KENTUCKY GEOLOGICAL SURVEY
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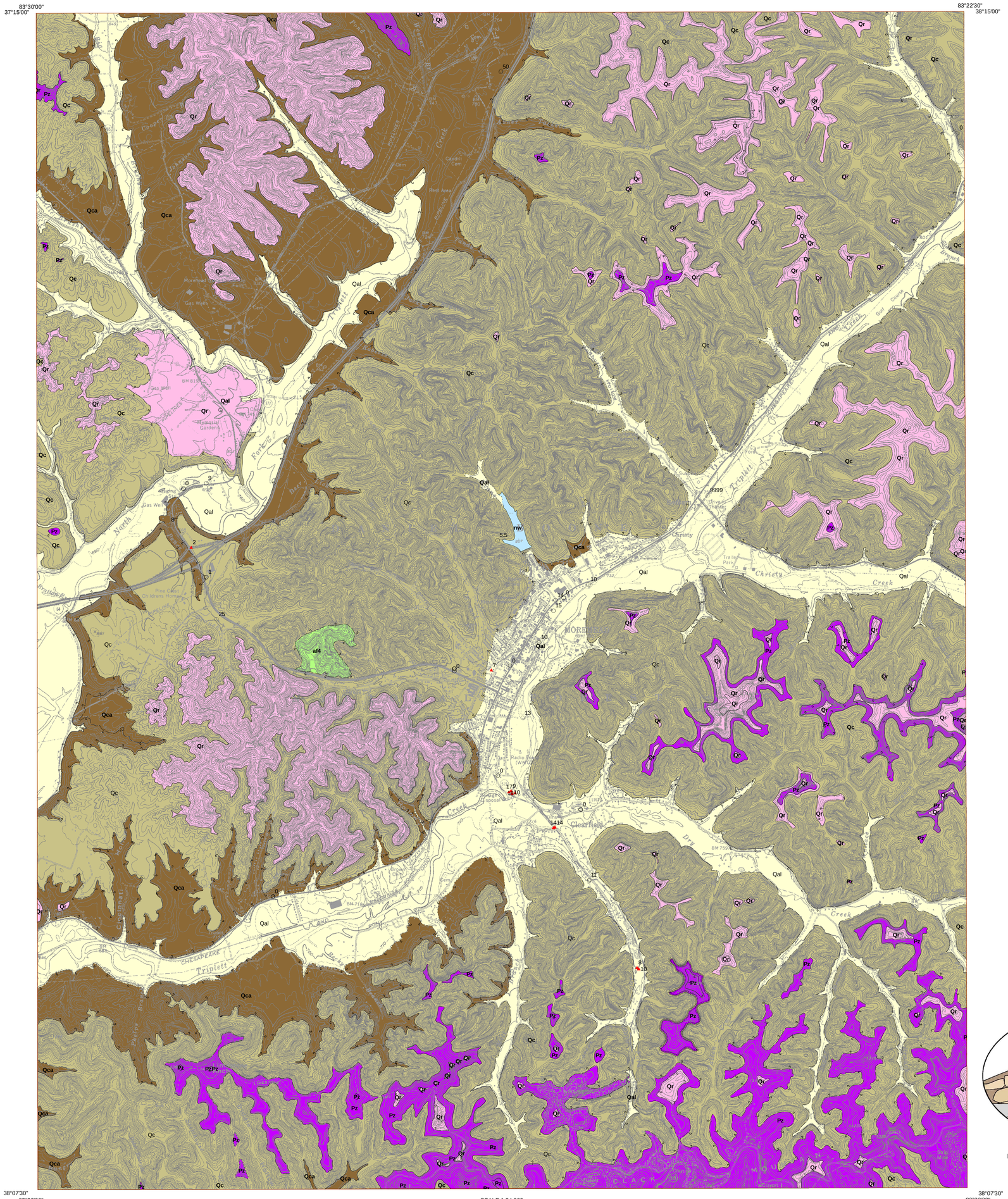
DRAFT GEOLOGIC QUADRANGLE
MOREHEAD QUADRANGLE, KY.
Series XII, 2011
GQ-1022
Version 1.0
Contract Report 44



