Map Unit Properties Table: Weir Farm National Historic Site

Colored rows indicate units mapped within Weir Farm National Historic Site. Stone et al. (2005) provides an updated interpretation of the surficial geology and glacial history of the park area.

Age	Unit Type	Map Unit (Symbol)		Geologic Description	Geologic Issues	Geologic Features and Processes	Geologic History
HOLOCENE	Surficial Geologic Units		Artificial fill (*Qaf*) Artificial fill-graded (*Qafg*)	*Qaf* includes earth materials and/or manmade materials used as fill along roads, dams, railroads, and other construction sites. *Qafg* also includes areas of significant land surface excavation where natural slopes were destroyed. Variable erosion resistance.	Disturbed lands and Adjacent Land Use—Units are primarily associated with infrastructure and sometimes constructed to alleviate potential hazards. Some exposures may have been quarried in gravel pits.	Modern roadway and borrow ditch habitat.	Units are evidence of modern anthropogenic activities altering the natural landscape.
HOLOCENE	Surficial Geologic Units	Post Glacial Deposits	Alluvium (*Qal*) Swamps (*Qs*)	*Qal* contains gravel, sand, and silt in modern stream channel and floodplain deposits with scant organic matter. Beds of this unit are typically less than 3 m (10 ft) thick. *Qs* contains organic matter intermixed with sand, silt, and clay. Deposits of *Qs* are typically less than 3 m (10 ft) thick, but can reach as much as 19 m (61 ft) of peat and muck locally. Low erosion resistance.	Water Issues—Units are associated with fragile riverine and wetland environments and are associated with flooding and regular water saturation.	Units are associated with riparian and wetland habitats.	Swamps and wetlands often contain records of paleoclimate and other environmental conditions. Stream channel and floodplain deposits record the evolution of modern waterways.
PLEISTOCENE	Surficial Geologic Units	Glacial Ice Deposits	Upper till (*Qtu*) Lower till (*Qtl*) Till and bedrock outcrops (*Qtbc*)	In general, the till mapped throughout the area contains poorly sorted, non-stratified mixtures of rock particles ranging in size from clay to boulders. Color in outcrops ranges from yellowish gray to olive gray and brown. Till mantles bedrock in exposures less than 3 to 5 m (10 to 15 ft) thick, but can be much thicker in drumlin deposits, upwards of 30 m (100 ft). *Qtu* is loose to moderately compact sand and stony material with lenses of sorted sand and gravel. *Qtl* is moderately to extremely compact and is finer grained, less stony, and darker in color than *Qtu*. *Qtbc* contains mixed exposures of glacial till and bedrock, which are in some areas too numerous or closely spaced to discern at the map scale. Low to moderately low erosion resistance for more compact *Qtl*. *Qtbc* is mapped within the park.	Water Issues—Drainage may be poor for particularly clay-rich portions. Geologic Hazards—Units may be prone to slumps and slides where undercut by stream action and exposed on slopes. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined or quarried in gravel pits.	Glacial Features—Deposits associated with glacial history of the area. Till deposits may underlie poorly drained areas such as wetlands. Geology and History Connections—May contain historic to prehistoric remains, and may have provided clay for early brick and pottery. Sand, gravel, silt, clay, boulders, pebbles, iron-manganese stained joints in *Qtl*. Bedrock outcrops featured in artwork by Weir and others.	Upper till is most prevalent and is associated with the last glacial advance. Lower till is associated with earlier glacial advances. Umpawaug Hill contains more than 30 m (100 ft) of glacial till in a drumlin. Till composition and color reflects those of the local bedrock (parent material). Grumman Hill is strewn with boulders, common on till deposits.
PLEISTOCENE	Surficial Geologic Units	Glacial Stream and Lake Deposits	Uncorrelated meltwater deposits (*Qgu*)	*Qgu* contains localized (small), mixed, ice-contact deposits associated with the environments at the retreating edge of the glacier. Lake deposits are typically fine-grained and layered, whereas stream deposits are more coarse and sorted. Low erosion resistance.	Geologic Hazards—Units may be prone to slumps and slides where undercut by stream action and exposed on slopes. Disturbed Lands and Adjacent Land Use—Some exposures may have been quarried in gravel pits.	Glacial Features—Deposits associated with glacial history of the area. Geology and History Connections—Sand, silt, gravel, clay mineral resources may have been quarried.	Deposited near retreating edge of glacier.
