-62” bedrock	2.9
WID	Wellston Silt Loam, 12-20% slopes	CL	0-35" silt loam, 35-60” fine sandy loam, and 60-70” bedrock	7.6
WID3	Wellston Silt Loam, 12-30% slopes	CL	0-3" silt loam, 3-25” silty clay loam, 25-60” fine sandy loam, and 60-70” bedrock	2.4
WIE	Wellston Silt Loam, 20-30% slopes	ML	0-30” silt loam, 30-52” loam, and 52-62” unweathered bedrock	1.2
ZaB	Zanesville Silt Loam, 2-6% slopes	CL	0-31" silt loam, and 31-68” silty clay loam	5.5
ZaC	Zanesville Silt Loam, 6-12% slopes	CL	0-50" silt loam, and 50-70” clay loam, and 70-80” bedrock	5.0
ZaC3	Zanesville Silt Loam, 6-12% slopes	CL	0-23" silt loam, 23-34” silty clay loam, 34-56” clay loam, and 56-66” bedrock	3.9

2.4 Bedrock Geology

The physiographic map of Kentucky (KGS 2001) indicates that the project site is located in the Western Kentucky Coal Field region. The project site is located close to the border of the Western Kentucky Coal Field and Mississippi Plateau, which is commonly marked by an escarpment of thick Pennsylvanian-age sandstones. According to the USGS Geologic Map of the Dunmor Quadrangle (as shown on KGS 2024), subsurface conditions are characteristic of Lower Pennsylvanian to Middle Pennsylvanian age bedrock, which consist of sandstone, shale, and coal in the project area. See Figure 3 in Appendix A for a map of the Soil and Bedrock Geology.

The Lost City solar site is underlain by the Tradewater and Caseyville bedrock formations, with primary lithology consisting of sandstone, shale, and coal. The upper sandstone is described as light to dark brown fine grained, commonly thin bedded and argillaceous (containing clay) and the sandstone is interbedded with and grades laterally into light- to dark-greenish gray shale. At least two poorly exposed thin lenticular coal beds range in thickness from 6 to 25 inches. Coal is interbedded with the shale, and is locally carbonaceous and overlies clay beds in places.

The middle sandstone layer is generally described as light- to dark-reddish brown, fine grained, iron-stained, massive, and thick-bedded. The middle sandstone layer may represent the upper part of the Caseyville Formation.

The lower part of the unit consists of sandstone, shale, and coal. The sandstone is light brown to tan fine grained, silty, argillaceous, thin-bedded bedrock layers and iron stained. This layer is interbedded with shale that is described as grayish black, soft, and commonly carbonaceous. Discontinuous coal beds are interbedded with shale and clay.

2.5 Land Use

The land use mapping (see Figure 4 in Appendix A) includes large area of deciduous forest and mixed forest, small areas of open water, grassland/herbaceous, and developed open space of low to medium intensity.

One area of open water near the central portion of the project site appears to be formed by a dam, which is not listed in the national dam inventory. Development near this area would require considerations of dam safety, and if development downstream would trigger the state dam safety regulator to reclassify the dam. Depending on dam classification, the state regulator may require regular inspections, maintenance, and filing of dam safety documentation.

Due to the large area covered in deciduous forest, clearing and grubbing may be a significant effort during development of the solar site.

2.6 Mining History

Coal mining features were reviewed from available layers from the Kentucky Mine Mapping Information System (KEEC 2024) and from the Kentucky Geologic Map Service (KGS 2024). No coal mining features

were identified directly within the project area based on the available mapping. See Figure 5 in Appendix A for the identified mining history observations. Mine maps were reviewed from inactive mines located approximately 2 miles to the northeast of the project site. Additional inactive coal mined out areas are located approximately 2 miles to the northwest of the project site. Many features associated with coal mining, including mine shafts, exploratory coal boreholes, strip mines, and mapped coal beds were found in the available mapping as close as about 3 miles north of the project area, but more prominently about 5 miles north of the project area. These areas are underlain more prominently by the Tradewater and Carbondale Formations than in the project area, which is underlain by the Caseyville and Tradewater Formation.

Two abandoned limestone mines were identified from mapping (KGS 2024) approximately 3 to 4 miles south of the project site near the towns of Hollow Bill and Diamond Springs. These appear to have targeted the alluvial deposits and Clore and Menard Limestone formations. No mapped mines were identified within the project area.

2.7 Karst Potential

Based on geologic mapping, no known karst areas or mapped sinkholes are located within the project site, although karst activity is prevalent in some areas of Western Kentucky. See Figure 6 in Appendix A. Most of the mapped karst locations and sinkholes are south/southeast of the project area. There are many reported karst locations and sinkholes along a path from Pembroke to Russellville to Bowling Green, Kentucky, in an area mapped as having intense karst potential in the Ste. Genevieve and St. Louis Limestone Formation. Moving north from there toward the project area, a karst prone formation of Chesterian age rocks is present. However, the project area is underlain by the non-karst potential Caseyville Formation (generally sandstone) according to the available mapping. The closest mapped sinkholes were noted to be approximately 8 miles east and south of the project area, near contacts between the Caseyville and Chesterian rock units. A contact between the Caseyville formation and the Chesterian age rocks is approximately half-mile south of the project area.

While the mapping suggests the project area is not prone to karst and does not indicate existing mapped sinkholes or karst features, some bedrock coring should be considered during a geotechnical exploration for the solar site, to verify the bedrock type/formation present, particularly near the southern extents of the project.

2.8 Landslide Susceptibility

According to the available mapping (KGS 2024), no landslide features are within the project area. However, based on the topography and some areas of steep slopes, the solar development should consider the slope stability near the existing ridges.

2.9 Seismic Activity

Seismicity within Kentucky varies widely depending on location. The Lost City project area is located within the western portion of the state, where seismicity is influenced by the New Madrid and Wabash

Valley source zones. These zones are relatively active with many documented historical seismic events (KGS 2014). According to the available mapping (KGS 2024), the Twin Tunnels fault system and other un-named faults are located approximately 2.5 miles north of the project area. See Figure 7 in Appendix A. These are typically downthrown faults and concealed faults. As reported in KGS (2014), a few magnitude 3 or greater earthquakes have occurred near the project area, and Muhlenberg County is in a zone of moderate influence from a seismic event on the New Madrid fault. The most recent seismic activity in the western portion of Kentucky was in 2016, when Ballard County experienced a magnitude 3.5 earthquake (KGS 2024a). The ASCE 7-22 Online Hazard Tool (ASCE 2024) indicates that the peak ground acceleration with the default soil classification is 0.24g (or 24% of the acceleration of gravity). This value should be revisited following a site-specific geotechnical exploration used to better estimate the seismic site classification. Resilience to seismic activity should be considered during project development.

2.10 Oil and Gas

Based on the geologic mapping (KGS 2024), there are about 45 oil and gas wells that have been drilled within an approximately one-mile radius of the project area. Many of these were reported as dry and abandoned. See Figure 8 in Appendix A for the Oil and Gas Wells map. Four of those dry and abandoned wells were located within the project area. The well logs within the project area reported the depth to the top of rock ranging from 21 to 26 feet and the type of surface bedrock encountered was typically sandstone. The Penrod East Gas Field is located to the northwest of the project site and Hunts School Oil Field to the east of the project site (KGS 2024).

2.11 Hydrogeology

Based on the geologic mapping, twenty-three water wells have been drilled within two-mile radius of the project footprint. Water wells near the project site were drilled to depths ranging from 9 to 403 feet. The well logs indicate a bedrock depth ranging from 2 to 30 feet. The material encountered was described as clay, sand, shale, coal, limestone, and sandstone. The logs indicate static water depth in the area ranges from 5 to 125 feet. See Figure 9 in Appendix A for the water well locations.

Of those water wells described above, four are within or adjacent to the project area. These four indicate depth to bedrock ranging from 2 to 14 feet, with static water level ranging from 72 to 97 feet deep.

As shown on Figure 3 in Appendix A, two existing bodies of water are within the project area. Based on aerial imagery and available mapping, tributary streams drain to and from these bodies of water. Additionally, as shown on Figure 9 in Appendix A, land categorized as FEMA Flood Zone A is located in the northeastern corner of the project area. Site development should consider the flood zone impacts, potential for wetlands, wet or saturated soils, or other similar conditions that may impact design.

3 Closing

3.1 Conclusions

The Lost City site is planned for use as a solar development. This desktop study documents the review of available online information that may be pertinent to the subsurface conditions in the project area. The conclusions below should be considered during future subsurface exploration and design phases of the project.

The web soil survey (NRCS 2024) includes commentary regarding corrosivity of soils, as well as use of sites for solar arrays. Most of the project area is rated as having low risk of corrosion to steel; however, portions of the site were described as having high potential for corrosion, particularly in the flatter areas. See Figure 2 for a generalized site boundary, where green represents low risk of steel corrosion, yellow is moderate risk, and red is high risk. The risk of corrosion is rated based on soil moisture, particle-size distribution, acidity, and electrical conductivity of soil. This could impact the considerations for foundations such as steel H-piles or helical piles. Future exploration and laboratory testing for the site should include corrosivity testing of the soils.

