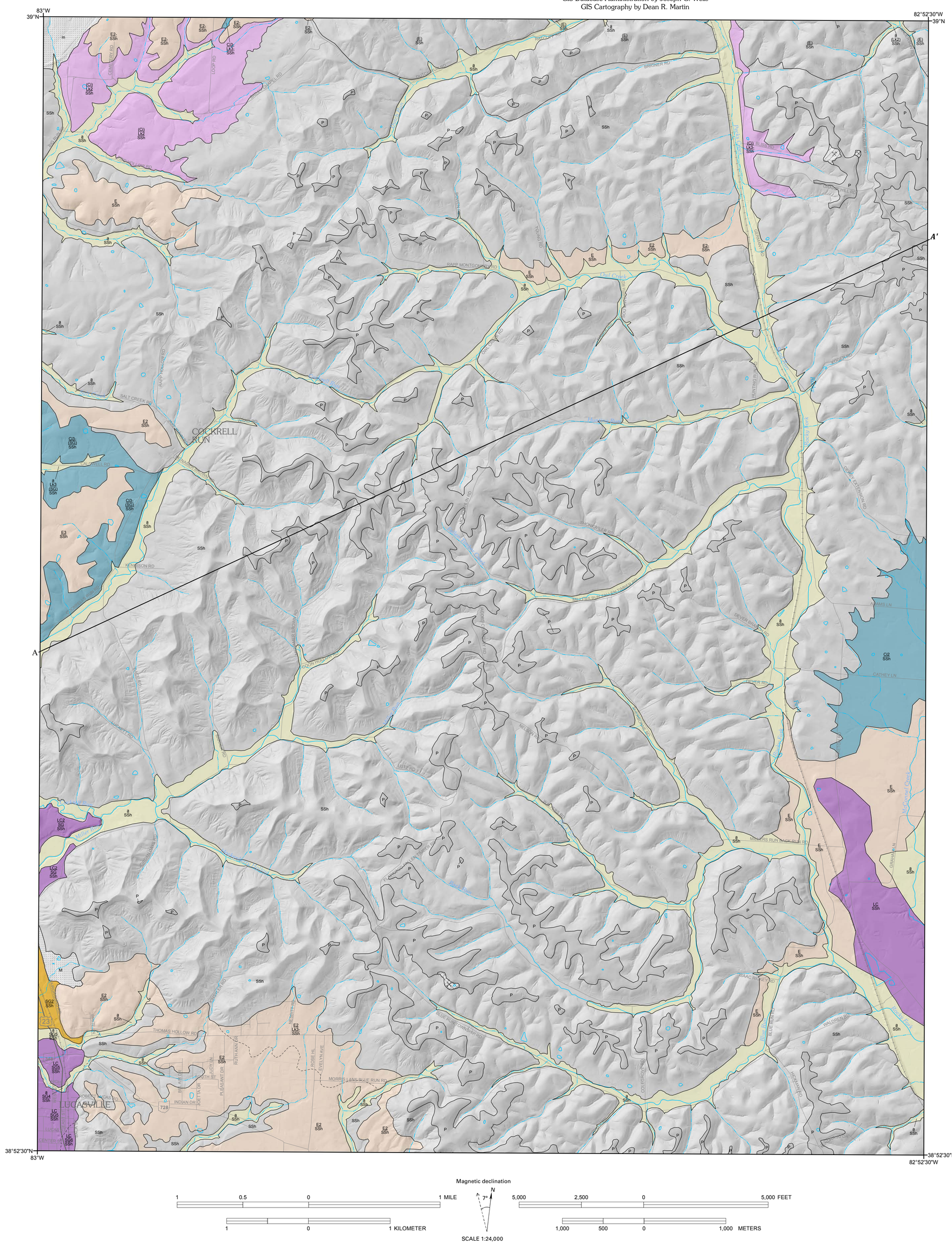
STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
Thomas J. Serenko, Chief

