

Chapter 2. Geology and Soils

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Exposed bedrock near the Fall Kill.
Photo credit: Camelia Manring

Geology shapes the landscape in visible and invisible ways - influencing landforms and topography, soil depth and chemistry, resulting in plant communities, as well as the above- and below-ground movement of water and contaminants. These factors influence the establishment of ecosystems and can be important considerations for land development. Geology and soils also contribute important natural and economic resources for human populations, including groundwater recharge and storage, minerals, and construction materials, as well as agricultural resources.

The maps presented in this chapter are only intended to give a general sense of the geologic features and soils of the city, as the data presented were collected at broad scales. The information can be enhanced through local knowledge and site-specific surveys.

Bedrock Geology

Bedrock geology underpins the City of Poughkeepsie's landforms and topography and has shaped patterns of soil development, habitats, and water movement that define the ecological landscape. Characteristics of the bedrock geology strongly influences above and below ground water movement and can determine groundwater storage capacity and the

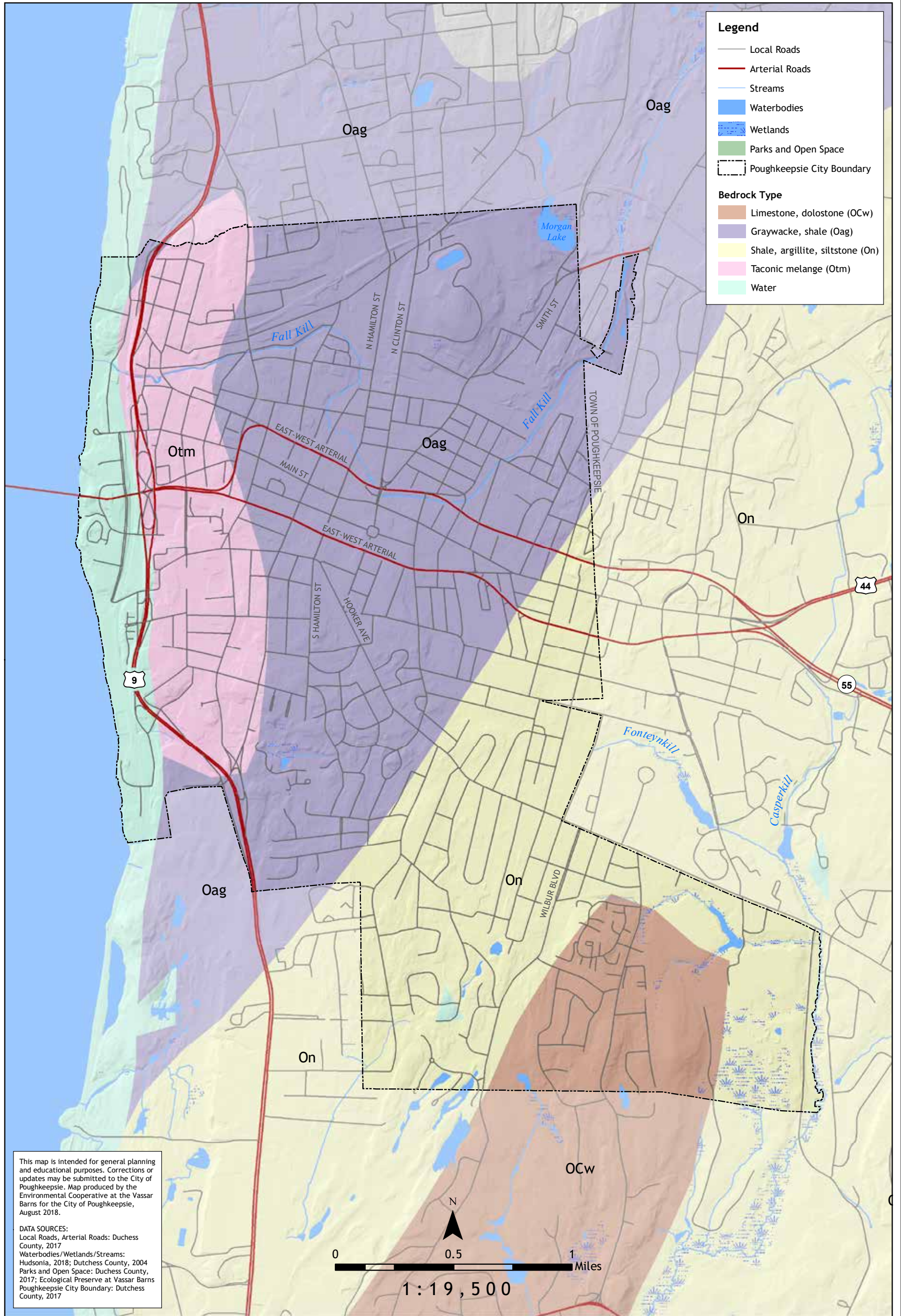
movement of contaminants in water supplies. According to general bedrock geology maps from the New York State Museum ([Map 2.1](#)), bedrock in the City of Poughkeepsie is composed primarily of shale and greywacke which is less permeable (Lower Hudson Bedrock Sheet). The City’s southeastern corner is partially underlain by limestone and dolostone, which are typically more permeable and therefore more susceptible to groundwater contamination from surface water runoff. These calcium-rich carbonate bedrock materials are also more likely to support alkaline or calcareous habitats and plant communities. [Table 2.1](#) describes the various bedrock formations in the City of Poughkeepsie