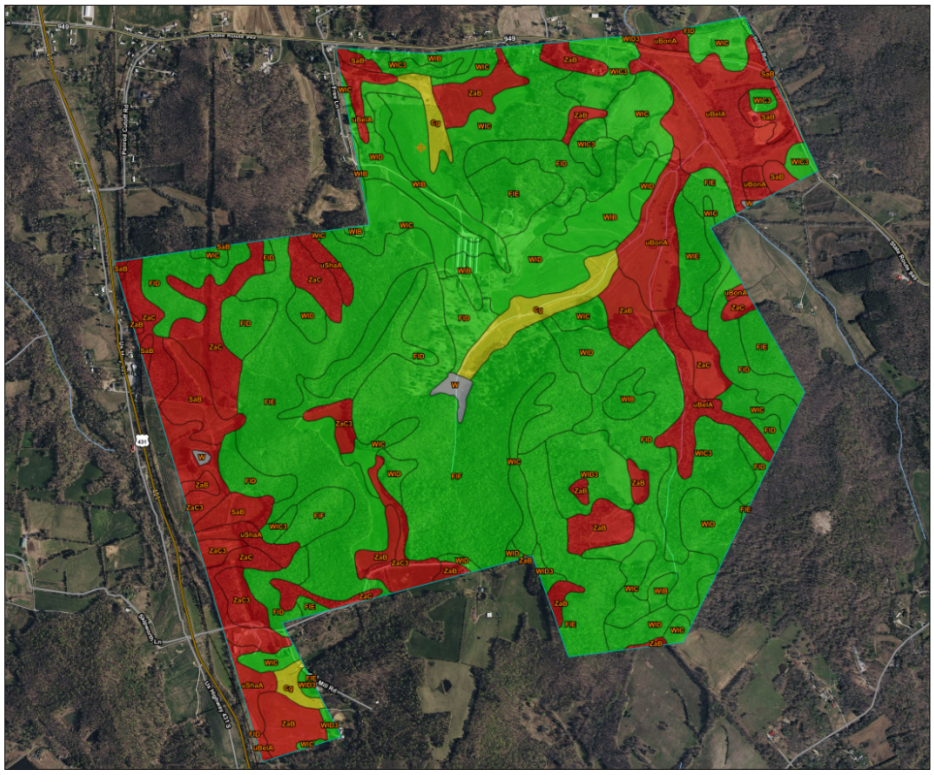

Figure 2. Corrosion of Steel Rating (from NRCS 2024)

According to the web soil survey (NRCS 2024), the project area is rated as very limited for use as solar arrays for both ballast anchor systems and soil-based anchor systems. The rating is based on flooding, frost action, slope, depth to bedrock, and in some cases, corrosion of steel and low strength. As the project advances, these site characteristics should be considered during siting of the solar arrays and for foundation design.

Overall, steep slopes and shallow depth to bedrock would be subsurface conditions to explore, confirm, and consider during design of the proposed solar site. Subsurface explorations should consider bedrock soundings to evaluate depth to the top of rock for consideration in foundation design. In areas of very shallow bedrock of less than approximately 8 to 10 feet, driven or helical piles may not be able to be installed to required depths using conventional construction methods. Pre-boring of piles into bedrock and backfilling with lean concrete may be necessary.

Development near the existing dam in the central area of the site may require coordination with state dam safety regulators and additional studies or documentation regarding impacts and risks to the dam. The site is near to the Twin Tunnels fault system, and within the influence area of the larger New Madrid Fault. Potential for seismic impacts to the soils, solar arrays, and other infrastructure for the site should be evaluated during design.

From the existing mapping, it appears that the bedrock below the site is not prone to karst conditions, however a mapped contact with a prone bedrock unit is within about ½ mile to the south of the project area. Some bedrock coring may be warranted during future exploration to verify the bedrock type and evaluate karst susceptibility.

3.2 Limitations

This geotechnical desktop study is based on Stantec's current understanding of the project area limits and the publicly available information cited. Locations and details regarding the planned structures, foundations, access roads, utilities, or other project information were not known at the time of this study. Stantec looks forward to supporting Lost City Renewables LLC with this project during future design phases.

3.3 References

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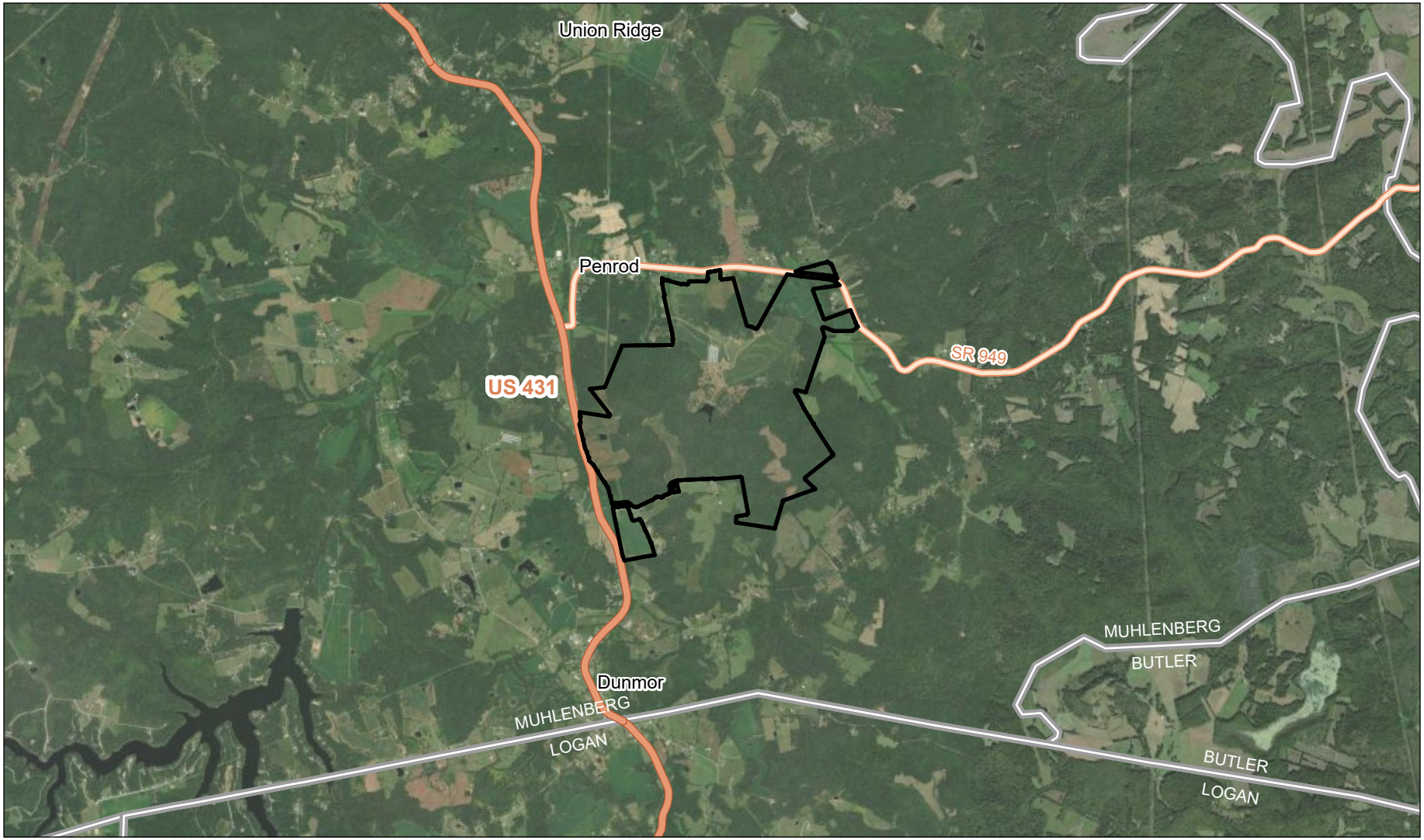
Natural Resources Conservation Service (NRCS). 2024. United States Department of Agriculture. Web Soil Survey. Available online at https://websoilsurvey.sc.egov.usda.gov/. (Accessed April 2024).

