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Soil Map and Geologic Map of the Chanler Estate Town of Geneseo, Livingston County, western NY, 14454

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Soil Map and Geologic Map of the Chanler Estate

Town of Geneseo, Livingston County, western NY, 14454

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Abstract: Utilizing Livingston County estate maps, USGS topographic maps, and publicly available soil survey information, a soil map and geologic map were created for the Chanler estate in Geneseo NY. The estate encompasses Fall Brook Glen, a hanging valley which cuts through Upper Devonian strata in the following order: West River shale, Genundewa limestone, Penn Yan shale, Geneseo Shale, Leicester Pyrite, and Moscow formation. Topographic maps were analyzed for slopes, and zones were delineated based on severity of hillslope. Using web soil survey data from the USDA Natural Resources Conservation Service (NRCS), varying zones of soils were analyzed for their current uses, and potential uses in the future. It was concluded that much of the soils on the Chanler estate were prime farmland as a result of the fertile silty loams with gently sloping topography. A survey of the geology under these soils was completed, and a geologic map of Upper Devonian strata in Fall Brook was compiled. Following the soil map and geologic map, it was recommended that the most fertile, gently sloping regions on the estate should be used for farmland, while the more sloped regions would best be suited as orchards due to their instability for field crops.

Introduction: In order to develop an understanding of the soils and bedrock geology within the Chanler estate, multiple data sets were analyzed. Topographic data from the USGS was used to make graphics that delineate sloped regions remotely (Fig. 1A). Web soil survey data from the USDA Natural Resources Conservation Service was used to produce graphics depicting prime and poor farmland (Fig. 1B; Fig. 2). Stratigraphic correlation data from Kirchgasser et al. (1994), was used to overlay the strata of Fall Brook Glen on an image of the falls (Fig. 3). The geology, soil types, and gradient of acreage were then used to evaluate optimum land use.

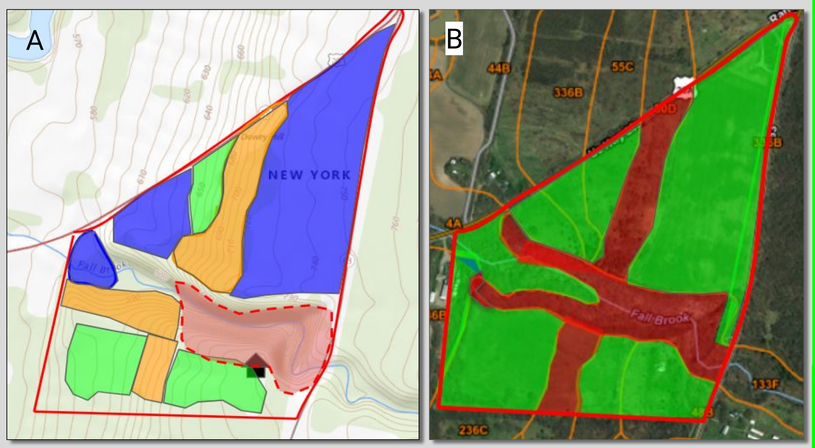


Figure 1. A.) Topographic map modified from USGS state databases. The estate is outlined in red. Blue represents areas of 3% to 8% slope. Green represents areas of 8% to 15% slope. Orange represents areas of 15% to 25% slope. Red represents areas of 25% to 50% slope. The black house symbol represents the residency on the estate. **B.) m**odified satellite images from Google Earth. The red regions are poor farmland, the green represents prime farmland.

Schoharie	Silty Soils
Soil Type	Properties
Schoharie & Odessa Lake Terrace Soils.	Silty, and organic rich. Requires good drainage.
Slope:	3% to 8% Or 8% to 15%

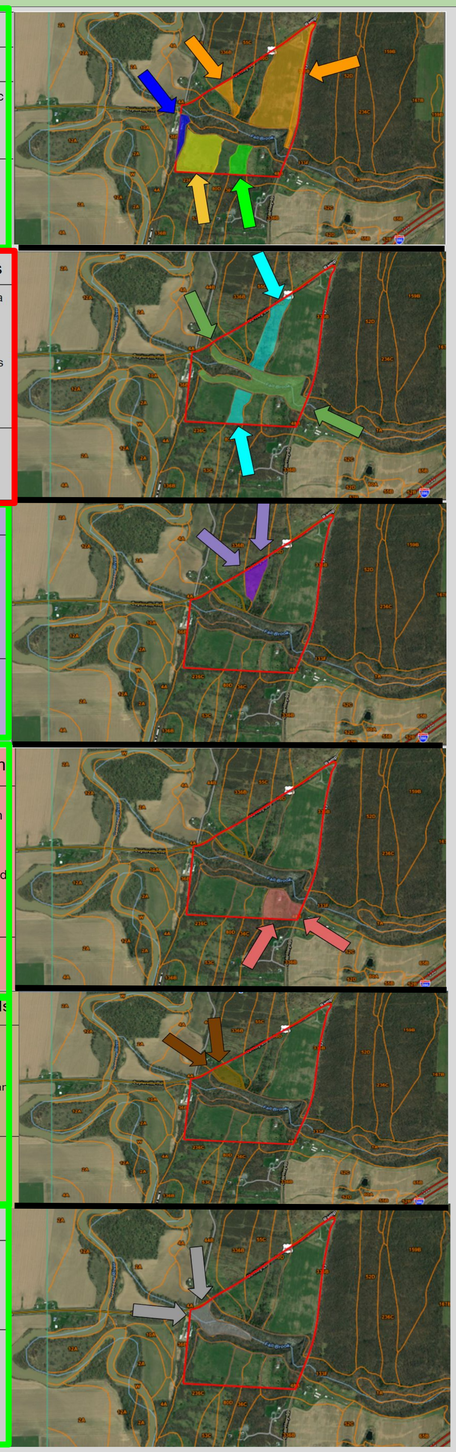
Hudson and	Aurora Soils
Hudson and Aurora Glaciolacustrine Soils	Hudson and Aurora soils made of clayey/silty glaciolacustrine deposits. Loam made of calcareous shale with sandstone and limestone. Poor farmland.
Slope:	8% to 15% Some areas by falls 25% to 50%.

