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)	Located in river valleys with poorly sorted to well-sorted, unconsolidated sediments of clay, silt, sand, gravel, and boulders.	Low	Suitable for most development unless undercut, exposed on a slope, or highly permeable, in which case waste-treatment facility development is not advised.	Slumps, slides, and slope creep possible in this unit.	Fossils weathered from older units may be present in valley fill.	Terraces of larger rivers may contain campsites for Native Americans.	Iron mounds near seeps associated with mine waste.	None	Sand, gravel, clay.	Modern land surface, supports heavy oak forests.	Good for most recreation unless exposed on a steep slope or undercut by erosion.	None documented.
PENNSYLVANIAN	Casselman Formation (PNcc); Glenshaw Formation (PNcg); Allegheny Group (PNa); Pottsville Group (PNp).	Upper formations have sequence of shale, siltstone, sandstone, red beds, and thin impure limestone; coal beds are present locally. Four prominent shale or limestone marine layers in Glenshaw. Lower formations include sequences of sandstone, shale, limestone, claystone, and coal beds. Lowermost unit is sandstone and conglomerate rich with some thin beds of black shale, claystone, limestone, and 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 layers may be undercut by softer shale units and pose rockfall hazard.	Marine fossils	None documented	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.	Classic coal deposits
MISSISSIPPIAN	Mauch Chunk Formation (Mmc); Burgoon Sandstone (Mb); Pocono Sandstone (Mp).	Upper units of grayish-red shale, siltstone, sandstone, and several limestone members. Middle beds contain buff, medium-grained sandstone with some coal and shale interbeds, some conglomerate at base. Lower beds contain light-gray to buff, medium-grained sandstone with minor siltstone, several conglomeratic layers.	Medium overall, medium to high in lower unit.	Iron-rich groundwater 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	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.	Mississip-pian coal deposits.
MISSISSIPPIAN – DEVONIAN	Shenango Formation through Oswayo Formation, undivided (Mdso); Rockwell Formation (MDr).	Upper units contain greenish-gray, olive, and buff sandstone and siltstone with some gray shale interbeds. Lower unit contains fine- to medium-grained, crossbedded argillaceous sandstone and dark-gray shale with some carbonate cement, conglomerate, and diamictite locally	Medium to high.	Suitable for most developments unless highly fractured.	Carbonate cement may weather to friable sandstone, having potential for rockfall in these units.	Marine fossils	None documented	Diamictite	Not enough carbonate present.	Sandstone for building materials.	Dissolution features may provide burrow and nesting habitat.	Good for most recreation unless highly fractured and undercut.	Records Devonian–Mississip-pian transition in Pennsylvania.
DEVONIAN	Catskill Formation (Dck); Foreknobs Formation (Df); Scherr Formation (Ds); Brallier and Harrell Formations, undivided (Dbh); Hamilton Group (Dh); Onondaga and Old Port Formations, undivided (Doo).	Upper unit contains fining-upward cycles of grayish-red sandstone, siltstone, shale, and mudstone with few conglomerate lenses. Next lowest unit contains interbedded sandstone, siltstone, and shale bounded by conglomerate beds. Unit Ds is predominantly siltstone, with some fine-grained sandstone, shale, and mudstone interbeds. Lower units dominated by dark-gray shale and planar-bedded siltstone. Lowermost units characterized by coarsening-upward cycles of shale and siltstone to sandstone and gray, brown, and olive limestone. Fossils increase in lowermost units of shale and medium-gray argillaceous limestone, chert, and siltstone.	Medium to high in upper units, medium to low in lower units.	Heterogeneous nature of the layered units may be unstable for development. Tioga bentonite member has potential for shrinking and swelling.	Fractured sandstone and siltstone have potential for rockfall when weaker shale units are undercut. Clays that shrink and swell may cause buckling and warping of roads and trails.	Some marine fossils.	Chert in lower units may have provided tool material for Native Americans.	Siderite concretions	Lack of carbonate in upper beds precludes karst formation, 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 because of slippery conditions for trails and other visitor-use areas.	Widespread Devonian units for correlation throughout the Appalachians; Tioga ash marker bed records major Middle Devonian volcanic activity.