APPENDIX A
GIS MAPS



Legend

Project Location

County Boundary

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US

2. Data Sources: Lost City Solar

3. Background: ESRI

Stantec

Project Location

Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project

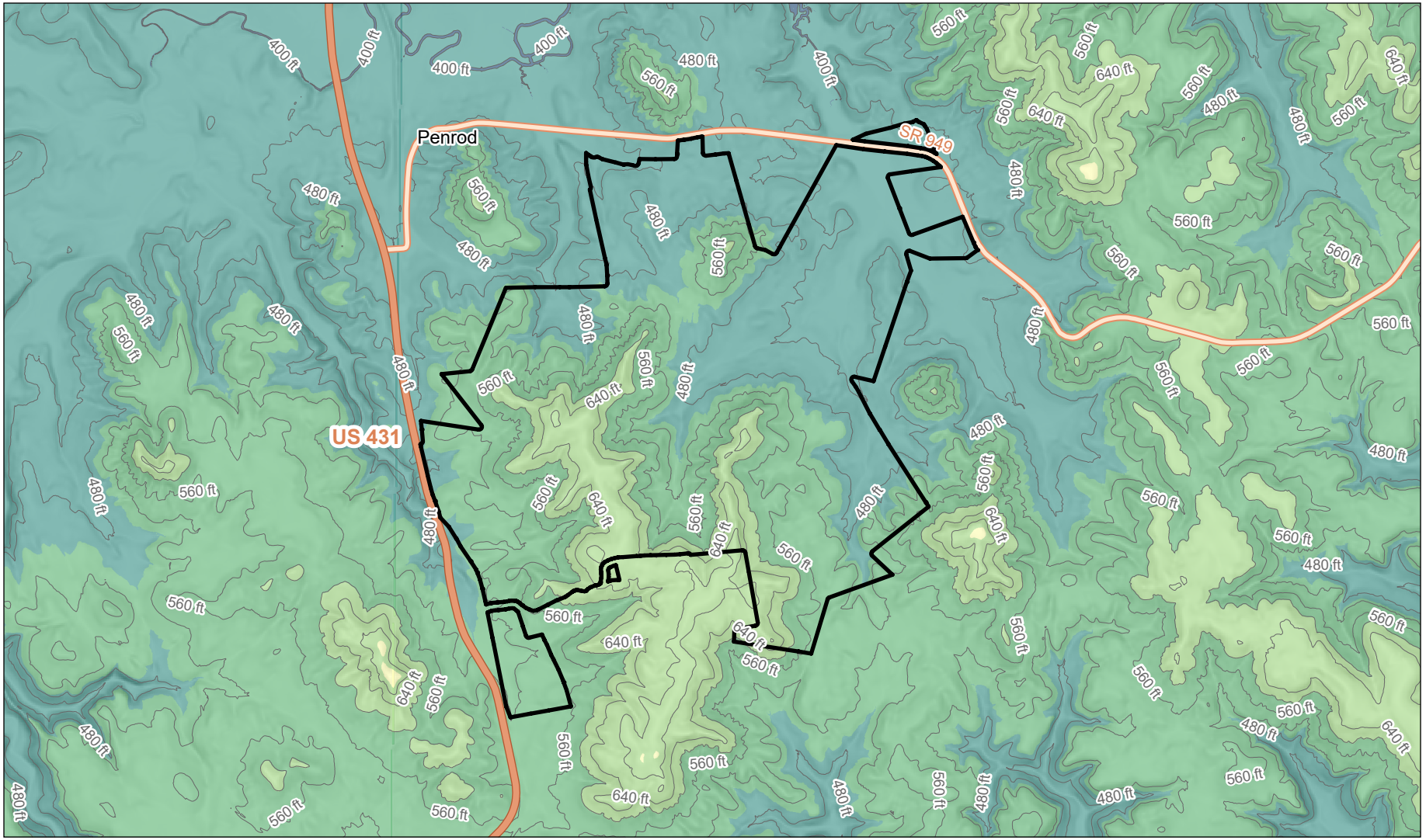
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.

1

Title

Project Overview



Legend

Project Location

Elevation

- < 400 ft
- > 400 - 500 ft
- > 500 - 600 ft
- > 600 - 700 ft
- > 700 - 800 ft

N

0 0.25 0.5 Miles

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US

2. Data Sources: KyGovMaps; KyTopo

3. Background: ESRI

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Project Location

Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project

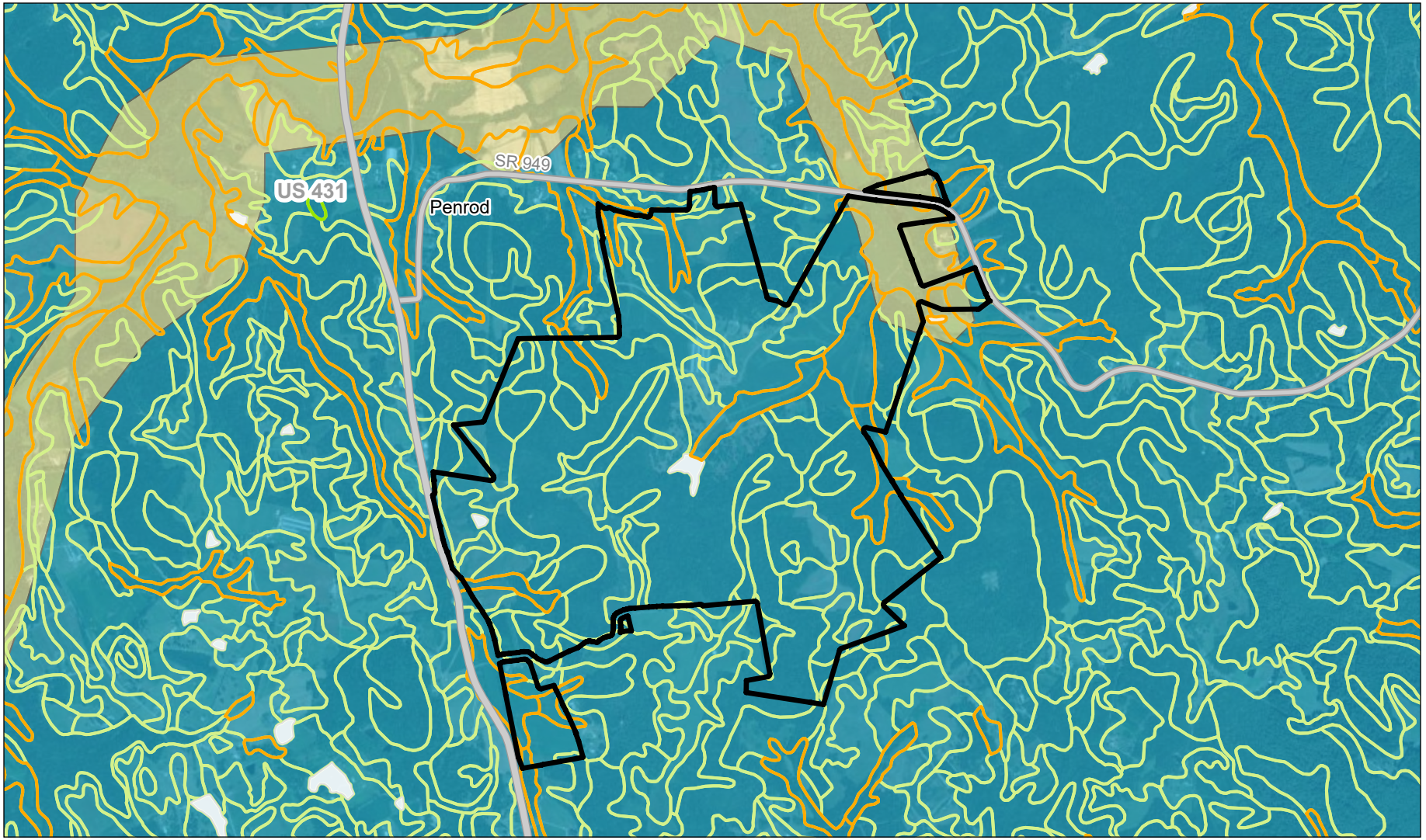
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.

2

Title

Topography



Legend

Project Location

General Geology

Qal - Alluvium

Ptc - Tradewater and Caseyville Formations

Dominant Soil Order

Alfisols - moderately leached with relatively high fertility; formed under forest

Bodies of Water

Entisols - - little or no evidence of horizon development; many are sandy or shallow

Inceptisols - from semiarid to humid environments; moderately weathered

N

0 0.25 0.5 Miles

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US

2. Data Sources: NRCS; Kentucky Geological Survey

3. Background: ESRI

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Project Location

Muhlenberg County, Kentucky

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Client/Project

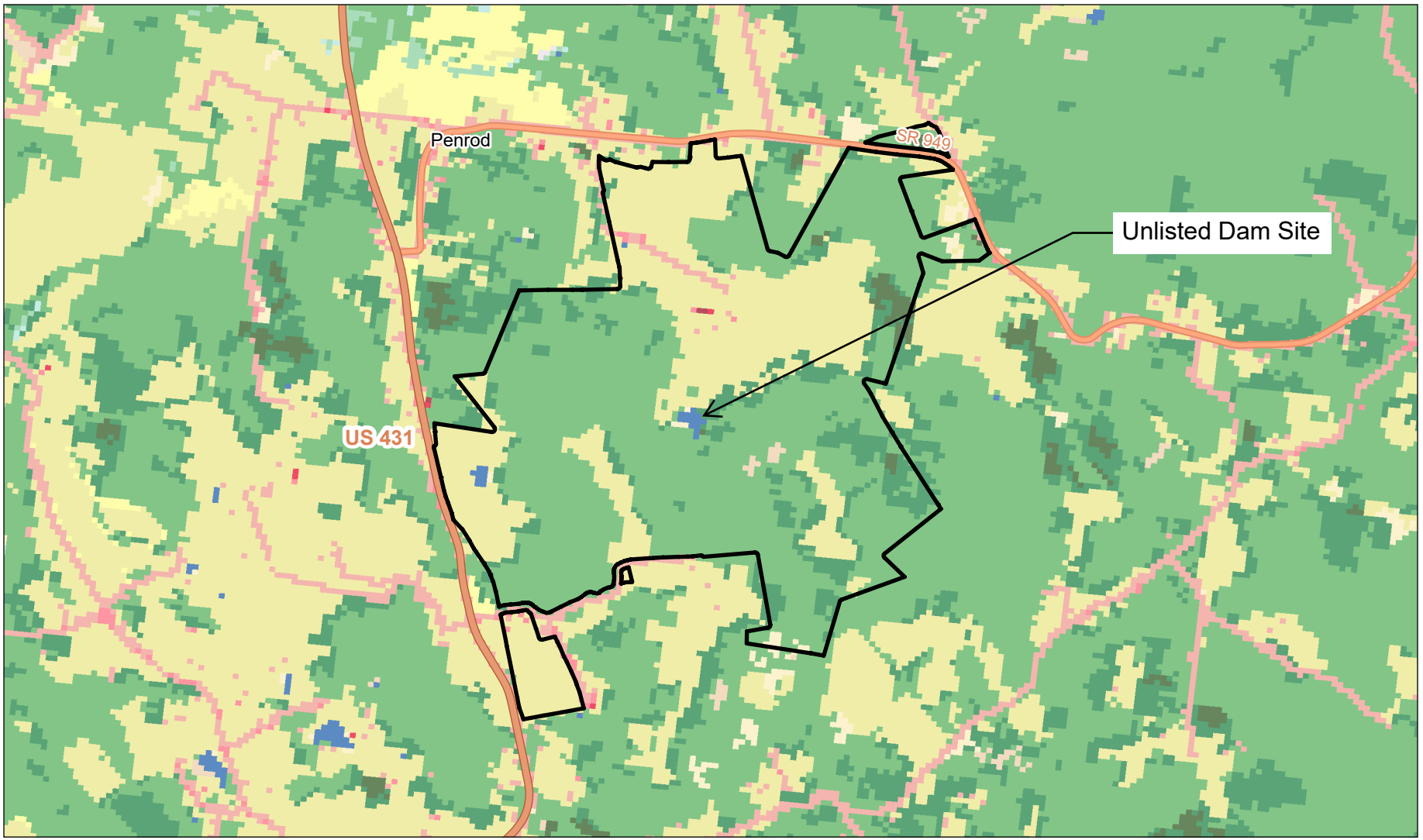
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.