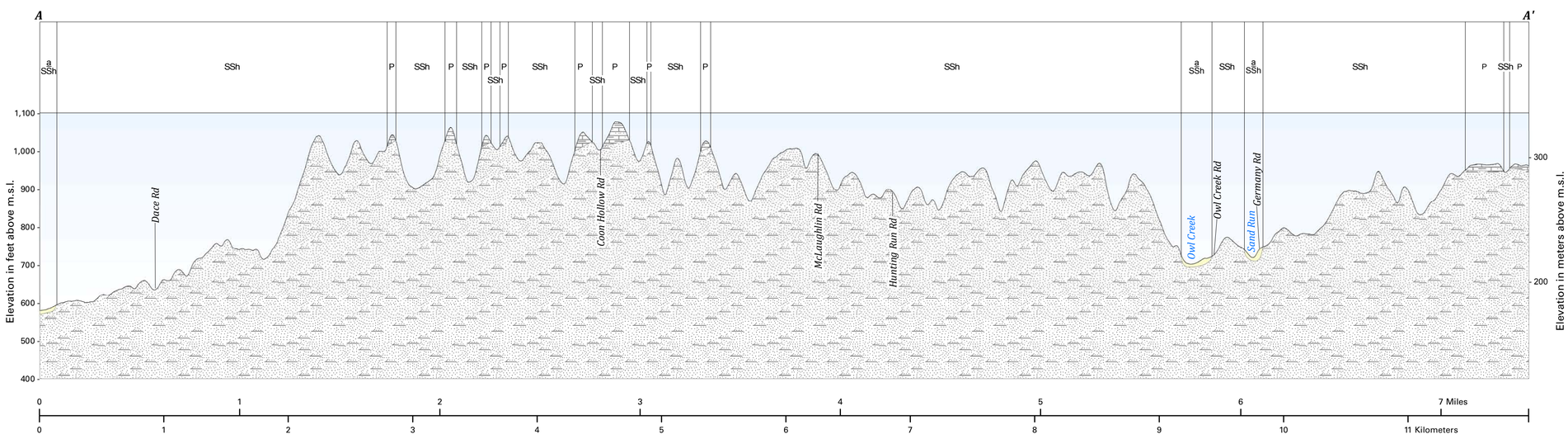
SURFICIAL GEOLOGY OF THE LUCASVILLE 7.5-MINUTE QUADRANGLE, OHIO

by
Audrey A. Blakeman

GIS Database Administration by Joseph G. Wells
GIS Cartography by Dean R. Martin

Map SG-2-LUC
This geologic map was funded in part by the USGS National Cooperative Geologic Mapping Program under STATEMAP award number G16AC00197, 2017.
09/2017





Cross section of the Surficial Geology of the Lucasville 7.5-Minute Quadrangle, Ohio. See lithologic unit descriptions and key to lithologic colors for explanation of symbols. The cross section illustrates thicknesses and mapping conventions described in the text. Precise surface topography can be determined from topographic maps that are available from the ODNR Division of Geological Survey at several scales; bedrock-surface topography and bedrock geology are available from the ODNR Division of Geological Survey as 1:24,000-scale quadrangle maps. m.s.l. = Mean Sea Level. Horizontal scale same as map. Vertical exaggeration is 10x.

MAPPING CONVENTIONS

This map provides a three-dimensional framework of the study area's surficial geology and depicts four important aspects of surficial geology:

1. Geologic deposits, indicated by letters that represent the major lithologies.
2. Thicknesses of the individual deposits, indicated by numbers and modifiers.
3. Lateral extents of the deposits, indicated by map-unit area boundaries (solid and dashed lines).
4. Vertical sequence of deposits, by the stack of symbols within each map-unit area.