SCALE 1:24,000

10,000 5,000 0 10,000 Feet

1 0.5 0 1 Miles

1 0.5 0 1 Kilometers

CONTOUR INTERVAL 20 FEET

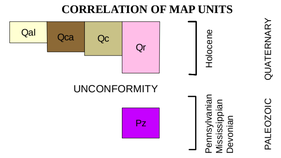
Kentucky Single Zone State Plane projection

Topographic base and cultural features are from Kentucky Raster Graphics from Kymartian.ky.gov/krgmaps/KRG of MOREHEAD

MAP LOCATION

7.5 MIN QUADRANGLE INDEX

CORRELATION OF MAP UNITS



CORRELATION OF MAP UNITS chart and DESCRIPTION OF MAP UNITS
Includes map units from adjacent quadrangles. Only map units within this quadrangle are shown with color fill.

DESCRIPTION OF MAP UNITS

Qal — **Alluvium modern (Holocene)**
Unconsolidated sand, silt, gravel, and clay. Mainly occupies modern river channels, narrow stream valley bottoms, and floodplains. Local sand and gravel bars containing cobbles and boulders present. Unit typically generated from weathered colluvium and debris flows near valley bottoms and often flooded, eroded, and re-deposited. Contact between adjacent colluvium and alluvial fans varies from sharp to poorly defined. Thickness ranges from 0 to 30 feet.

Qaf — **Alluvium, alluvial fans (Holocene)**
Broad, fan-shaped deposits of unconsolidated material at the mouths of small valleys and ravines. Confined to coalescing tributary valleys, unit probably contains a mixture of flood-plain alluvium and hill slope colluvium. Fluvial origin varies from recent to old.

Qat — **Alluvial Terrace (Holocene)**
Higher level deposits representing higher level flooding event deposits features large enough for mapping.

Qc — **Colluvium , modern (Holocene)**
Unconsolidated sand, gravel, silt, clay, cobbles, and boulders; gravity driven material mantling steep slopes, generated from weathering of underlying bedrock. Thickness ranges from 0 to 40(?) feet and varies depending on landscape position and underlying bedrock lithology. Typically colluvial slopes are thickest at the base (toe slopes) and thin and discontinuous toward the shoulder (side slopes).

Qca — **Colluvial accumulation zone (Holocene)**
Unconsolidated colluvium, deposited by gravity forming a gentler slope than adjacent colluvium. Unit may be fan-shaped deposits near base of steep slopes or within concave slopes.

Qr — **Residuum (Holocene)**
Highly weathered bedrock regolith found along ridge tops, gently sloping hills, and convex upward slopes. Unit is typically interbedded fine-grained rock and silty soil, few large angular rock pieces; maintains sedimentary rock structure. Underlain by the Farmers sandstone, Bedford, Sunbury, and Ohio shale which determines rate of weathering accumulation of colluvium in the Farmers.

Pz — **Bedrock**
Consolidated layers of siltstone, shale, and sandstone. Except where exposed as a roadcut or natural rock face, unit is primarily underlying the surficial geology and comprises the core of the steep hills.

Qls — **Landslide deposits, modern (Holocene)**
Complex accumulations of slumps, earthflows, debris flows, and hummocky ground within colluvial slopes. Unit derived from thick colluvial slopes or boulder dominated areas. Commonly consist of a combination Ohio Shale, and Crab Orchard material in the Farmers. Slides range from active to historic non-active slides.

af1 — **Artificial fill, engineered fill (Modern)**
Unconsolidated material used as fill for the construction of roads, railroads, buildings, floodwalls, and other engineered structures.

af2 — **Artificial fill, mine spoil (Modern)**
Quarried rock faces overburden and fill material generated from surface rock quarries. This unit delineated by soil map analysis, modern aerial photography, and historical topographic maps.

af4 — **Artificial fill, hollow fill (Modern)**
Unconsolidated and Consolidated material generated from surface rock quarries during mining and placed in narrow valleys. This unit delineated by soil map analysis, modern aerial photography, and historical topographic maps.

nw — **New water**
Areas of former land which have been removed by active erosion or dredging since the completion of original topographic mapping.