3

Title

Soil and Bedrock Geology



Legend

- Project Location
- Open Water
- Perennial Snow/Ice
- Developed Open Space
- Developed Low Intensity
- Developed Medium Intensity
- Developed High Intensity
- Barren Land
- Deciduous Forest
- Evergreen Forest
- Mixed Forest
- Dwarf Scrub
- Shrub/Scrub
- Grassland/ Herbaceous
- Sedge/Herbaceous
- Lichens
- Moss
- Pasture/Hay
- Cultivated Crops
- Woody Wetlands
- Emergent Herbaceous Wetlands

N

0 0.25 0.5 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US
2. Data Sources: USA NLCD
3. Background: ESRI

Stantec

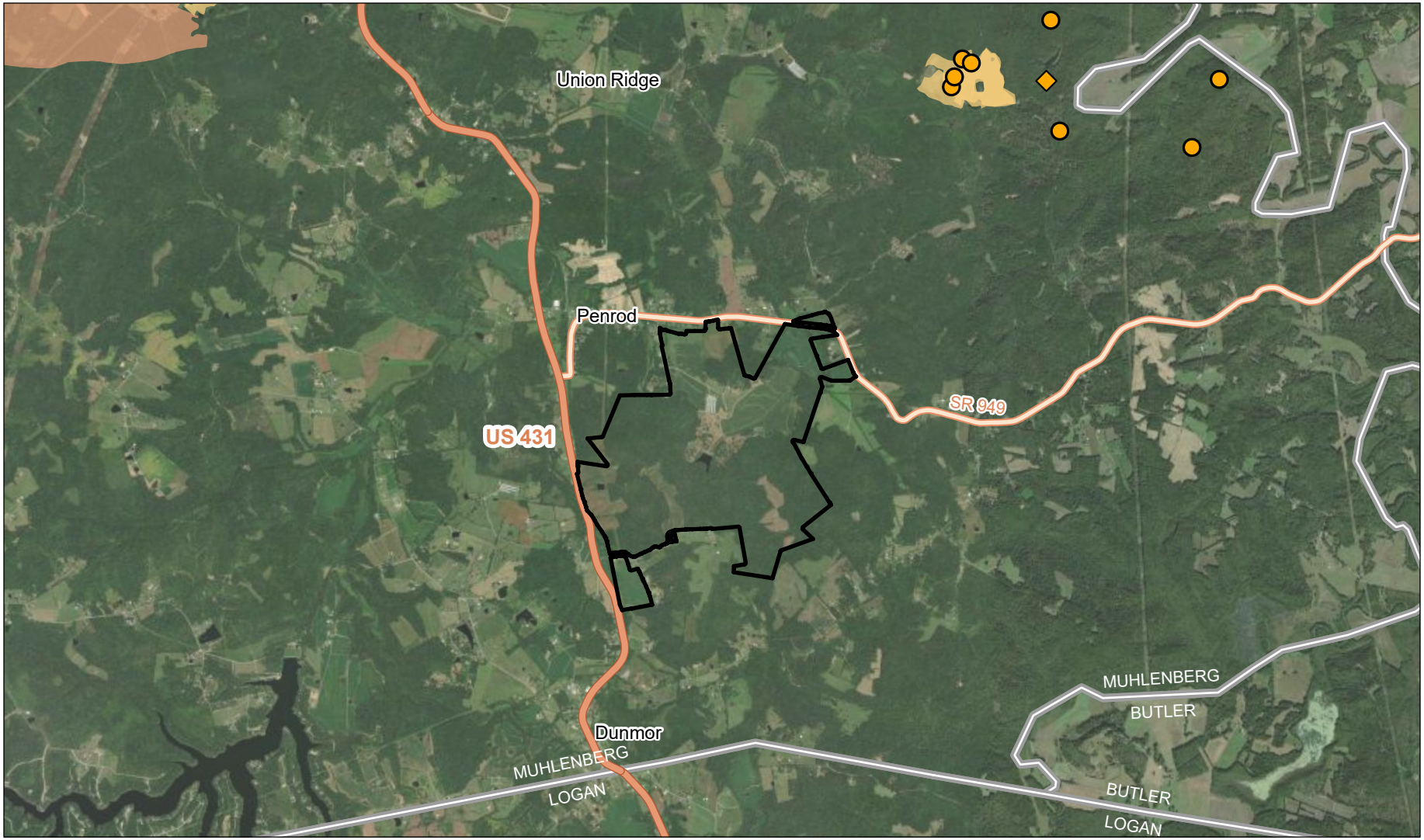
Project Location
Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.
4

Title
Land Use Mapping



Legend

- Project Location
- County Boundary
- Borehole
- Shaft
- Permitted Mine Boundaries
- Underground Mined Out Areas

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US

2. Data Sources: Kentucky Mine Mapping Information System; Kentucky Geological Survey; KyGov OpenData

3. Background: ESRI

Stantec

Project Location

Muhlenberg County, Kentucky

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Project: Lost City Solar Site
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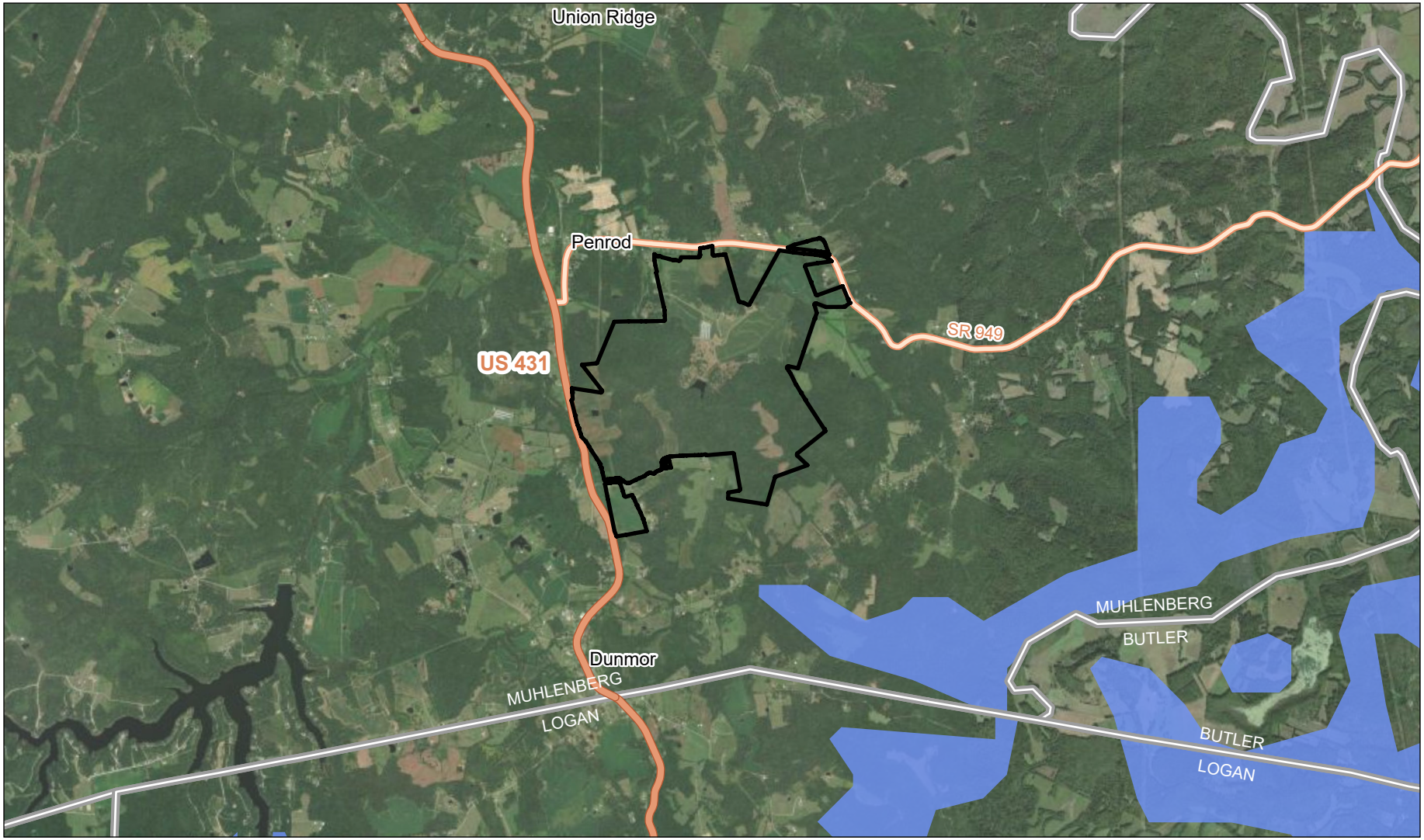
Figure No.

