Map Unit Properties Table

Age	Map Unit (Symbol)	Unit Description	Erosion Resistance	Suitability for Development	Hazards	Paleontologic Resources	Cultural Resources	Mineral Specimens	Karst Issues	Mineral Resources	Habitat	Recreation	Global Significance
QUATERNARY	Alluvium (Qal); Carmichaels Formation (Qcm.	Unconsolidated gravel, sand, silt, and clay in floodplain deposits and along streams and low terraces, some cobbles present. Unit Qcm contains lacustrine deposits of unconsolidated clay, silt, sand, gravel, cobbles, and boulders of sandstone (silica- cemented quartzarenite), some small limonite nodules. Deposits in abandoned channels and on rock terraces in the eastern half of Fayette County.	Low	Wells in these units report sufficient water for domestic needs (high Fe and Mn, low pH); acid mine drainage may be a concern for development of wells. Avoid for waste facility development due to high permeability.	Unit is highly susceptible to slides, rockfall, slumping, and mass movement if exposed on bare and/or undercut slopes.	Perched terraces record paleolake levels and may contain remains from Pleistocene Ice Ages.	May contain Native American artifacts and campsites.	None documented.	None	Gravel, sand, silt, clay, cobbles, some sandstone boulders.	Habitat for cliff-dwelling birds and burrowing animals on terraces, riparian habitat along rivers.	Good for most use unless undercut along a slope or adjacent to a waterway; avoid bare slopes.	Unit Qcm represents the paleolake levels of Ancient Lake Monongahela and records the glacial setting during the Pleistocene; boulders in unit Qcm are from Pottsville Group.
JURASSIC	Gates- Adah dike (Jk.)	Present on surface in Fayette County as the only igneous rock found there, swarm of three or more mica- peridotite dikes.	High	Present only locally.	Rockfall potential if unit is exposed on slope.	None	May have been source of stone prized for Native American trade.	Sold as kimberlite; may contain olivine, pyroxene, amphibole, and mica.	None	Kimberlite	None	Present only locally; good for most uses.	Unit is the only Jurassic (Mesozoic) rock in the area.
PERMIAN	Greene Formation (Pg); Washington Formation (Pw)	Unit Pg consists of shale, sandstone, siltstone, thin limestone beds, claystone, carbonaceous shale, and impure coal interbeds (Ten Mile coal is less than 24 in. thick). Most units are micaceous with variable thickness and crossbeds. Unit Pw contains an upper olive to dark- gray limestone member; a middle shale, siltstone, and micaceous, olive- gray sandstone member; and a lower argillaceous limestone member that is 0.5–2 ft thick and contains shale interbeds. Jollytown coal beds are less than 24 in. thick, and the Washington coal is impure and shaly and is close to 48 in. thick	Low to medium in shale- rich beds, medium to high in massive sandstone- limestone beds.	Unit is suitable for most development unless exposed on undercut or unvegetated slope; poor aquifer with hard to very hard water (high barium, Fe, and Mn, moderate pH).	Slides and slumps are a hazard for claystone and shale- rich members; heterogeneous layering may prove unstable on slopes; rockfall hazard exists when resistant beds are undercut.	Freshwater ostracodes, *Spirorbis*, and fish remains.	Nodules may have provided tool material.	Siderite (ironstone) and limestone nodules.	Not enough massive carbonate units present for karst.	Ten Mile coal is impure and lenticular; Jollytown coal and Washington coals are impure.	Units support forests in middle to upper parts of stream basins.	Good for most uses unless highly fractured and exposed on bare slopes.	Represent Permian Period with dateable coal horizons and fresh- water fossils.
PERMIAN - PENNSYLVANIAN	Waynesburg Formation (PPNw).	Unit is between 85 and 210 ft thick. Upper member is predominantly gray to black shale containing some calcareous layers and gray sandstone interbeds, and a basal layer of impure Little Washington coal. Middle member consists of medium- gray shale, sandstone, and light- gray siltstone with the shaly, impure Waynesburg B and A coals as much as 84 in. thick locally. Lower member comprises shale, light- gray, massive, crossbedded sandstone, and siltstone. The viable Waynesburg coal is at the base of the formation and is as much as 84 in. thick.	Medium	Suitable for most development except near unremediated mined areas. Several wells record elevated Fe, Mn, chloride, and hydrogen sulfide (10% of wells showed high Ca, Mg, Pb, Al); where mines are present, low pH and high dissolved solids.	Mined areas pose safety hazards and acid- mine- drainage problems. Slides and slumps are a hazard for shale- rich members; heterogeneous layering may prove unstable on slopes; rockfall hazard exists when resistant beds are undercut.	Previously believed to be wholly Permian, but Pennsylvanian fossils were recently found in this unit.	Nodules may have provided tool material.	Siderite nodules.	Not enough massive carbonate units present for karst.	Thin and impure Little Washington coal, thin and locally impure Waynesburg B and A coals; viable Waynesburg coal mined in eastern map areas.	Units support forests and riparian habitat in lower parts of stream basins.	Good for most uses unless near mine- altered areas, or highly fractured and exposed on bare slopes.	Records depositional environments during Pennsylvanian to Permian transition.
