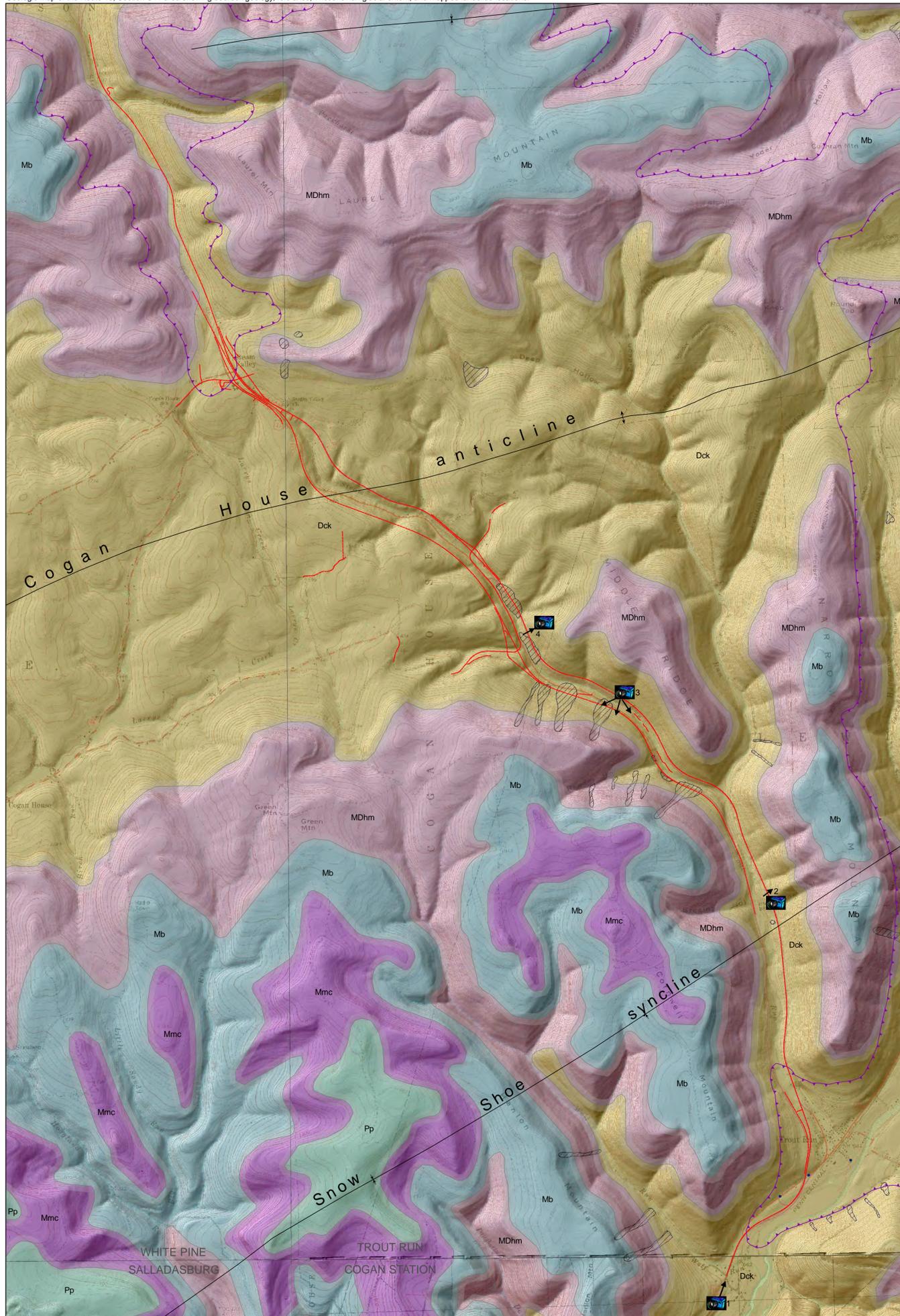
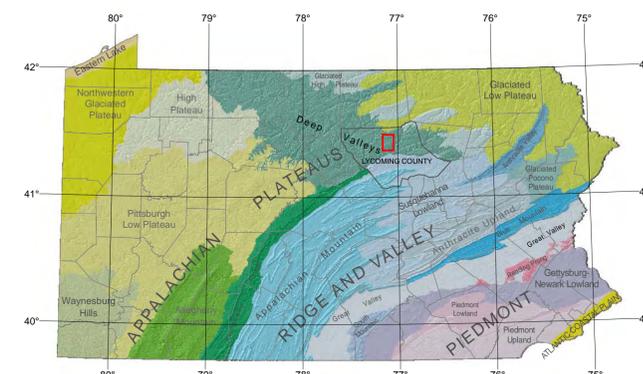


Geologic map of the Route 15, Section C41 area showing bedrock geology, fold axes, Wisconsin glacial extent, and mapped landslide locations.



MAPPING POTENTIAL GEOLOGIC HAZARDS FOR PROPOSED HIGHWAY CONSTRUCTION PROJECTS IN PENNSYLVANIA: ROUTE 15 IN LYCOMING COUNTY



Location of road project area (shown in red) in the Deep Valleys section of the Appalachian Plateaus physiographic province, Lycoming County, Pennsylvania.