5

Title

Mining Activity



Legend

- Project Location
- County Boundary
- Prone - Karst Potential

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US
2. Data Sources: Kentucky Geological Survey
3. Background: ESRI

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Project Location
Muhlenberg County, Kentucky

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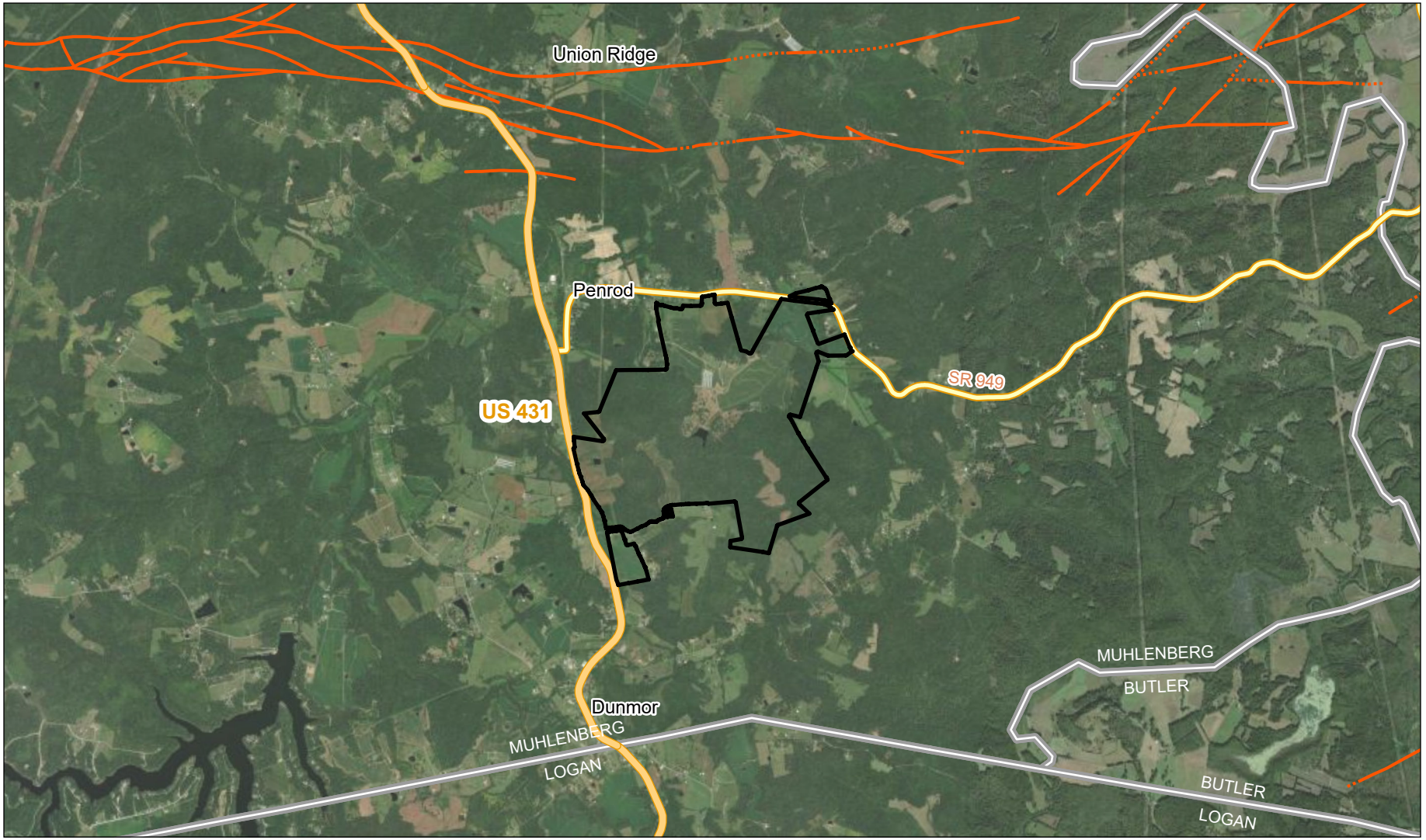
Report: Geotechnical Desktop Study

Figure No.
6

Title
Karst Potential



Legend

Project Location

Geologic Faults

Fault - Concealed

Fault

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US

2. Data Sources: Kentucky Geological Survey

3. Background: ESRI

Stantec

Project Location

Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project

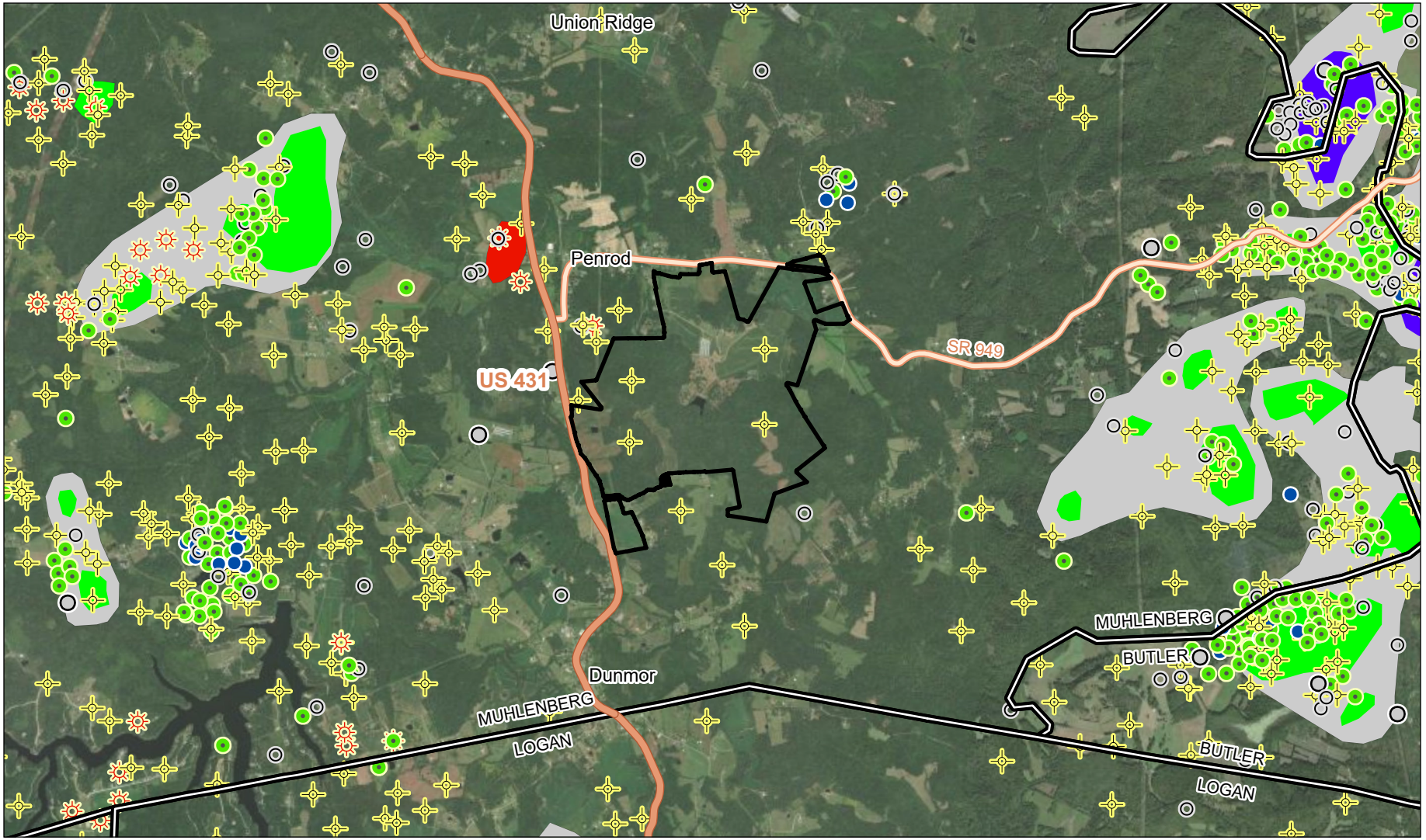
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.