PLEISTOCENE	Surficial Geologic Units	Deposits in the Housatonic River basin	Glacial Lake Kenosia deposits (*Qkb*) Glacial Lake Danbury deposits (*Qdsb*) Sympaug Brook area deposits (*Qsb*) Nashville Road area deposits (*Qn*) Wolfpit Brook area deposits (*Qwb*)	*Qkb* contains up to 35 m (116 ft) of interbedded sand, silt, and clay as lake-bottom sediments increasing in thickness from north to south. Swamp deposits (2 to 19 m [8 to 61 ft] thick) underlie *Qkb* locally. *Odsb* consists of sand, silt, clay, and some local gravel in deposits 3 to more than 41 m (10 to 135 ft) thick. Local deposits of peat and muck overlie the lacustrine sediments. *Qsb* contains sand deposits between 3 and 18 m (40 and 60 ft) thick. Some fluvial cobble-pebble gravels are present locally. All are part of individual ice-contact deltas in an ice-marginal lake. *Qn* contains cobble gravel in deposits as much as 10 m (30 ft) thick. *Qwb* consists of sand with occasional pebble-cobble gravel lenses. Individual deposits may reach 15 m (50 ft) thick. Low erosion resistance.	Water Issues—Units are of variable permeabilities. Geologic Hazards—Units may be prone to slumps and slides where undercut by stream action and exposed on slopes. Disturbed Lands and Adjacent Land Use—Some exposures may have been quarried in gravel pits.	Glacial Features—Deposits associated with glacial history of the area. Geology and History Connections—Sand, silt, gravel, clay mineral resources may have been quarried.	*Qkb* records the presence of glacial Lake Kenosia, which occupied the Mill Plain Swamp drainage. It may have drained through the spillway southeast of Spruce Mountain, but later drained eastward into glacial Lake Danbury. *Qdsb* are from the Saugatuck River stage of glacial Lake Danbury that drained south at the head of Sympaug Brook valley. The ice-marginal lake that collected *Qsb* drained south through a spillway in the Housatonic-Saugatuck drainage divide; the unit appears some 10 km (6 mi) from the park. *Qn* was deposited as fluvial sediments in the stagnant ice margin and are exposed more than 10 km (6 mi) northeast of the park. *Qwb* contains collapsed bedding structures and were deposited along the stagnant ice margin just north of the Housatonic-Saugatuck drainage divide, some 10 km (6 mi) northeast of the park.

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Age	Unit Type	Map Unit (Symbol)		Geologic Description	Geologic Issues	Geologic Features and Processes	Geologic History
PLEISTOCENE	Surficial Geologic Units	Deposits in the Norwalk River basin	Great Swamp area deposits (***Qgs***) East Branch Silvermine River area deposits (***Qesm***) <u>Norwalk River area deposits:</u> unit 6 (***Qnr6***) unit 5 (***Qnr5***) unit 4 (***Qnr4***) unit 3 (***Qnr3***) Comstock Brook valley meltwater deposits (***Qcb***)	***Qgs*** contains 4 to 24 m (13 to 80 ft) thick sand, silt, and clay layers that underlie wetland areas. Deposition was likely in a lake and fills a closed bedrock basin. ***Qesm*** consists of 15 m (50 ft) thick sand deposits that are likely lacustrine filling closed bedrock basins. ***Qnr6*** contains coarse, fluvial gravel containing cobbles, pebbles, and boulders interlayered with poorly sorted till lenses grading into sandy deposits downstream. Unit is 8 to 26 m (25 to 84 ft) thick. ***Qnr5*** contains 14 m (45 ft) of interbedded sand and gravel. ***Qnr4*** contains coarse fluvial sand and gravel in deposits ranging from 2 to 10 m (5 to 32 ft) thick. Gravel can reach boulder and cobble size. ***Qnr3*** contains beds of sand and gravel that can be as thick as 12 m (40 ft) deposited as part of a meltwater terrace. ***Qcb*** contains mixed glacial meltwater deposits at indiscernible scales. Low erosion resistance.	Geologic Hazards—Coarser-grained deposits within these units are prone to collapse. Disturbed Lands and Adjacent Land Use—Some exposures may have been quarried as gravel pits.	Glacial Features—Deposits associated with glacial history of the area. Geology and History Connections—Sand, silt, gravel, clay mineral resources may have been quarried.	Units record intermittent glacial lakes and ice-front river deltas persistent throughout the area during the Pleistocene. Their different levels (successively lower) record ancient spillways active at different times during glacial advance and retreat over the area. Great Swamp deposits occur in the marsh area 3 km (2 mi) northwest of the park. ***Qesm*** is exposed almost 3 km (2 mi) southwest of the park; the Norwalk River area deposits occur along its length to the east of the park; and ***Qcb*** is exposed less than 5 km (3 mi) due south of the park boundary.