Qfd — **High Level Fluvial Deposits**
Deposits of well rounded poorly sorted pebbles associated with fluvial deposits found in higher elevation than the modern stream or river channels.

*Map unit **Qc**, **Qr**, and **Qal** are primarily derived from the parent materials of the USDA soil series units. Delineation of these units was completed by field observations, slope percentage analysis, and mining data.

*Map units **Qca**, Qcc, Qcor, Qcoc, Qca, and Qls are derived from field observation.

*Map unit **af2** were derived from soil series maps, known mined areas, mine permit maps, and aerial photography

EXPLANATION

- Contact
- Approximate contact
- Inferred contact
- Concealed contact
- Fault
- Approximate fault
- Inferred fault
- Terrace scarp
- Contour strip
- ♂23 KGS database, number indicates depth to bedrock in feet
- KGS drilling
- Landform observation and soil probe
- Landform observation

GEOLOGIC SUMMARY

GEOLOGIC SETTING

The Morehead 7.5-minute quadrangle is located in Rowan county in Eastern Kentucky near the Appalachian Basin. The economic geology includes two natural gas fields(North Triplett Field and Bluestone Field), refractory clay of the Olive Hill Clay Bed of Crider (1913) and the Newman Limestone. The Quarries are shown on the map as af2 materials.

The distribution of surficial materials is related to specific bedrock lithology, weathering rates, and the influence of mining and other types of development. The units described on this map reflect natural processes collectively operating as a dynamic geomorphic system (Newell, 1978). They are the result of the relationship between processes and landforms. Chemical and mechanical weathering, mass wasting, and streamflow are the main agents creating and transporting the surficial materials that become the residual, alluvial, and colluvial units.

GEOTECHNICAL BEHAVIOR

The Quaternary deposits identified in the map area exhibit a wide range of grain size and geotechnical behaviors. Grain-size distribution, soil thickness, plasticity index, clay content, and soil wetness are the primary factors affecting the behavior of soils for geotechnical, hydrogeologic, and agricultural applications. The grain-size distribution of unconsolidated sediments is dominantly controlled by the conditions under which the material was deposited. Fluvial processes produce moderate sorting; colluvial processes produce poorly sorted deposits. Low-energy environments allow the deposition of fine-grained materials. High-energy deposits limit deposition to only coarser-grained materials.

Major properties of surficial materials recorded during mapping include (1) texture, using standard U.S. Department of Agriculture (USDA) terms defined by percentages of sand, silt, and clay and (2) classification, determined by the Unified Soil Classification System, which classifies soil properties that affect construction development.

HAZARDS

The diverse topography in the Morehead area has a history of mass wasting and has the potential to cause engineering and maintenance problems. The failures include: landslide, creep, slumps, and debris flows, affecting new and old construction projects roads and housing. Heavy precipitation, stream erosion, new roads, logging, clear-cutting, and removal of vegetation for construction can all destabilize slopes. Landslides of colluvium from hillsides pose engineering hazards and have damaged roads, houses. A colluvium whose matrix is rich in clay and silt (sandstone is less than 33 percent of the bedrock) is poorly drained and easily saturated and mobilized (Newell, 1978).

Flooding is a common occurrence, particularly in late winter or early spring, in areas underlain by alluvium. Both modern channel deposits and floodplain alluvium occupying narrow stream valleys between steep slopes have flood potential. Floodplain alluvium will vary from sandy, well-drained sediment to predominantly silt and clay that may drain poorly following floods. Low terraces correspond to high-magnitude, low-frequency flood stages.