7

Title

Faults and Earthquake Activity



Legend

- Project Location
- County Boundary

KY Oil and Gas Wells

- Service or Secondary Recovery Well
- Dry and Abandoned Well
- Gas Well
- Location
- Oil Well
- Other Well

KY Oil and Gas Fields

- Oil
- Gas
- Waterflood
- Consolidated

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US
2. Data Sources: Kentucky Geological Survey
3. Background: ESRI

Stantec

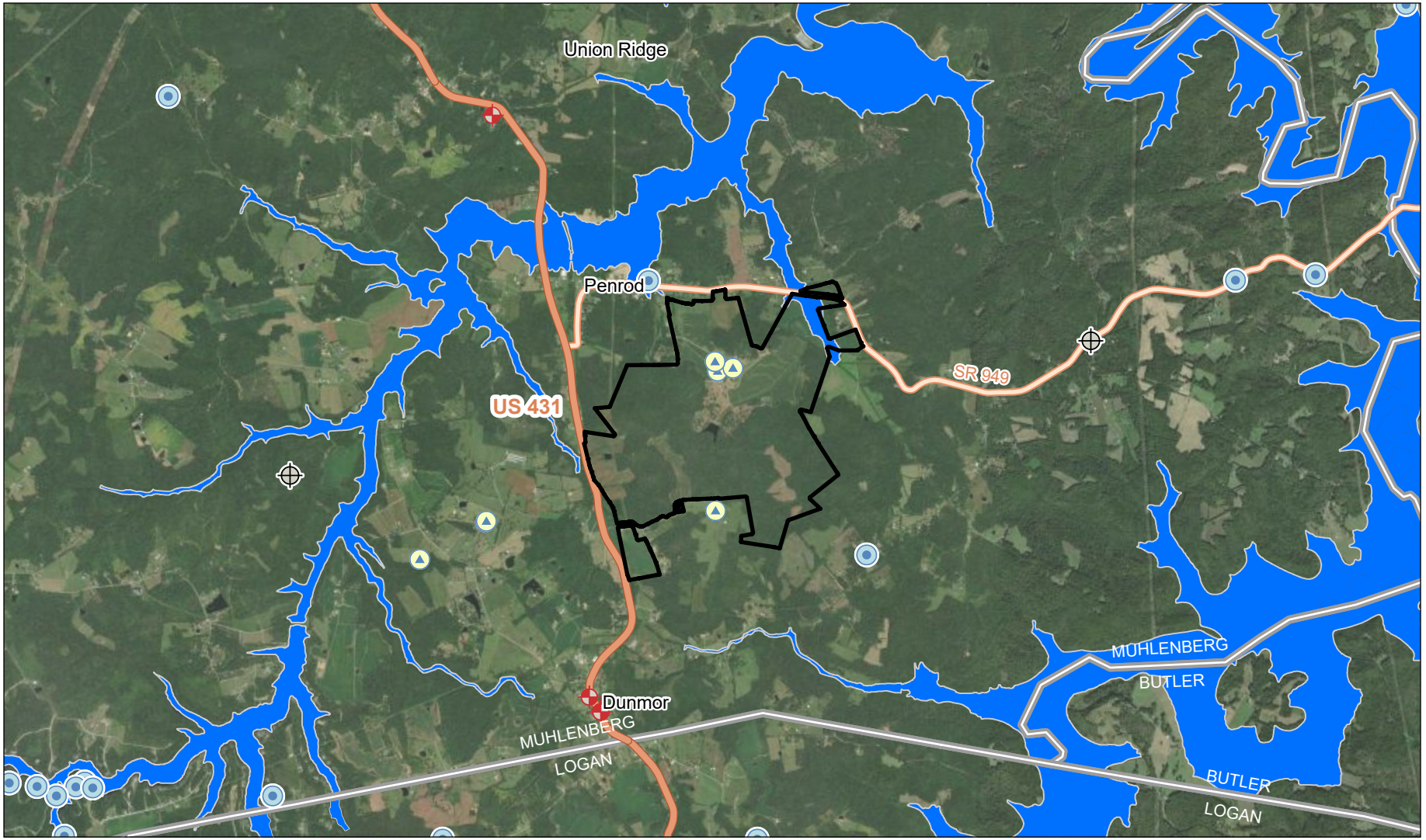
Project Location
Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.
8

Title
Oil and Gas Wells



Legend

- Project Location
- County Boundary

Flood Zone

- A
- X

Water Wells

- Other
- Domestic
- Agriculture
- Monitoring

N

0 0.5 1 Mile

(At original document size of 8.5x11)

Notes

1. Coordinate System: NAD 1983 2011 StatePlane Kentucky South FIPS 1602 Ft US
2. Data Sources: FEMA; Kentucky Geological Survey
3. Background: ESRI

Stantec

Project Location
Muhlenberg County, Kentucky

Prepared by JBS on 4/18/2024
IR by KB on 4/18/2024

Client/Project
Client: Lost City Renewables LLC
Project: Lost City Solar Site
Report: Geotechnical Desktop Study

Figure No.
9

Title
Federal Emergency Management Agency (FEMA) Flood Insurance Map

APPENDIX B
WEB SOIL SURVEY REPORT

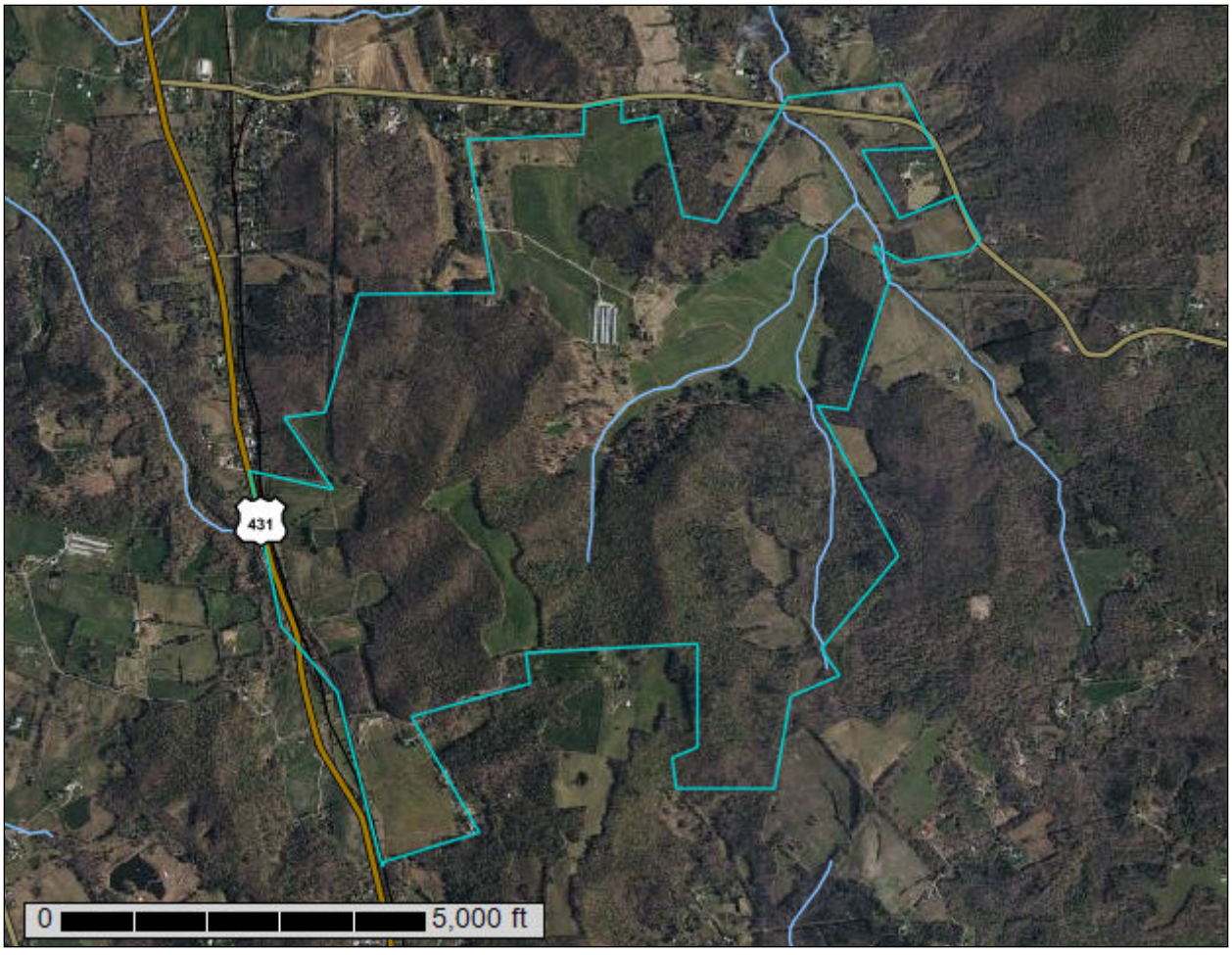
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for McLean and Muhlenberg Counties, Kentucky