		Deposits in the Saugatuck River Basin	Upper Saugatuck River area deposits (***Qus***) Starrs Plain Road area deposits (***Qsp***) Umpawaug Pond area deposits (***Qup***) <u>Saugatuck River area deposits:</u> unit 7 (***Qsr7***) unit 6 (***Qsr6***) West Branch Saugatuck River deposits (***Qws***)	***Qus*** is chiefly gravel deposits in beds as much as 15 m (50 ft) thick. Grain size reaches cobble and boulder dimensions. ***Qsp*** is 8 m (25 ft) thick gravel deposits that occupy a shallow trough in the upland bedrock surface. Unit is mostly well sorted layers of variable grain size intermixed with occasional till lenses. ***Qup*** contains mixed sand and gravel deposits in beds up to 15 m (50 ft) thick. Grain size can reach pebble to boulder dimensions. ***Qsr7*** consists of sand and gravel interlayered with thin beds of pure sand probably deposited in deltaic to lacustrine environments. ***Qsr6*** consists of fluvial sand and gravel. ***Qws*** consists of relatively thin deposits of sand and pebble gravel deposited in mixed fluvial to lacustrine environments. Low erosion resistance.	Geologic Hazards—Coarse-grained deposits within these units are prone to collapse, particularly around swamp areas (old kettles).	Glacial Features—Deposits associated with glacial history of the area.	Units record braided river channels and deltas into glacial lakes persistent throughout the area during the Pleistocene. Their different depositional settings reflect shifting environments during glacial advance and retreat over the area. ***Qus*** is exposed less than 8 km (5 mi) due north of the park; ***Qsp*** occurs less than 6 km (4 mi) due north of the park; ***Qup*** deposits are approximately 4 km (2 mi) north of the park; and the Saugatuck River units are exposed along its valley which trends northwest-southeast to the northeast of the park area.
PALEOZOIC-PRECAMBRIAN		Bedrock outcrops (***PZPCbro***)		Mixed areas of large or nearly continuous bedrock outcrops in areas mantled by discontinuous, thin deposits of glacial till. Moderate to high erosion resistance.	Geologic Hazards—If exposed on slopes, unit may be prone to landsliding and blockfall. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Unit may have been mined.	Unit represents resistant portions of bedrock that remained exposed whereas less resistant layers were eroded and mantled by till.

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Age	Unit Type	Map Unit (Symbol)	Geologic Description	Geologic Issues	Geologic Features and Processes	Geologic History
DEVONIAN	Bedrock Geologic Units	Pegmatite (*Dp*) Hornblendite (*Dh*) Granodiorite gneiss (*Dgog*)	*Dp* consists of unfoliated, coarse- to very coarse-grained rock in discrete intrusions. *Dh* contains medium- to coarse-grained, poorly foliated, dark-colored, crystalline rock. *Dgog* consists of medium- to coarse-grained, poorly foliated, pink-colored rock with alternating light and dark bands. Moderately high erosion resistance.	Geologic Hazards—If exposed on slopes, unit may be prone to landsliding and blockfall. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Pegmatites were sources for minerals in local quarries including some adjacent to the park boundary.	Pegmatite forms as mineral-laden fluids inject into surrounding rock deep beneath the surface. Units record deformation and metamorphism events during the Paleozoic.