Table 2.1: Bedrock geology descriptions of the City of Poughkeepsie

Map Symbol	Bedrock Type	Description
OCw	Limestone, dolostone	Wappinger Formation; water-soluble rocks “formed primarily from the precipitation of calcium and magnesium carbonate in seawater, commonly through the action of algae and other organisms like corals and mollusks.” (Budnik, Walker, & Menking, 2010) Calcareous (Kiviak & Stevens, 2001)
Otm	Taconic Melange	“Relatively unaltered to moderately metamorphosed autochthonous clastic sedimentary rocks...a jumbled mix of sandstone blocks in a matrix of mud.” (Budnik, Walker, & Menking, 2010)
Oag	Graywacke, shale	Austin Glen Formation; Coarse-grained sandstone containing >15% clay. Potentially calcareous (Haeckel & Heady, 2014)
On	Shale argillites, siltstone	Normanskill Formation; gray to black shales and argillites with silty laminations. (Fisher, Isachsen, & Rickard, 1970)
N/A	Water	Unknown; adjacent to Hudson River. (Budnik, Walker, & Menking, 2010)

Bedrock Geology

City of Poughkeepsie, New York



This map is intended for general planning and educational purposes. Corrections or updates may be submitted to the City of Poughkeepsie. Map produced by the Environmental Cooperative at the Vassar Barns for the City of Poughkeepsie, August 2018.

DATA SOURCES:
 Local Roads, Arterial Roads: Dutchess County, 2017
 Waterbodies/Wetlands/Streams: Hudsonia, 2018; Dutchess County, 2004
 Parks and Open Space: Dutchess County, 2017; Ecological Preserve at Vassar Barns
 Poughkeepsie City Boundary: Dutchess County, 2017