April 10, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

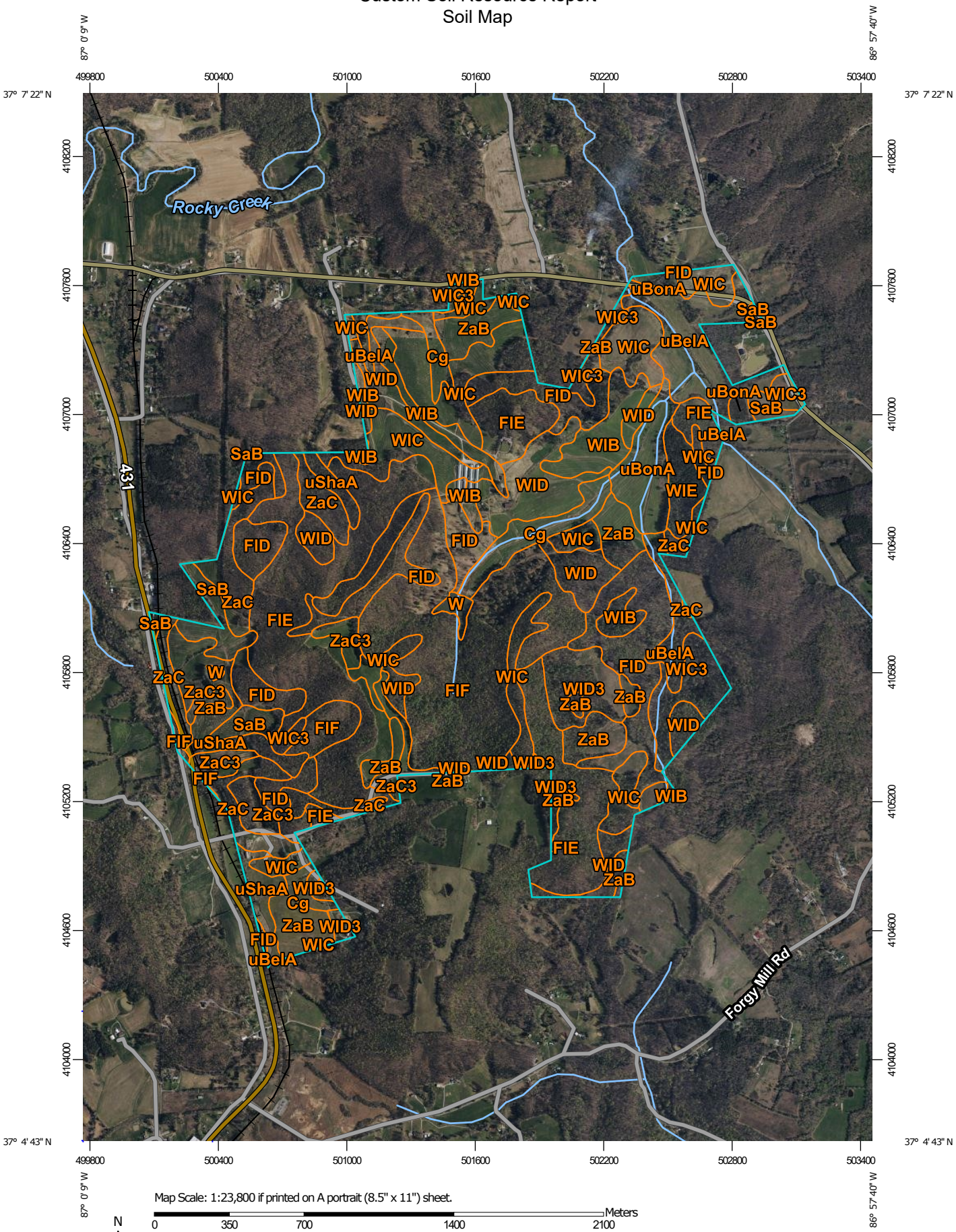
Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.


87° 0' 9" W
86° 57' 40" W
37° 7' 22" N
37° 4' 43" N
499800
500400
501000
501600
502200
502800
503400
4108200
4107600
4107000
4106400
4105800
4105200
4104600
4104000
Rocky Creek
431
Forgy Mill Rd
WIB
WIC3
WIC
ZaB
uBelA
Cg
WID
FID
uBonA
SaB
FIE
uShaA
ZaC
W
ZaC3
FIF
WID3
N
Map Scale: 1:23,800 if printed on A portrait (8.5" x 11") sheet.
Meters
0
350
700
1400
2100
Feet
0
1000
2000
4000
6000
Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 16N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: McLean and Muhlenberg Counties, Kentucky
Survey Area Data: Version 21, Sep 10, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 10, 2023—Apr 12, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cg	Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded	35.4	2.7%
FlD	Frondorf-Lenberg complex, 12 to 20 percent slopes	148.0	11.1%
FlE	Frondorf-Lenberg complex, 20 to 30 percent slopes	220.0	16.5%
FlF	Frondorf-Lenberg complex, 30 to 50 percent slopes	184.3	13.8%
SaB	Sadler silt loam, 2 to 6 percent slopes	28.6	2.1%
uBelA	Belknap silt loam, 0 to 2 percent slopes, occasionally flooded	69.6	5.2%
uBonA	Bonnie silt loam, 0 to 2 percent slopes, occasionally flooded	35.3	2.6%
uShaA	Sharon silt loam, 0 to 2 percent slopes, occasionally flooded	25.6	1.9%
W	Water	4.9	0.4%
WlB	Wellston silt loam, 2 to 6 percent slopes	58.2	4.4%
WlC	Wellston silt loam, 6 to 12 percent slopes	146.2	10.9%
WlC3	Wellston silt loam, 6 to 12 percent slopes, severely eroded	39.3	2.9%
WlD	Wellston silt loam, 12 to 20 percent slopes	101.6	7.6%
WlD3	Wellston silt loam, 12 to 30 percent slopes, severely eroded	31.6	2.4%
WlE	Wellston silt loam, 20 to 30 percent slopes	16.0	1.2%
ZaB	Zanesville silt loam, 2 to 6 percent slopes	73.4	5.5%
ZaC	Zanesville silt loam, 6 to 12 percent slopes	66.2	5.0%
ZaC3	Zanesville silt loam, 6 to 12 percent slopes, severely eroded	52.6	3.9%
Totals for Area of Interest		**1,336.9**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas

shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

McLean and Muhlenberg Counties, Kentucky

Cg—Clifty gravelly silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2r14j
Elevation: 380 to 760 feet
Mean annual precipitation: 38 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 154 to 212 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Clifty, occasionally flooded, and similar soils: 86 percent
Minor components: 14 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Clifty, Occasionally Flooded

Setting

Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid fine-loamy alluvium

Typical profile

Ap - 0 to 8 inches: gravelly silt loam
Bw - 8 to 30 inches: gravelly silt loam
C - 30 to 80 inches: gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (2.00 to 6.00 in/hr)
Depth to water table: About 60 to 80 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2s
Hydrologic Soil Group: A
Ecological site: F120AY015KY - Loamy Alluvial Headwaters
Hydric soil rating: No

Minor Components

Skidmore, occasionally flooded

Percent of map unit: 6 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear

Hydric soil rating: No

Blackford, occasionally flooded

Percent of map unit: 4 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Cuba, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Sharon, occasionally flooded

Percent of map unit: 2 percent
Landform: Flood plains
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

FID—Frondorf-Lenberg complex, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: lhgd
Elevation: 360 to 760 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf and similar soils: 45 percent
Lenberg and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Thin fine-loamy noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

H1 - 0 to 20 inches: silt loam
H2 - 20 to 32 inches: channery silt loam
R - 32 to 42 inches: unweathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 18 inches: silty clay loam
H3 - 18 to 25 inches: silty clay
H4 - 25 to 35 inches: very gravelly silty clay
Cr - 35 to 45 inches: weathered bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C

Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston
Percent of map unit: 10 percent
Hydric soil rating: No

Other soils
Percent of map unit: 10 percent
Hydric soil rating: No

FIE—Frondorf-Lenberg complex, 20 to 30 percent slopes

Map Unit Setting
National map unit symbol: lhgf
Elevation: 360 to 760 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition
Frondorf and similar soils: 45 percent
Lenberg and similar soils: 35 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-loamy noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile
H1 - 0 to 20 inches: silt loam
H2 - 20 to 32 inches: channery silt loam
R - 32 to 42 inches: unweathered bedrock

Properties and qualities
Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 18 inches: silty clay loam
H3 - 18 to 25 inches: silty clay
H4 - 25 to 35 inches: very gravelly silty clay
Cr - 35 to 45 inches: weathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent

Hydric soil rating: No

Zanesville

Percent of map unit: 5 percent
Hydric soil rating: No

Collins

Percent of map unit: 3 percent
Hydric soil rating: No

Clifty

Percent of map unit: 2 percent
Hydric soil rating: No

FIF—Frondorf-Lenberg complex, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: lhgg
Elevation: 350 to 730 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Frondorf and similar soils: 45 percent
Lenberg and similar soils: 20 percent
Minor components: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Frondorf

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-loamy noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

H1 - 0 to 20 inches: silt loam
H2 - 20 to 32 inches: channery silt loam
R - 32 to 42 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Description of Lenberg

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Clayey residuum weathered from acid shale

Typical profile

H1 - 0 to 4 inches: silt loam
H2 - 4 to 18 inches: silty clay loam
H3 - 18 to 25 inches: silty clay
H4 - 25 to 35 inches: very gravelly silty clay
Cr - 35 to 45 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: C
Ecological site: F120AY005KY - Moderately Deep Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Wellston

Percent of map unit: 10 percent
Hydric soil rating: No

Zanesville

Percent of map unit: 10 percent

Hydric soil rating: No

Clifty

Percent of map unit: 5 percent
Hydric soil rating: No

Collins

Percent of map unit: 5 percent
Hydric soil rating: No

Other soils

Percent of map unit: 5 percent
Hydric soil rating: No

SaB—Sadler silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2vtzl
Elevation: 360 to 990 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sadler and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sadler