MIDDLE ORDOVICIAN		Ordovician? granitic gneiss: (*Og*) massive felsic gneiss (*Ogmsg*) porphyroblastic gneiss (*Ogpg*) mixed felsic gneiss (*Ogmxg*)	*Og* contains poorly foliated and foliated granitic gneiss that ranges in color from white, light gray, buff, or pink. *Ogmsg* contains medium- to coarse-grained, poorly foliated gneiss that appears gray to buff in color. *Ogpg* includes medium- to coarse-grained, porphyroblastic, foliated gneiss that appears gray to buff in outcrop. *Ogmxg* contains medium- to coarse-grained, poorly to well-foliated gneiss that appears gray to buff in color. High erosion resistance. *Og* is mapped within the park and is probably intruded into *Oh*.	Geologic Hazards—If exposed on slopes, unit may be prone to landsliding and blockfall, especially where foliation is parallel to the slope. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections— Quarried for building stone and stone walls. Bedrock outcrops featured in artwork by Weir and others.	*Og* is part of the Iapetus (Oceanic) Terrane/Connecticut Valley Synclinorium that accreted onto the North American continent during the Paleozoic.
		Brookfield Gneiss (*Ob*)	*Ob* contains medium- to coarse-grained, massive to poorly foliated gneiss that appears in dark and light, distinctly speckled, and banded outcrops. Unit is locally associated with amphibolite or hornblende schist layers. High erosion resistance.	Geologic Hazards—If exposed on steep slopes, unit may be prone to landsliding and blockfall, especially where foliation is parallel to the slope. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Units may have been mined.	*Ob* is part of the Iapetus (Oceanic) Terrane/Connecticut Valley Synclinorium that accreted onto the North American continent during the Paleozoic.
		Walloomsac Schist: (*Ow*) Basal marble member (*Owm*)	*Ow* contains scantly layered schist or phyllite that appears black to dark or silvery gray and is locally feldspathic or calcareous near its base, and strongly retrograded to secondary minerals. *Owm* consists of massive to layered schistose or phyllitic marble that appears dark gray to white in outcrop. Moderate erosion resistance.	Geologic Hazards—Marble and calcareous layers can be prone to preferential dissolution and may weaken areas of the rock. Schistose nature of units may render them unstable on slopes. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Marble may have been quarried locally.	*Ow and Owm* are part of the Proto-North American (Continental) Terrane/Ordovician and Cambrian Shelf Sequence.
		Harrison Gneiss: (*Oh*) Pumpkin Ground Member (*Ohp*) pillow zone (*Ohpz*) garnet-gedrite rock (*Ohgg*)	*Oh* consists of interlayered medium-grained, well-foliated gneiss that appears in bands of dark and light-gray rock in outcrop. *Ohp* contains medium- to coarse-grained, well-layered and foliated gneiss, intermixed with some garnetiferous schist and gneiss locally. *Ohpz* contains medium- to coarse-grained, moderately to well foliated gneiss that appears gray to black in outcrop with some fine cross laminations. *Ohpz* can appear as granular pods 4 cm to 1 m (2 in. to 3 ft) in diameter. *Ohgg* contains medium- to coarse-grained, moderately to well foliated gneiss that appears gray to black with fine laminations and locally contains brown silvery schist. Moderately high erosion resistance. *Oh* is mapped within the park.	Geologic Hazards—If exposed on steep slopes, unit may be prone to landsliding and blockfall, especially where foliation is parallel to the slope. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Units may have been quarried for building stone and stone walls. Bedrock outcrops featured in artwork by Weir and others.	Units originally deposited by marine volcanoes or sedimentation during the Paleozoic prior to accretion onto the North American continent.
LOWER ORDOVICIAN		Ratlum Mountain Schist: (*Or*) Amphibolite unit (*Ora*) calc-silicate gneiss (*Orcs*) coticule-bearing granulite interlayers (*Orct*) uncertain stratigraphic position (*Oru*)	*Or* is medium-grained, interlayered schist and granofels that appears gray to buff in outcrop with many layers of darker amphibolite and quartz-spessartine (coticule) and calc-silicate rock. *Ora* contains massive amphibolite and hornblende gneiss that appears black or mottled in outcrop. *Orcs* is medium-grained, poorly foliated, interlayered quartzo-feldspathic granular rock and medium-grained rusty schist. Layers appear gray to buff in outcrop. *Orct* contains medium-grained, poorly foliated, quartzo-feldspathic granular rock interlayered with coarse-grained, rusty schist. *Oru* is similar to *Orct*, but with uncertain stratigraphic position. Moderate erosion resistance.	Geologic Hazards—Calcite-rich layers can be prone to preferential dissolution and may weaken areas of the rock. Heterogeneous and/or schistose nature of units may render them unstable on slopes. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Units may have been mined.	Units are part of the Iaeptus (Oceanic) Terrane/Connecticut Valley Synclinorium. Units record deformation and metamorphism accompanying accretion onto the North American eastern continental margin during the early Paleozoic.