BEDROCK GEOLOGY

- Pp, Pottsville Formation
- Mmc, Mauch Chunk Formation
- Mb, Burgoon Formation
- MDhm, Huntley Mountain Formation
- Dck, Catskill Formation
- Geologic contact (with approximate scale error in light gray)

Other Symbols

- Wisconsin glacial extent. Teeth point toward ice.
- USGS GWSI water well
- anticline
- syncline
- Highway realignment Section C41
- Mapped landslides



Photo site 3 -- Merged photos looking south to west over Route 15; timber has been cut in preparation for road realignment on southbound.



Photo site 1 -- Scenery approaching Trout Run from the south.



Photo site 2 -- Springs along northbound Route 15.



Photo site 4 -- Vertical jointing in Catskill sandstone.

ENVIRONMENTAL CHARACTERISTICS

Description and Potential Geologic Hazards

The C41 section is almost entirely underlain by the Upper Devonian Catskill Formation. These rocks are dominated by interbedded and alternating red and gray sandstones, siltstones, shales, and mudstones. The rocks are arranged in fining-upward cycles from gray sandstones through red mudstones.

Rocks are slightly folded; folds are broad and dips rarely exceed 15 degrees. Most fracturing is steeply dipping (70 degrees or more) and parallel or perpendicular to bedding.

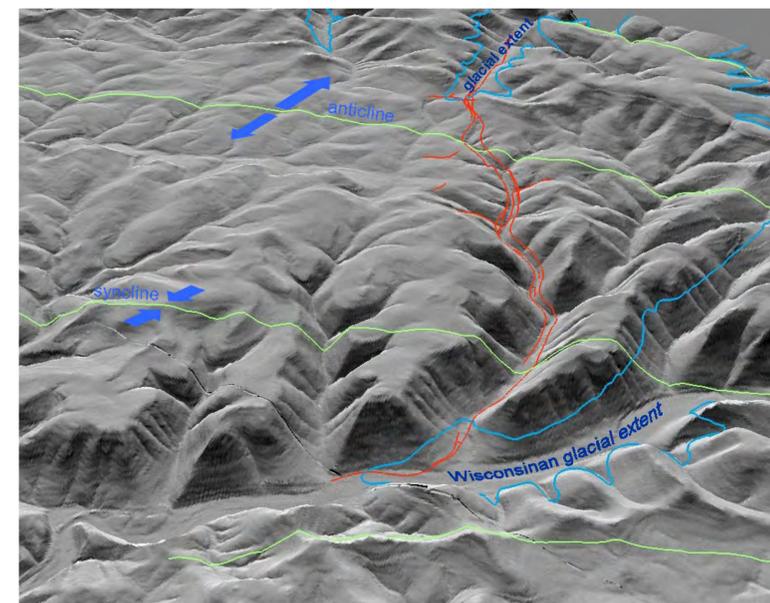
In the Catskill Formation of north-central Pennsylvania, localized enrichments of copper and uranium in paleochannel lag deposits may exist. Such lag deposits also may contain elevated concentrations of trace elements of arsenic, lead, and silver, and may contain pyrite nodules (Smith and Hoff, 1984).

Delano and Wilshusen (1999) classified the area as a "high-susceptibility" zone of landslide occurrence. Saturated shales and mudstones sequences on steep slopes have the potential to form landslides. Instability in the colluvium also may occur. Historic landslides on the route typically occurred on north-facing slopes.

Steep valley slopes with high vertical relief have the potential to form rock fall areas where interbedded sandstones create ledges in relief to underlying mudstones and shales. Fracturing perpendicular to bedding can enhance this potential.

Relatively high groundwater levels might be encountered in the valley areas. If sulfides associated with uranium deposits described previously are in a reduced state from a high groundwater table and are encountered and oxidized (change in groundwater table), they have the potential to produce some acid runoff.

Wisconsin glacialiation penetrated the valleys of both the southern and northern portions of the C41 section. Till deposits, if excavated, could be unstable with respect to engineering characteristics.



Three-dimensional representation of local topography based on 10-meter DEM data. View is to the northwest; vertical exaggeration is 2X. Wisconsin glacial extent is shown in light blue. Fold axes are shown in green (Faill, 2007).

MAP LAYERS

Bedrock geology units slightly modified from Miles, C. E., and Whitfield, T. G., compilers, 2001, Bedrock geology of Pennsylvania: Pennsylvania Geological Survey, 4th ser., dataset, scale 1:250,000. [www.dcnr.state.pa.us/topogeo/map1/bedmap.aspx] (Geologic unit contacts were widened to reflect the coarser precision at 1:24,000.)

Glacial boundary border 1:100,000 digital dataset, URL address: [http://www.pasda.psu.edu/summary.cgi/dcnr/pags/pags_glacier1k.xml]

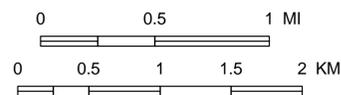
Shaded relief and 3D imagery derived from 10-meter Digital Elevation Model (DEM) data for the Cogan Station, Salladasburg, Trout Run, and White Pine 7.5-minute quadrangles, U. S. Geological Survey, 2000.

Base maps from digital raster graphics for the Cogan Station, Salladasburg, Trout Run, and White Pine 7.5-minute quadrangles, U. S. Geological Survey, 1996.

Location of highway route by Gannett Fleming, Inc. for the Pennsylvania Department of Transportation, 2007.

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