DEVONIAN – SILURIAN	Keyser and Tonoloway Formations, undivided (DSkt).	Unit contains medium-gray, crystalline to nodular, fossiliferous limestone, with laminations and mudcracks common. Some olive-gray, dark shale interbeds are present.	Medium	Suitable for most development unless highly fractured or contain karst features, in which case, developments of waste-treatment facilities should be avoided.	Rockfall associated with fractured limestone underlain by eroded shale beds.	Fossiliferous (Devonian flora and fauna).	None documented	Mudcracks in laminated layers.	Caves and karst present.	Crystalline limestone building stone.	Dissolution features may provide burrowing and nesting habitat.	Avoid fissile mudcrack units for trails.	Widespread, well-known Tonoloway Limestone unit.

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SILURIAN	Wills Creek Formation through Mifflintown Formation, undivided (Swm); Wills Creek Formation (Swc); Bloomsburg and Mifflintown Formations, undivided (Sbm); Clinton Group (Sc); Tuscarora Formation (St).	Upper unit is gray to reddish, yellowish, and greenish-gray, interbedded calcareous shale, siltstone, shaly limestone, and dolomite. Beds contain more very fine grained to coarse-grained sandstone lower in column. Lower units contain light-olive-gray to brownish-gray shale and local limestone, rare ferruginous and oolitic sandstone. Lowermost unit is quartzite and quartzitic sandstone, in places conglomeratic, with minor shale and siltstone interbeds.	Low to medium.	Upper units may prove too fissile and erodable for significant development; lower units should be avoided if highly fractured.	Slumps and slides associated with upper units; rockfall possible in lower units.	Fossiliferous, oolites.	None documented	Hematite, oolites, and ferruginous sandstone.	Karst is possible in upper units.	Sandstone for building material, iron ore in unit Sc.	Fissile and weak upper units may provide burrowing habitat.	Good for most recreation unless soft shale units are exposed along slopes.	None documented.
ORDOVICIAN	Juniata Formation (Oj); Bald Eagle Formation (Obe); Reedsville Formation (Or); Coburn Formation through Loysburg Formation, undivided (Ocl); Bellefonte and Axemann Formations, undivided (Oba); Nittany and Stonehenge/Larke Formations, undivided (Ons).	Upper two units contain grayish-red, very fine grained to medium-grained, crossbedded sandstone with siltstone and shale and some conglomerate in lower beds. Unit Or contains dark shale, siltstone, and fine-grained, thin-bedded sandstone with graded bedding. Middle units contain more limestone, with dark-gray, shaly limestone; some chemically pure limestone present. Lower beds contain brownish-weathering, medium-bedded dolomite and minor sandstone. Lowermost units contain medium- to dark-gray, thick-bedded dolomite with chert and siliceous oolites, and some conglomerate.	Medium to high in upper beds, medium in lower beds, high in lowermost unit Ons.	Shale-rich units should be avoided if exposed on slopes because of potential for slumping.. Metabentonite layers that can shrink and swell are common in lower units.	Slumps and slides associated with upper units, heterogeneous layering may lead to rockfall hazards if massive units are fractured and undercut	Fossiliferous in conspicuous sandstone layer (unit Or), oolites.	Chert in dolomite may have provided tool material for Native Americans.	Pure limestone in unit Ocl, calcilutite (thick-bedded limestone), dolomite striped "tiger-striped" layers.	Limestone and dolomite susceptible to dissolution karst.	Sandstone for building material.	Dissolution features may provide burrowing and nesting habitat.	Avoid clay units because of slippery conditions for trails and other visitor-use areas.	Records Ordovician conditions for widespread units across Appalachians.
CAMBRIAN	Gatesburg Formation (Cg); Warrior Formation Cw); Pleasant Hill Formation (Cph); Waynesboro Formation (Cwb).	Upper unit contains cyclic sandstone and dolomite units, fossiliferous, laminated to massive limestone and dolomite, and thick-bedded, crystalline dolomite. Middle units contain cyclic limestone and dolomite with minor amounts of sandstone to gray, thin-bedded argillaceous limestone with shale, siltstone, and sandstone. Lowermost unit contains greenish-gray and grayish-purple shale interbedded with sandstone and conglomerate.	High in upper beds, medium in lower beds.	Suitable for most development unless highly fractured or contain karst features.	Rockfall potential is high if resistant sandstone – limestone units are undercut by weaker shale units	Stromatolites in unit Cw	None documented	Stromatolites	Caves and karst present.	Massive limestone and crystallized dolomite for building stone.	Alternating beds of sandstone and carbonate may provide ledges for nesting habitat.	Good for most uses unless highly fractured and undercut.	Unit Cwb is widespread Cambrian unit; units contain fossil algae of post-Grenville ocean basin.