Surficial Geology

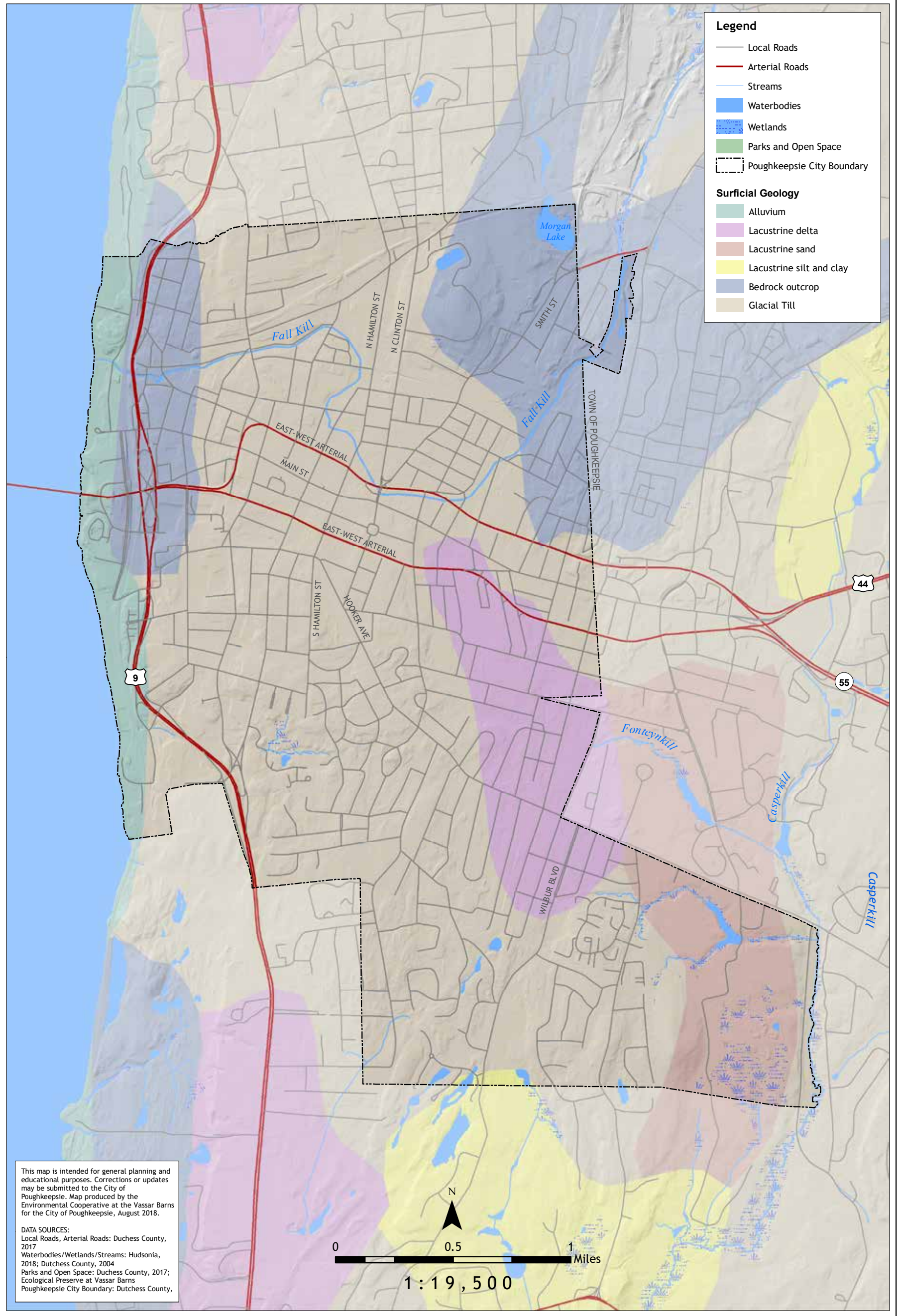
Surficial geology refers to the layer of unconsolidated sediment that sits above bedrock. Surficial geology materials mapped in the City of Poughkeepsie include sand and gravel, clay and silts, and glacial tills, presented in [Table 2.2](#). These materials influence soil development and can affect suitability for development projects such as the construction of new roads, and buildings, or septic systems. They are therefore important to consider in urban planning. Surficial materials also affect surface and groundwater flow and storage; for example, alluvium, which are formed by riverine deposits, are often associated with high-yield unconsolidated aquifers (Gilchrist, et al., 2010). Certain surficial deposits also have important economic value; for example, sand deposits may be mined for road maintenance and construction uses.

Table 2.2: Surficial geology descriptions in the City of Poughkeepsie (NYS Museum, 2018)

Surficial Material	Description (Lower Hudson Surficial Shape)
Alluvium	Formed by riverine deposits. Oxidized fine sand to gravel, permeable, generally confined to flood plains within a valley, in larger valleys may be overlain by silt, subject to flooding, thickness 1-10 meters
Lacustrine delta	Formed by ancient lakes. Coarse to fine gravel and sand, stratified, generally well sorted, deposited at a lake shoreline, thickness variable (3-15 meters).
Lacustrine sand	Formed by ancient lakes. Generally, quartz sand, well sorted, stratified, usually deposited in proglacial lakes, but may have been deposited on remnant ice, generally a near-shore deposit or near a sand source, permeable, thickness variable (2-20 meters).
Lacustrine silt and clay	Formed by ancient lakes. Generally laminated silt and clay, deposited in proglacial lakes, generally calcareous, low permeability, potential land instability, thickness variable (up to 50 meters).
Bedrock outcrop	Exposed bedrock, generally within 1 meter of surface.
Glacial Till	Variable texture (boulders to silt), usually poorly sorted sand-rich diamict, deposition beneath glacier ice, permeability varies with compaction, thickness variable (1-50 meters).