Letters represent geologic deposits (lithologic units) and are described in detail below. Lithologic units may be a single lithology, such as sand (S) or clay (C), or a combination of related lithologies that are found in specific depositional environments, such as sand-and-gravel (SG) or ice-contact (IC) deposits. The bottom symbol in each stack indicates the bedrock lithologies that underlie the surficial deposits. The detailed lithologic unit descriptions below summarize:

1. Geologic characteristics, such as range of textures, bedding, and age.
2. Engineering properties or concerns attributed to the unit.
3. Depositional environments.
4. Geomorphology or geomorphic locations.
5. Geographic locations within the map area, if pertinent.

Numbers (without modifiers) that follow the lithology designators represent the average thickness of a lithologic unit in tens of feet (for example, *3* represents 30 feet [ft]). If no number is present, the average thickness is implied as *1* (10 ft). These unmodified numbers correspond to a thickness range centered on the specified value but may vary ±50 percent. For example, *T4* indicates an average thickness of till in a map-unit area is 40 ft, but that thickness may vary from 20 to 60 ft.

Modifiers provide additional thickness and distribution information:

1. Parentheses indicate that a unit has a patchy or discontinuous distribution and is missing in portions of that map-unit area. For example, *(T2)* indicates that till with an average thickness of 20 ft is present in only part of that map-unit area.
2. A negative sign (-) following a number indicates the maximum thickness for that unit in an area such as a buried valley or ridge. Thickness decreases from the specified value, commonly near the center of the map-unit area, to the thickness of the same lithologic unit and vertical position specified in an adjacent map-unit area. For example, a *SG9-* map-unit area adjacent to a *SG3* area indicates a sand-and-gravel unit having a maximum thickness of 90 ft that thins to an average of 30 ft at the edge of the map-unit area. If the material is not present in an adjacent area, it decreases to zero at that boundary.

The small scale of this reconnaissance map generalizes the great local variability within surficial deposits. That variability is explained in the lithologic unit descriptions and by the use of thickness ranges. Some areas and lithologies are too small to delineate at 1:24,000 scale and have been included in adjacent areas. This map should serve only as a regional predictive guide to the area's surficial geology and not as a replacement for subsurface borings and geophysical studies required for site-specific characterizations.

UNIT DESCRIPTIONS

Sand-and-gravel pit. Pit bottom generally underlain by unconsolidated lithologic units of surrounding polygon(s). May contain reclaimed areas.

Quarry. Floored in bedrock; may contain reclaimed areas.

Made land. Large areas of cut and fill, such as dams, landfills, and urban areas.

a — **Alluvium (Holocene).** Water-laid and overbank deposits that include a wide variety of textures from silt and clay to boulders; commonly includes organic material; generally, not compact. Found in floodplains of modern streams throughout entire map area. Rarely greater than 20 feet thick; mapped where thickness and extent significant.

Ci — **Clay (Illinoian).** Water-laid clay deposits that drape hillsides and upper reaches of alluvial valleys. Up to 30 feet thick.

E — **Eolian silt (loess) and fine sand, unspecified age.** Deposited by wind, generally on bedrock, but may be present as a cap on higher terraces. Up to 20 feet thick; mapped where thickness and extent significant.

LC — **Silt and clay (Wisconsinan).** Laminated to interbedded, may contain thin fine-sand or gravel layers. Occurs as thick, lacustrine valley-fill deposits in larger fluvial valleys or upland depressions. May exceed 20 feet thick.

Lk — **Silt (pre-Illinoian).** Water- or wind-borne silt deposits that drape lower hillsides and alluvial valleys. May reach 30 feet thick.

SG — **Sand and gravel (Wisconsinan).** Intermixed and interbedded sand and gravel, commonly containing thin, discontinuous layers of silt, clay, and till. Grains well to moderately sorted, moderately to well rounded; finely stratified to massive, may be cross-bedded; locally may contain organic material. Up to 140 feet thick. In deep buried valleys, may be older than Wisconsinan age. Widespread fluvial deposit in terraces and buried valleys.