Cazenovia	Silt Loam
Cazenovia Silt Loam	Cazenovia silt loam made of limestone and reddish lake-laid clays or reddish clay shale. Good farmland statewide.
Slope:	15% to 25%

Arkport	Sandy Loam
Arkport Fine Sandy Loam	Arkport fine sandy loam from glaciofluvial or deltaic deposits. Fine or very fine-grained sand Prime farmland that drains well.
Slope:	3% to 15%

Galen and	Colonie Sands
Galen & Colonie Soils	Galen and Colonie soils from sandy deltaic deposits. Other sandy glaciofluvial or eoliar deposits possible. Prime farmland.
Slope:	3% to 8%

Teel	Silt Loam
Teel Silt Loam	Teel silt loam derived from silty alluvium. Prime farmland that drains well.
Slope:	8% to 15%



Methods:

Utilizing soil survey data from the USDA Natural Resources Conservation, soil types were delineated and analyzed for farmland suitability (Fig. 2). The graphics were developed from USGS slope data, as well as soil data and satellite imaging. Regions of the property were designated based on soil properties. Based on the soil properties (Fig. 2).

Parameters:
Organic content
Calcareosity
Drainage ability
Slope
Grain size

←

Figure 2. Modified satellite maps displaying soil types and locations from USDA data. Tables to the left of each image give soil and hillslope information. Red outlined tables represent poor farmland. Green outlined soil tables represent prime farmland.

Backgound Geology:

Strata are Middle and Late Devonian in age; approximately 390 to 370 mya. They represent a time when western New York was submerged under a shallow, warm sea. Interbedded black and gray shales predominantly. Black shales represent higher sea level with increased organic deposition. Gray shales are more fossiliferous and typical of shallower water. The Genundewa Limestone is a limestone formed during a time of low sedimentation.

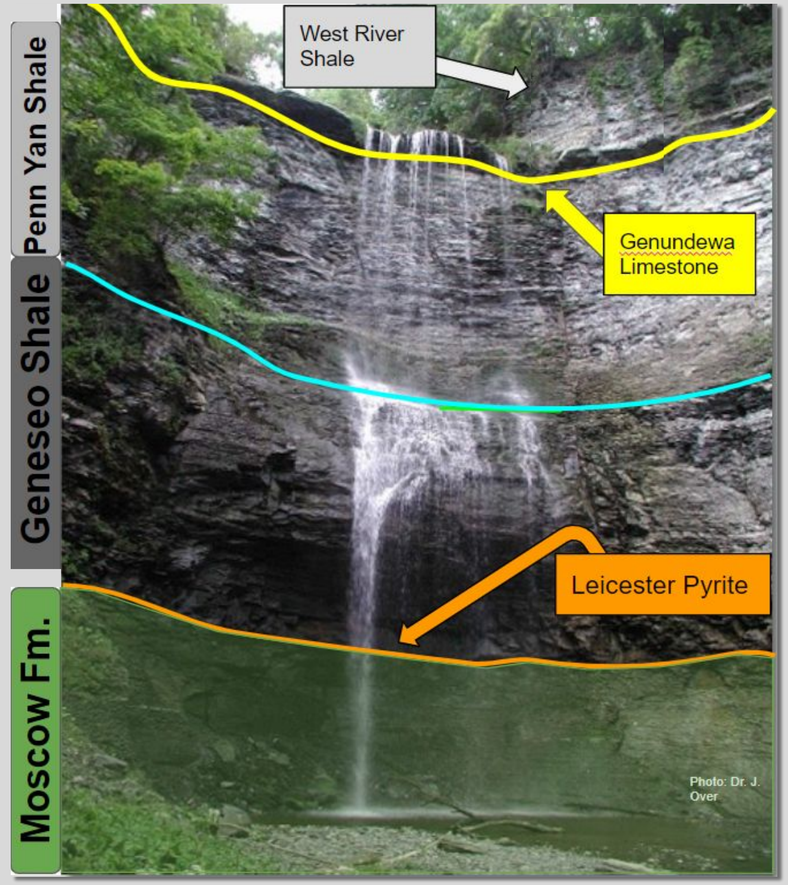


Figure 3. Photo of Fall Brook Falls and stratigraphic units.

Conclusions:

The green regions (Fig. 1B) are well-suited for field crops like soybeans. The red regions are either too steep, and/or too calcareous for profitable farmland. The northeastern most green region is currently under tillage. The glacially and lake-deposited sediments of the Genesee Valley are incredibly fertile and represent some of the most productive farmland in America.