Surficial Geology

City of Poughkeepsie, Dutchess County, New York



Legend

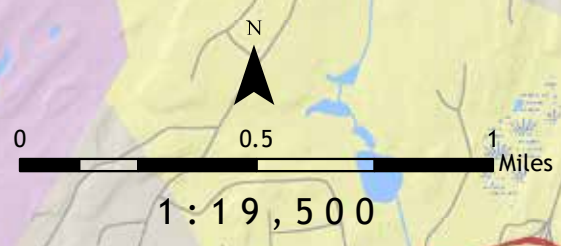
- Local Roads
- Arterial Roads
- Streams
- Waterbodies
- Wetlands
- Parks and Open Space
- Poughkeepsie City Boundary

Surficial Geology

- Alluvium
- Lacustrine delta
- Lacustrine sand
- Lacustrine silt and clay
- Bedrock outcrop
- Glacial Till

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Soils

Soil is the foundation for ecosystems and many natural processes and strongly influences feasibility for land use and development. Soil controls the decomposition of organic matter and biogeochemical cycles; regulates water flow; and influences the vegetation, habitat type, and agricultural potential of particular locations (Haeckel & Heady, 2014). Some important soil characteristics include pH, soil texture, reaction (acidity), permeability, drainage, organic content, depth to bedrock, and slope. These soil characteristics determine the establishment of habitats and distinct plant communities. From a land use perspective, consideration of soil properties is important. It will impact such things as planning and design of drainage systems, the siting of structures, septic system evaluation, properly engineering foundations, basements, and roads, and determining the feasibility of excavation.

There are many soil types in the City of Poughkeepsie, and each soil type is further classified by variation of slope and topography. The reaction (pH), depth to bedrock, and drainage classifications for each soil survey unit are displayed in [Table 2.3](#). Full descriptions of each listed soil type can be found with the Dutchess County Soil Survey or using the USDA Web Soil Survey.

Table 2.3: Soil types of the City of Poughkeepsie. (Web Soil Survey, 2018, Soil Survey of Dutchess County, New York, 2001)

Name on Map	Full Name	Soil Reaction	Depth to bedrock (inches)	Drainage
BeC	Bernandon Silt Loam, 8-15% slopes	Very strongly acid to moderately acid	>60	Well-drained
BeD	Bernandon Silt Loam, 15-25% slopes	Very strongly acid to moderately acid	>60	Well-drained
BgB	Bernandon Silt Loam, 3-8% slopes	Very strongly acid to moderately acid	>60	Well-drained
Ca	Canandaigua Silt Lam	Moderately acid to neutral in the surface and upper subsoil, neutral in the lower subsoil and substratum	>60	Very poorly drained
DwB	Dutchess Cardigan Complex, undulating/rocky	Very strongly acid to moderately acid in solum, strongly acid to slightly acid in the substratum	>60	Well-drained

Table 2.3: Soil types of the City of Poughkeepsie. (Web Soil Survey, 2018, Soil Survey of Dutchess County, New York, 2001) (Continued)

DwC	Dutchess Cardigan Complex, rolling/rocky	Very strongly acid to moderately acid in solum, strongly acid to slightly acid in the substratum	>60	Well-drained
DxB	Dutchess Cardigan Urban Land Complex, undulating/rocky	Very strongly acid to moderately acid in the solum, and strongly acid to slightly acid in the substratum	20-40	Well-drained
DxC	Dutchess Cardigan Urban Land Complex, rolling/rocky	Very strongly acid to moderately acid in the solum, and strongly acid to slightly acid in the substratum	>60	Well-drained
Fr	Fredon Silt Loam	Moderately acid to neutral in the surface and subsoil, and slightly acid to moderately alkaline in the substratum	>60	Somewhat poorly drained
HeA	Haven Loam, nearly level	Very strongly acid to moderately acid	>60	Well-drained
HsA	Hoosic Gravelly Loam, nearly level	Very strongly acid or strongly acid above 30 inches, very strongly acid to slightly acid below 30 inches	>60	Somewhat excessively drained
HsD	Hoosic Gravelly Loam, hilly	Very strongly acid or strongly acid above 30 inches, very strongly acid to slightly acid below 30 inches	>60	Somewhat excessively drained
KrB	Knickerbocker Fine Sandy Loam, undulating	Very strongly acid to moderately acid	>60	Somewhat excessively drained