PENNSYLVANIAN	Monongahela Group (PNm).	Unit PNm consists of black to light- gray, massive limestone and some argillaceous limestone containing thin- bedded to massive, gray sandstone, carbonaceous shale, and coal interbeds. Unit is dominated by repetitive sequences (cyclothems) of shale, mudstone, claystone, sandstone, coal, and limestone. Continental (fresh- water) cyclothems are present in this unit. Group contains the Uniontown and Pittsburgh formations, which have well- documented coal horizons.	Medium to high, lower in shale- rich beds.	Suitable for most development except near areas of extensive mining, where subsidence is possible. Ground- water is hard to very hard with dissolved solids, Fe, Mn, Ca, Mn; chloride commonly high.	Rockfall hazard exists when resistant beds (such as massive limestone and sandstone) are undercut by erosion of shale and friable claystone.	Pennsylvanian fossils.	Artifacts relevant to the land- use history at the Gallatin House .	None documented.	Some dissolution possible in massive limestone units.	Thin and impure Little Waynesburg coal, Uniontown bony coal beds; massive limestone may provide building material.	Unit supports forests on bluffs and low- level terraces.	Good for most uses unless highly fractured and exposed on bare slopes.	Records depositional environments in the long- standing Appalachian Basin. Source areas include the equatorial Allegheny Mountains in an arid climate.

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PENNSYLVANIAN	Casselman Formation (PNcc); Glenshaw Formation (PNcg); Allegheny Group (PNa); Pottsville Group (PNp).	Upper formations contain sequence of thin-bedded, green and red calcareous claystone; gray siltstone; massive, gray sandstone; and impure limestone. Scant coal beds are present locally. Four prominent clay, shale, or limestone marine horizons in Glenshaw (including Ames Limestone) with some coarse- grained sandstone and minor fresh- water limestone. Lower formations include sequences of olive to dark-gray claystone, thin to massive sandstone, nodules of limestone, gray siltstone, and coal beds. Unit is dominated by repetitive sequences (cyclothems) of shale, mudstone, claystone, sandstone, coal, and limestone. Fresh- water cyclothems are present in unit PNa. Lowermost unit is gray, crossbedded sandstone and quartz-pebble conglomerate containing some thin beds of carbonaceous black shale, siltstone, claystone, and thin, nonpersistent coal.	Low to medium in upper beds, medium in lower beds.	Units yield very hard water with excessive iron, manganese, and sulfate. Heterogeneity of layers may lead to instability on slopes.	Ledge- forming sandstone may be undercut in softer shale units, posing rockfall hazard.	Marine fossils, plant fossils. Unit PNcg contains vertical burrows, biogenic mounds, crinoids, trilobites, foraminifera, fusulinids, bryozoans, brachiopods, fish fragments. Unit PNcc contains bivalves, myriapods.	Native American sites, and artifacts relevant to the land- use history at the Gallatin House .	Nodular limestone, siderite.	Some dissolution in limestone interbeds.	Coal (Freeport, Kittanning, and Brookville-Clarion), high-alumina clay deposits.	Dissolution features may provide burrow and nesting habitat.	Good for most recreation unless soft shale units are exposed along slopes.	Cyclothems in units represent arid conditions with a river floodplain and wetlands of a foreland basin at equatorial latitudes. Classic coal deposits.
MISSISSIPPIAN	Mauch Chunk Formation (Mmc); Burgoon Sandstone (Mb).	Upper beds consist of grayish- red shale, siltstone, sandstone and several limestone members (Wymps Gap, Deer Valley, and highly crossbedded, gray, siliceous Loyalhanna), containing some conglomerate. Middle beds consist of buff, medium- grained sandstone interbedded with some coal and shale, some conglomerate at base. Lower beds consist of light- gray to olive and buff, medium- grained sandstone containing minor siltstone and several gray shale layers.	Medium, medium to high in lower unit.	Iron- rich ground water from these units. Suitable for most development unless highly fractured or on shale- rich slopes.	Rockfall is possible if units are undercut on a slope; slumping possible in shale- rich units.	Plant fossils. Unit Mmc contains fish fragments, worm burrows, corals, conularids, bryozoans, brachiopods, gastropods, pelecypods, echinoids, cephalopods, crinoids, trilobites, foraminifera, conodonts, ostracodes.	None documented.	None documented.	Some dissolution in limestone members.	Coal beds	None documented.	Good for most recreation unless soft shale units are exposed along slopes.	Mississippian coal deposits.
MISSISSIPPIAN –DEVONIAN	Shenango Formation through Oswayo Formation, undivided (MDso).	Upper units consist of greenish- gray, olive, and buff sandstone and siltstone containing some gray shale interbeds.	Medium	Suitable for most developments unless highly fractured.	Carbonate cements may weather to friable sandstone and have potential for rockfall.	Marine fossils	None documented.	Diamictite	Not enough carbonate present.	Sandstone for building materials.	Dissolution features may provide burrow and nesting habitat.	Good for most uses unless highly fractured and undercut.	Records Devonian–Mississ ippian transition in Pennsylvania.
DEVONIAN	Catskill Formation (Dck); Foreknobs Formation (Df).	Upper unit consists of fining- upward cycles of grayish- red sandstone, siltstone, shale, and mudstone; contains a few conglomerate lenses locally. Next lowest unit consists of interbedded gray to olive (grading to red at top) sandstone, siltstone, and shale bounded by basal and upper conglomerate beds.	Medium to high, highest in conglomerate beds.	Heterogeneous nature of the layered units may prove unstable for development. Tioga bentonite member has shrink- and- swell potential.	Fractured sandstone and siltstone pose rockfall potential when undercut due to weathering of weaker shale units. Shrink- and- swell clay may cause buckling and warping of roads and trails.	Some marine fossils. Unit Df contains pelecypods. Unit Dc contains plants, spores, fish, and vertebrates.	Chert in lower units may have provided tool material for Native Americans.	Siderite concretions.	Not enough carbonate present in upper beds, some dissolution possible in unit Doo.	Tioga Ash beds (clays) for industrial material fabrication.	Weaker units may provide burrowing habitat; supports climax forests.	Avoid clay units due to slippery conditions for trails and other visitor areas.	Widespread Devonian units for correlation throughout the Appalachians; Tioga Ash marker bed records major Middle Devonian volcanic activity.