LANDUSE

The topography in the Morehead area is highly diverse with flat hilltops formed from residual soils of the Breathitt, Lee, and Borden formations to the steep slopes formed by the colluvial material mostly formed from the Upper Borden (Renfro, Nada, Cowbell, and Nancy Members), and the wide flat alluvial plains formed by the North Fork Triplett Creek and Triplett Creek. Housing developments and transportation corridors are most often located on relatively flat alluvium near valley bottoms and on the stable flat to gentle rolling residuum.

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The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.

ACKNOWLEDGMENTS

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Field mapping was completed by Monte R. Rivers and Charles Mason from May 2010 to May 2011, with assistance from M. Murphy, and W. Andrews.

Subsurface information was compiled from data on file at the Kentucky Geological Survey as well as data contributed by the Kentucky Transportation Cabinet and the U.S. Geological Survey.

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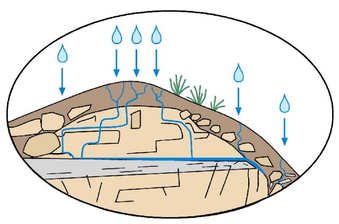

Figure 1A. Development of the Residual soil (Qr). Influence of water on weathering of Bedrock, soil development, and transport of Colluvium (Qc) by infiltration.

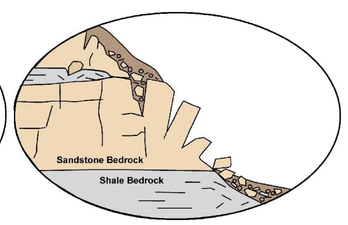

Figure 1B. Different types of Bedrock (Pz) exposed on a hillside.

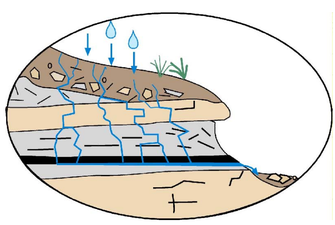

Figure 1C. Bedrock (Pz) outcrop and location of hillslope Colluvium Accumulation (Qca). Note infiltration of water with seep at impervious coal seam

QUATERNARY GEOLOGIC MAP OF THE MOREHEAD 7.5-MINUTE QUADRANGLE, EASTERN KENTUCKY

By Monte Rivers and Charlie Mason
Compiled by Scott Waninger
2011

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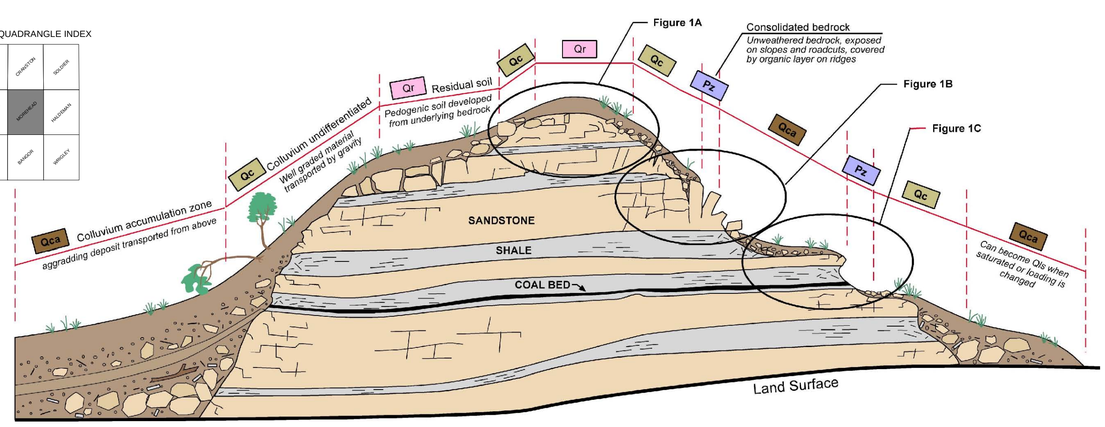

Figure 1. Conceptual model of the geomorphic processes in the Morehead 7.5-minute quadrangle