P — **Conglomerate, sandstone, shale, siltstone, clay, limestone, and coal bedrock and associated colluvium (Pennsylvanian).** Sandstone bedded to thickly bedded, medium to coarse grained with abundant rounded quartzite pebbles; quartzite pebble conglomerate may be present in basal portion. Interbeds of shale, sandstone, siltstone, clay, coal, and limestone common in upper portion of unit. Common horizontal and vertical changes of rock types. Exposures may reach 120 feet thick. Stratigraphic names: Breathitt Group and Sharon Formation.

SSh — **Sandstone and shale bedrock (Devonian and Mississippian).** Interbedded shale, siltstone, and sandstone and associated colluvium, with common vertical and horizontal changes. May reach 450 feet thick. Stratigraphic names: Borden Formation, Sunbury Shale, Berea Sandstone, Bedford Shale, and Ohio Shale.

Note: The colors on the map correspond to the uppermost continuous map units and serve to assist in visualizing the geology of the area. Discontinuous units (in parentheses) and subsurface-only units are not assigned colors.

†Fill patterns shown only in cross section. Units without patterns do not appear in cross section.

EXPLANATION OF MAP SYMBOLS

Boundary between map-unit areas having **different** uppermost, continuous lithologies or significant bedrock lithology change; underlying lithologies may or may not differ.

Boundary between map-unit areas having the **same** uppermost, continuous lithology but different thicknesses or different underlying lithologies.

Note: Boundary types reflect the relationships among uppermost continuous lithologies only and not patchy, discontinuous lithologies (in parentheses).

DATA SOURCES

Data were collected from numerous sources (see "References"). The concentration of data was greatest near the surface and decreased with depth. County soil survey maps, which describe the top 5 ft of surficial materials, provided an initial guide to map-unit areas. These areas were modified through interpretation of local geomorphic settings and other data that indicated changes of deposits at depth, including water-well logs from the Ohio Department of Natural Resources (ODNR), Division of Water Resources; test-boring logs provided by the Ohio Department of Transportation, Office of Geotechnical Engineering Geotechnical Document Management system, available online at **www.dot.state.oh.us/Divisions/Engineering/Geotechnical/Pages/GeoMS.aspx#GRSR** and at Ohio Environmental Protection Agency (EPA) and county engineers offices; theses; and published or unpublished geologic reports, maps, and field notes (on file at the ODNR Division of Geological Survey). These data also provided the basis for lithologic unit descriptions that summarize, as accurately as possible, recognized associations of genetically related materials. Total thickness of each surficial deposit was calculated using ODNR Division of Geological Survey open-file bedrock topography maps, and bedrock units were summarized from ODNR Division of Geological Survey bedrock geology maps, all of which are available for each 7.5-minute quadrangle in the map area. Land-surface topography was derived from LiDAR data, collected as part of the Ohio Statewide Imagery Program, and then converted into a 12.5 x 12.5-ft-resolution digital elevation model (DEM) and shaded-relief model by the Ohio EPA. The Ohio Statewide Imagery Program collected LiDAR data and converted it into a 2.5 x 2.5-ft-resolution DEM. Using this DEM, the ODNR Division of Geological Survey generated a shaded-relief model and a percent slope.

ACKNOWLEDGMENTS

This map project was partially funded by the United States Geological Survey, STATEMAP component of the National Cooperative Geologic Mapping Program (NCGMP).

REFERENCES

Fugitt, F.L., and Blakeman, A.A., 2016, Bedrock geology of the Portsmouth, Ohio region (Portsmouth, Friendship, West Portsmouth, & New Boston 7.5-minute quadrangles): Columbus, Ohio Department of Natural Resources, Division of Geological Survey BG-2-POR, scale 1:24,000.

Hendershot, R., 1984, Soil survey of Pike County, Ohio: U.S. Department of Agriculture, Soil Conservation Service, Ohio Department of Natural Resources, Division of Soil and Water Conservation and the Ohio Department of Agriculture Research and Development Center, p. 151.

