STATE OF OHIO
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF GEOLOGICAL SURVEY
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SURFICIAL GEOLOGY OF THE BIRMINGHAM QUADRANGLE, OHIO

by
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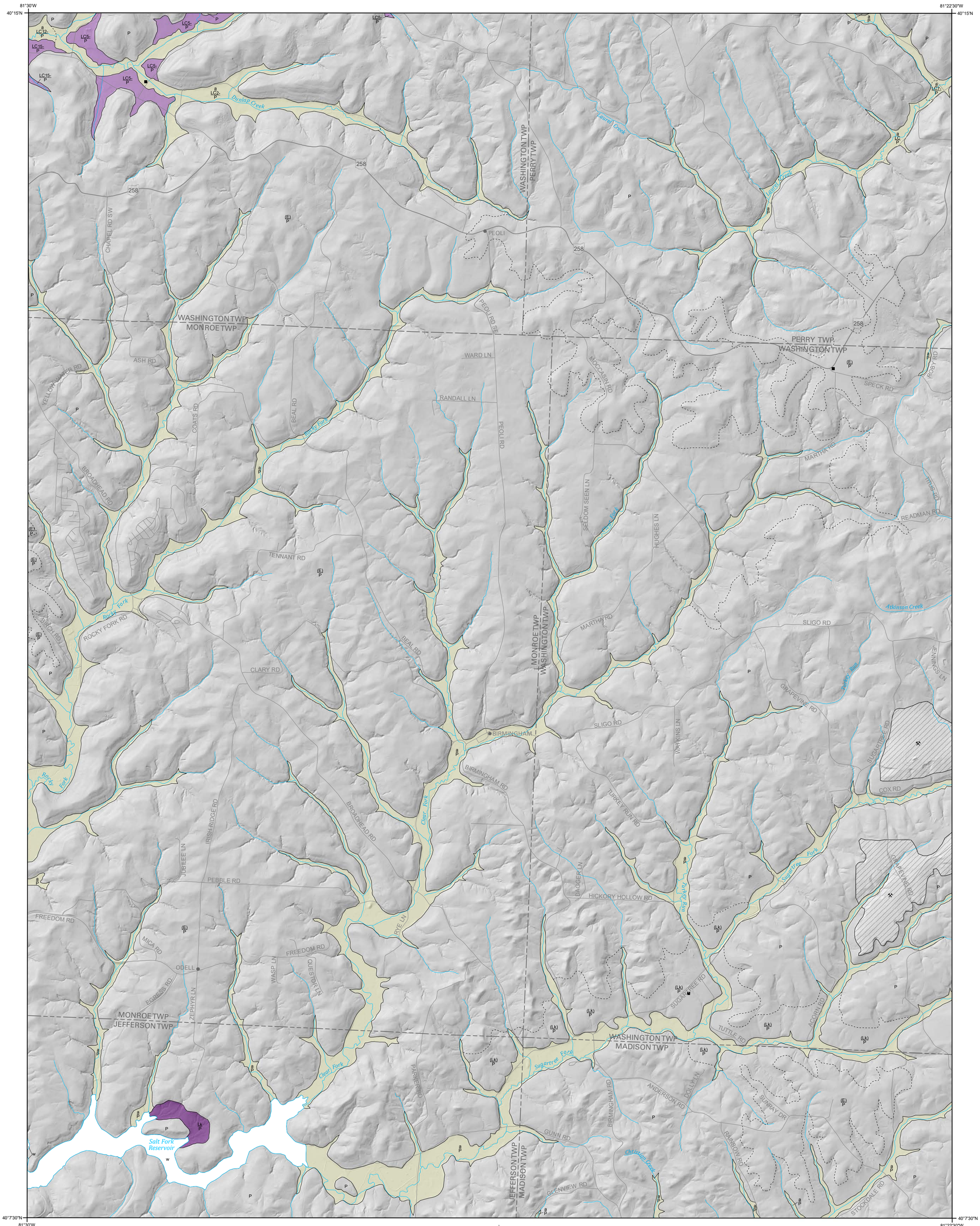
Digital Map Series SG-4A
Birmingham
08/2019



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*

w — **Water.** Lakes generally larger than 20 acres and not appearing on the base map.

⚒ — **Quarry.** Floored in bedrock; may contain reclaimed areas. Includes strip-mine benches.

a — **Alluvium (Holocene).** Includes a wide variety of textures from silt to clay to boulders. Commonly includes organic material, generally not compacted. Found in floodplains of modern streams and mapped only where areal extent and thickness are noteworthy. Also includes alluvial terraces; old floodplain remnants that are positioned tens of feet above modern floodplains.

LC — **Silt and clay with occasional sand and gravel interbeds (unspecified age).** Present as deltaic deposits, outwash, deposits in upland depressions, and slackwater lake deposits.

Lk — **Silt and clay: Minford Silt (Pre-Illinoian).** Present on high terraces or as eroded remnants of lacustrine clays and silts, finely laminated, often covered with loess and/or colluvium, sometimes underlain by sand and gravel.

P — **Sandstone, siltstone, shale, clay, limestone, and coal (Pennsylvanian).** Sandstone thinly-bedded to massive, medium to coarse grained with abundant rounded quartz-pebbles; quartz pebble conglomerate present. Interbeds of shale, sandstone, siltstone, clay, coal, and limestone common in upper portions of unit. Common horizontal and vertical changes in rock type. Stratigraphic names: Pottsville, Allegheny, and Conemaugh Groups undivided.

■ Soil boring data collection locality.

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, not patchy, discontinuous lithologies (in parentheses).

*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.

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 https://gis.dot.state.oh.us/tims and at Ohio Environmental Protection Agency 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 Light Distance and Ranging (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.

Location of Birmingham 1:24,000 quadrangle in Ohio.

Basemap derived from various State of Ohio datasets
Projection is Ohio coordinate system, south zone
North American Datum 1983

Recommended Bibliographic Citation for this Map:

Nash, T.A., 2019, Surficial geology of the Birmingham 7.5-minute quadrangle, Ohio: Columbus, Ohio Department of Natural Resources, Division of Geological Survey Map SG-4A, scale 1:24,000.

www.OhioGeology.com

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4	**5**	6
7	8	9

1 Newcomerstown
2 Gnadenhutten
3 Tippecanoe
4 Kimbolton
5 Birmingham
6 Freeport
7 Cambridge
8 Old Washington
9 Antrim

Adjacent 7.5-minute quadrangles

This geologic map was funded in part by the USGS Great Lakes Geologic Mapping Coalition under cooperative agreement number G18AC00212.