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Age	Unit Type	Map Unit (Symbol)	Geologic Description	Geologic Issues	Geologic Features and Processes	Geologic History
LOWER ORDOVICIAN AND CAMBRIAN	Bedrock Geologic Units	Row Schist (*OCr*) Stockbridge Marble (*OCs*)	*OCr* contains fine-to medium-grained, poorly layered schist that appears light gray to silvery in outcrop. Layers of granofels are common locally, with rare layers of amphibolite, quartz-spessartine rock (coticule), and calc-silicate rock. *OCs* consists of massive to layered marble with some beds of schist, phyllite, and the metamorphosed equivalents of calcareous siltstone, or sandstone present locally. Moderate to low erosion resistance.	Geologic Hazards—Marble and calcareous layers can be prone to preferential dissolution and may weaken areas of the rock. Schistose nature of units may render them unstable on slopes. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Marble may have been quarried locally.	These two units demonstrate the complex relationships that resulted from the accretion of additional landmasses onto the North American continent during the Paleozoic mountain building events (orogenies), ultimately culminating in the Appalachian Mountains. Pervasive deformation and metamorphism accompanied these events. *OCr* contains sediments that collected in a basin between colliding landmasses during the Paleozoic mountain building events (known as the Iapetus [Oceanic] Terrane/Connecticut Valley Synclinorium). *OCs* was deposited along the margin of the continent prior to the accretion the terrane including *OCr* and was sandwiched between two colliding landmasses (part of a group of rocks called the Proto-North American [Continental] Terrane/Ordovician and Cambrian Shelf Sequence).
CAMBRIAN		Manhattan Schist (*Cm*) Dalton Formation (*Cd*)	*Cm* contains coarse-grained, foliated, generally massive gneiss and schistose gneiss that appears dark gray to silvery in fresh outcrops and weathers to rusty brown colors. Amphibolite layers are present locally. *Cd* consists of medium-grained, well-layered gneiss or feldspathic quartzite that appears gray in fresh outcrops and weathers to a tan to buff color. Pure quartzite layers are toward the top of the formation. Moderately high to very high erosion resistance for quartzite.	Geologic Hazards—If exposed on slopes, unit may be prone to landsliding and blockfall, especially where foliation is parallel to the slope. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Units may have been mined.	These two units demonstrate the complex relationships that resulted from the accretion of additional landmasses onto the North American continent during the Paleozoic mountain building events (orogenies), ultimately culminating in the Appalachian Mountains. Unit *Cm* is part of a terrane that accreted onto the North American continent during the Taconic Orogeny (known as the Proto-North American [Continental] Terrane/Taconic Allochthons [Displace Iapetus Terrane]). *Cd* was deposited along the margin of the continent prior to the accretion of the aforementioned terrane and was sandwiched between the two colliding landmasses (part of a group of rocks called the Proto-North American [Continental] Terrane/Ordovician and Cambrian Shelf Sequence).
PROTEROZOIC		Gneiss of Highlands massifs (*Yg*)	*Yg* contains mixtures of various gneisses that may appear banded and foliated in alternating light and dark layers in outcrop. High erosion resistance.	Suitable for most forms of infrastructure unless highly fractured and/or weathered. If exposed on slopes, unit may be prone to landsliding and blockfall, especially where foliation is parallel to the slope. Radon potential. Disturbed Lands and Adjacent Land Use—Some exposures may have been mined.	Geology and History Connections—Units may have been mined.	*Yg* is part of the original North American craton (Proto-North American [Continental] Terrane/Proterozoic Massifs-"Grenville") the eastern margin of which formed during an early mountain building event, the Grenville Orogeny.