



GEOLOGIC SUMMARY

GEOLOGIC SETTING

The regional project area is located in the lower Ohio River valley, downstream of the confluence of the Wabash River and Ohio River. The landscape of the map area is characterized by very low to high-relief bedrock uplands separated by broad valleys. Although the area is just south of the Pleistocene (Illinoian) glacial limit, both the Ohio and Wabash Rivers served as major outlets for glacial meltwater and entrained sediment during glacial stages. Rapid accumulation of glacial outwash in the valleys and along the mouths of tributaries led to impoundment and extensive deposition of slackwater and lacustrine sediment in the tributary valleys. This lacustrine deposit has a complex and gradual transition with loess mantling adjacent uplands. The loess was primarily derived from the valley-bottom outwash. The uplands are underlain by faulted Pennsylvanian coal-bearing strata steeply dipping North to Northeast.

GEOTECHNICAL BEHAVIOR

The Quaternary deposits identified in the map area exhibit a wide range of grain size and geotechnical behaviors. Grain size distribution is one of 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. Low energy environments allow the deposition of fine-grained materials. High energy deposits limit deposition to only coarser grained materials. Eolian processes produce very well sorted (poorly graded) materials. Fluvial processes produce moderate sorting; colluvial processes produce poorly sorted deposits.

HAZARDS

Flooding is a nearly annual occurrence along the Ohio River. Floods in the late winter or early spring commonly inundate low-lying areas in the floodplain. Larger floods occur roughly every 10 to 20 years (e.g. 1913, 1948, 1964, 1997, 2007), and cover parts of the low terraces. The maximum flood of record in the valley was in 1937; flooding river towns throughout the valley. Only structures on the highest outwash terraces and the lacustrine terrace (Ql) were spared flood damage. The impact of flooding is reflected in land-use patterns through the area. Older homes and businesses have survived on the lacustrine and high overwash terraces, and on the highest parts of low terraces (Qot1, Qot1g, Qot1g). Trailers and less expensively built homes are constructed on the low terraces. Only barns are found on the high parts of the floodplain (Qafp). The floodplain and low parts of the low terraces are dominantly left to woodlands or used for row-crop agriculture. Most livestock husbandry in the alluvial valleys has been abandoned and is now restricted to upland areas above the 10- to 20-year flood zone. The low-relief lacustrine terrace is locally very poorly drained.

The silt soils that dominate the loess-mantled uplands are highly erodible. Soil piping and associated cover collapses are common hazards as ground water seeps through the silt and is commonly perched above fragments. Great care must be taken during agricultural operations not to rut and lose this valuable resource.

The map area is proximal to the Wabash Valley Seismic Zone, the New Madrid Seismic Zone, and is within the Rough Creek - Shawneetown Fault Zone. Small to moderate earthquakes have been felt in the area relatively frequently. The significant thickness of unconsolidated sediment (locally as much as 150 feet in the regional map area) raise concerns about ground motion amplification of seismic waves and potential liquefaction. The variations in lithology and thickness between materials in different map units will likely cause different responses of these materials to seismic shaking.