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 20 inches: silt loam
E/B - 20 to 24 inches: silt loam
2Btx - 24 to 62 inches: silt loam
2C - 62 to 76 inches: very gravelly fine sandy loam
2R - 76 to 86 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: 22 to 31 inches to fragipan; 72 to 80 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 19 to 28 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 7 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 4 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Robbs

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

uBelA—Belknap silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2s2cn

Elevation: 300 to 700 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 164 to 240 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Belknap, occasionally flooded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Belknap, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid coarse-silty alluvium

Typical profile

Ap - 0 to 3 inches: silt loam
Bw - 3 to 9 inches: silt loam
Bg - 9 to 77 inches: silt loam
BCg - 77 to 100 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: B/D
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Wakeland, occasionally flooded

Percent of map unit: 6 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bonnie, occasionally flooded

Percent of map unit: 4 percent

Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Sharon, occasionally flooded
Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Stendal, occasionally flooded
Percent of map unit: 4 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Belknap, frequently (hydric)
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: Yes

uBonA—Bonnie silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting
National map unit symbol: 2vp3j
Elevation: 310 to 820 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 164 to 240 days
Farmland classification: Prime farmland if drained

Map Unit Composition
Bonnie, occasionally flooded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonnie, Occasionally Flooded

Setting
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave

Across-slope shape: Linear
Parent material: Acid fine-silty alluvium

Typical profile

Ap - 0 to 8 inches: silt loam
Bg - 8 to 38 inches: silt loam
Cg - 38 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.60 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C/D
Ecological site: F120AY020KY - Wet Alluvial Flats
Hydric soil rating: Yes

Minor Components

Belknap, occasionally flooded

Percent of map unit: 9 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Melvin, occasionally flooded

Percent of map unit: 8 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

Piopolis, occasionally flooded

Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Concave
Across-slope shape: Concave
Hydric soil rating: Yes

uShaA—Sharon silt loam, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

National map unit symbol: 2wltv
Elevation: 330 to 690 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 45 to 69 degrees F
Frost-free period: 164 to 240 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Sharon, occasionally flooded, and similar soils: 80 percent
Minor components: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sharon, Occasionally Flooded

Setting

Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Acid coarse-silty alluvium

Typical profile

Ap - 0 to 7 inches: silt loam
Bw - 7 to 80 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Negligible
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: About 20 to 36 inches
Frequency of flooding: Occasional
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very high (about 13.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Ecological site: F120AY019KY - Moist Silty Alluvium
Hydric soil rating: No

Minor Components

Belknap, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Talf
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Blackford, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Wilbur, occasionally flooded
Percent of map unit: 5 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Pope, occasionally flooded
Percent of map unit: 3 percent
Landform: Flood plains
Landform position (three-dimensional): Rise
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Bonnie, occasionally flooded
Percent of map unit: 2 percent
Landform: Flood plains
Landform position (three-dimensional): Dip
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: Yes

W—Water

Map Unit Setting
National map unit symbol: lhhb
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Water: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

WlB—Wellston silt loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 2wlvj
Elevation: 380 to 960 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Wellston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 40 inches: silt loam
2C - 40 to 52 inches: loam
2R - 52 to 62 inches: bedrock

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B

Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville
Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf
Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg
Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

WlC—Wellston silt loam, 6 to 12 percent slopes

Map Unit Setting
National map unit symbol: 2vtzy
Elevation: 330 to 1,160 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 68 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Wellston and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 35 inches: silt loam
2C - 35 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville

Percent of map unit: 4 percent
Landform: Ridges
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Frondorf

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg

Percent of map unit: 3 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

WIC3—Wellston silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2wv4t
Elevation: 360 to 940 feet
Mean annual precipitation: 30 to 58 inches
Mean annual air temperature: 41 to 69 degrees F
Frost-free period: 141 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 2 inches: silt loam
Bt - 2 to 40 inches: silt loam
2C - 40 to 52 inches: loam
2R - 52 to 62 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 40 to 69 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120BY007IN - Deep Well Drained Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Zanesville, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Rosine, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Gilpin, severely eroded

Percent of map unit: 3 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Trees/Timber (Woody Vegetation)
Hydric soil rating: No

Lenberg, severely eroded

Percent of map unit: 2 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

WID—Wellston silt loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 2wh3r
Elevation: 350 to 830 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 215 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 35 inches: silt loam
2C - 35 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Frondorf

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Lenberg

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Zanesville

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

WlD3—Wellston silt loam, 12 to 30 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 2vtzw
Elevation: 350 to 830 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston, Severely Eroded

Setting

Landform: Hills
Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

A - 0 to 3 inches: silt loam
Bt - 3 to 25 inches: silty clay loam
2C - 25 to 60 inches: fine sandy loam
2R - 60 to 70 inches: bedrock

Properties and qualities

Slope: 12 to 30 percent
Depth to restrictive feature: 49 to 74 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 to 0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Lenberg, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Other vegetative classification: Deep Well Drained Upland Soils >12% (PHG-6)
Hydric soil rating: No

Zanesville, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Shoulder
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Frondorf, severely eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope

Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

WlE—Wellston silt loam, 20 to 30 percent slopes

Map Unit Setting

National map unit symbol: lhhm
Elevation: 350 to 660 feet
Mean annual precipitation: 30 to 55 inches
Mean annual air temperature: 46 to 68 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Not prime farmland

Map Unit Composition

Wellston and similar soils: 70 percent
Minor components: 30 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wellston

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

H1 - 0 to 8 inches: silt loam
H2 - 8 to 30 inches: silt loam
H3 - 30 to 52 inches: loam
R - 52 to 62 inches: unweathered bedrock

Properties and qualities

Slope: 20 to 30 percent
Depth to restrictive feature: 40 to 72 inches to lithic bedrock
Drainage class: Well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.60 to 2.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B
Ecological site: F120AY004KY - Loess Veneered Sandstone-Shale Uplands
Hydric soil rating: No

Minor Components

Alluvial soils
Percent of map unit: 5 percent
Hydric soil rating: No

Frondorf
Percent of map unit: 5 percent
Hydric soil rating: No

Lenberg
Percent of map unit: 5 percent
Hydric soil rating: No

Loring
Percent of map unit: 5 percent
Hydric soil rating: No

Memphis
Percent of map unit: 5 percent
Hydric soil rating: No

Other upland soils
Percent of map unit: 5 percent
Hydric soil rating: No

ZaB—Zanesville silt loam, 2 to 6 percent slopes

Map Unit Setting
National map unit symbol: 2s2cp
Elevation: 350 to 670 feet
Mean annual precipitation: 30 to 60 inches
Mean annual air temperature: 44 to 69 degrees F
Frost-free period: 157 to 213 days
Farmland classification: All areas are prime farmland

Map Unit Composition
Zanesville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear

Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and shale

Typical profile

Ap - 0 to 7 inches: silt loam
Bt - 7 to 31 inches: silt loam
Btx - 31 to 39 inches: silty clay loam
2C - 39 to 68 inches: silty clay loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: 24 to 32 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Hosmer

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Sadler

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

Wellston

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

ZaC—Zanesville silt loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 2s2cr
Elevation: 330 to 910 feet
Mean annual precipitation: 30 to 61 inches
Mean annual air temperature: 44 to 70 degrees F
Frost-free period: 168 to 212 days
Farmland classification: Farmland of statewide importance

Map Unit Composition

Zanesville and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 8 inches: silt loam
Bt - 8 to 30 inches: silt loam
Btx - 30 to 50 inches: silt loam
2C - 50 to 70 inches: clay loam
R - 70 to 80 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 24 to 32 inches to fragipan; 40 to 79 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 21 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: C

Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Wellston
Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Hydric soil rating: No

Hosmer
Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Convex
Other vegetative classification: Moderately Well Drained Soils With a Fragipan (PHG-11)
Hydric soil rating: No

Sadler
Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

ZaC3—Zanesville silt loam, 6 to 12 percent slopes, severely eroded

Map Unit Setting
National map unit symbol: 2s2ct
Elevation: 320 to 970 feet
Mean annual precipitation: 30 to 61 inches
Mean annual air temperature: 42 to 70 degrees F
Frost-free period: 154 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition
Zanesville, severely eroded, and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Zanesville, Severely Eroded

Setting

Landform: Ridges
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear
Parent material: Thin fine-silty noncalcareous loess over loamy residuum weathered from sandstone and siltstone

Typical profile

Ap - 0 to 4 inches: silt loam
Bt - 4 to 23 inches: silt loam
Btx - 23 to 34 inches: silty clay loam
2C - 34 to 56 inches: clay loam
R - 56 to 66 inches: bedrock

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: 20 to 28 inches to fragipan; 38 to 75 inches to lithic bedrock
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.13 in/hr)
Depth to water table: About 17 to 26 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 4.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: C/D
Ecological site: F120AY002KY - Fragipan Uplands
Hydric soil rating: No

Minor Components

Wellston, severely eroded

Percent of map unit: 5 percent
Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Hydric soil rating: No

Hosmer, severely eroded

Percent of map unit: 5 percent
Landform: Loess hills
Landform position (two-dimensional): Shoulder, backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Convex
Across-slope shape: Linear

Other vegetative classification: Severely Eroded Soils (PHG-10)
Hydric soil rating: No

Sadler, eroded

Percent of map unit: 5 percent
Landform: Ridges
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Linear
Hydric soil rating: No

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