Kempton, J.P., 1981, Three-dimensional geologic mapping for environmental studies in Illinois: Illinois State Geological Survey, 43 p.

McCleary, F.E., Feasner, M.M., Hamilton, S.J., and Miller, K.E., 1989, Soil survey of Scioto County, Ohio: U.S. Department of Agriculture, Soil Conservation Service, Ohio Department of Natural Resources, Division of Soil and Water Conservation, and the Ohio Department of Agriculture Research and Development Center, 218 p.

McDonald, James, Pavey, R.R., Venteris, E.R., and Wells, J.G., 2007, GIS tools for 3-D surficial mapping in Ohio, *in* Digital Mapping Techniques '07—Workshop Proceedings, Columbia, South Carolina, May 20–23, 2007: U.S. Geological Survey Open-File Report 2008-1385, p. 109–121, last accessed July 26, 2016, at <https://pubs.usgs.gov/of/2008/1385/pdf/mcdonald.pdf>.

Ohio Division of Geological Survey, 1998, Physiographic regions of Ohio: Ohio Department of Natural Resources, Division of Geological Survey, page-size map with text, 2 p., scale 1:2,100,000.

Pavey, R.R., Goldthwait, R.P., Brockman, C.S., Hull, D.N., Swinford, E.M., and Van Horn, R.G., 1999, Quaternary geology of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map 2, scale 1:500,000.

Powers, D.M., and Swinford, E.M., 2004, Shaded drift-thickness of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map SG-3, scale 1:500,000.

Slucher, E.R., Swinford, E.M., Larsen, G.E., Schumacher, G.A., Shrake, D.L., Rice, C.L., Caudill, M.R., Rea, R.G., Powers, D.M, 2006, Bedrock geologic map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-1, scale 1:500,000.

Venteris, E.R., 2007, Qualitative and quantitative 3D modeling of surficial materials at multiple scales, *in* Digital Mapping Techniques '06—Workshop Proceedings, Columbus, Ohio, June 11–14, 2006: U.S. Geological Survey Open-File Report 2007-1285, p. 129–150, last accessed July 26, 2016, at <http://pubs.usgs.gov/of/2007/1285/pdf/Venteris.pdf>.

Walker, A.C., Schmidt, J.J., Stein, R.B., Pree, H.L., and Bailey, N.G., 1965, Ground water for industry in the Scioto River Valley: Ohio Department of Natural Resources, Division of Water Buried Valley Investigation No. 1, 138 p.

Location of the Lucasville 7.5-minute quadrangle, Ohio.

Base map derived from
Ohio Department of Natural Resources (ODNR),
Ohio Department of Transportation (ODOT), and
National Hydrography Dataset (NHD) data sets.
Projection of data is Ohio coordinate system, south zone,
North American Datum, 1983.

DISCLAIMER

This product of the Ohio Department of Natural Resources (ODNR), Division of Geological Survey is intended to provide a broad bedrock-geology framework and general information only and should not be used for any other purpose. It is not intended for resale or to replace site-specific investigations. These data were complied by the ODNR Division of Geological Survey, which reserves the publication rights to this material. If these data are used in the compilation of other data sets or maps for distribution or publication, this source must be referenced.

Recommended Bibliographic Citation for this Map:

Blakeman, A.A., 2017, Surficial geology of the Lucasville 7.5-minute quadrangle, Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Map SG-2-LUC, scale 1:24,000.

The information contained herein may be updated or edited in the future. Future releases of this material, if altered, will display a revision date. Users should check to ensure they have the latest version and reference the appropriate revision date if it is being used in other works.

Neither the Ohio Department of Natural Resources, nor any agency thereof, nor any of their employees, contractors, or subcontractors, make any warranty, expressed or implied, nor assume any legal liability or responsibility for the accuracy, completeness, or usefulness of this product. Any use thereof for a purpose other than for which said information or product was intended shall be solely at the risk of the user.