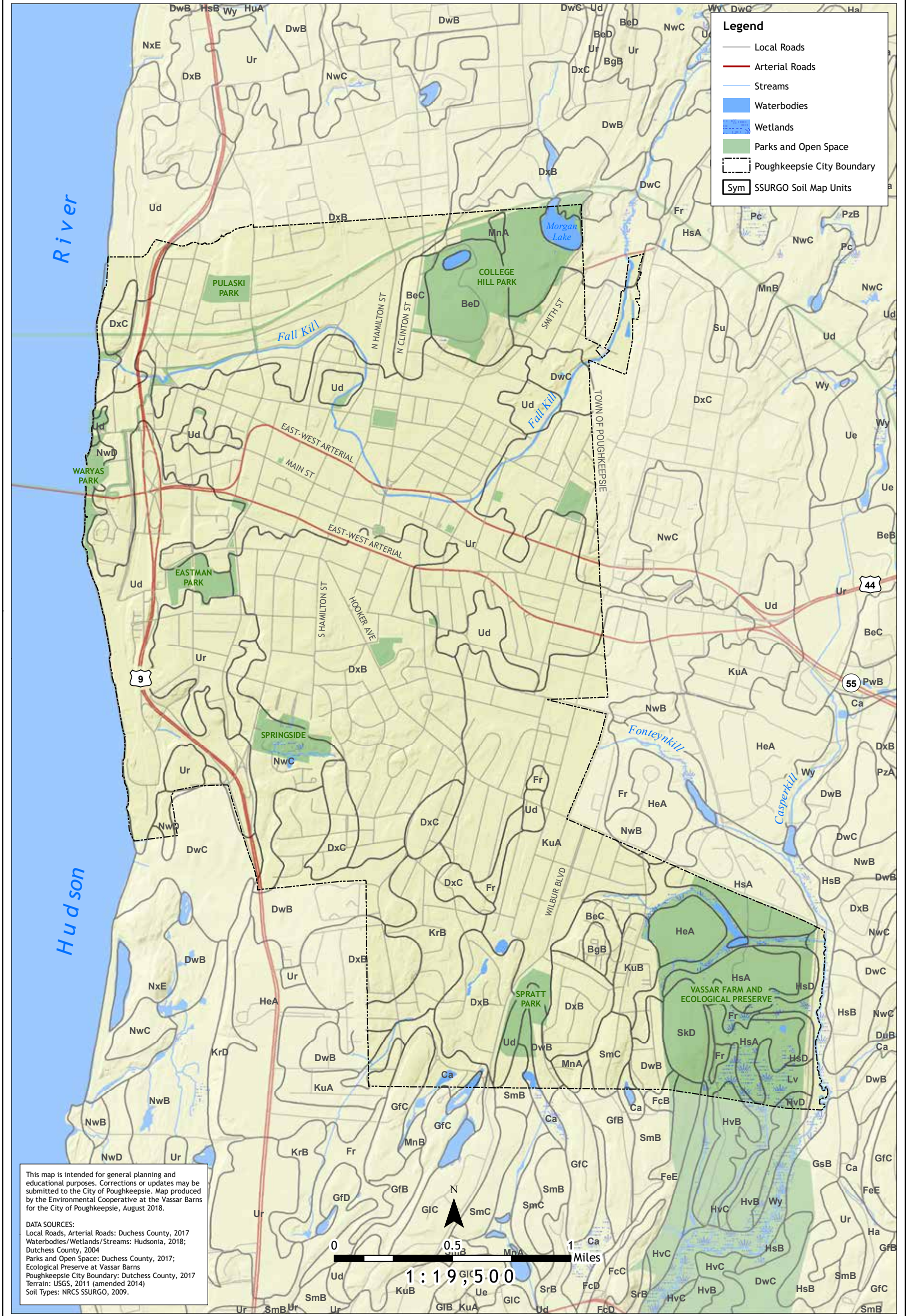
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KuA	Knickerbocker Urban Land Complex, nearly level	Very strongly acid to moderately acid	>60	Somewhat excessively drained
KuB	Knickerbocker Urban Land Complex, undulating	Very strongly acid to moderately acid	>60	Somewhat excessively drained
Lv	Livingston Silt Clay Loam	Strongly acid to neutral in the surface and upper subsoil, neutral to moderately alkaline in the lower subsoil and substratum	>60	Very poorly drained
NwC	Nassau-Cardigan Complex, rolling/very rocky	Very strongly acid to moderately acid	20-40	Somewhat excessively drained
NwD	Nassau-Cardigan Complex, rolling/rocky	Very strongly acid and strongly acid	20-Oct	Somewhat excessively drained
SkD	Stockbridge Silt Loam, 15-25% slopes	Strongly acid to neutral in the surface, moderately acid to neutral in the subsoil, moderately acid to moderately alkaline in the substratum	>60	Well-drained
SmC	Stockbridge-Farmington Complex, rolling/rocky	Strongly acid to neutral in the surface, moderately acid to neutral in the subsoil, moderately acid to moderately alkaline in the substratum	>60	Well-drained
Ud	Udorthents, smoothed	N/A	>80	Well-drained
Ur	Urban Land	N/A	Variable	Covered by impervious materials

Map 2.3 Soil types in the City of Poughkeepsie

Soil Types

City of Poughkeepsie, New York



References

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