

## SOIL SURVEY OF ONEIDA COUNTY, NEW YORK.

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### DESCRIPTION OF THE AREA.

Oneida County, New York, is just northeast of the central part of the State. It has an area of 1,226 square miles, or 784,640 acres. It is bounded on the north by Oswego and Lewis Counties, on the east by Herkimer County, on the south by Madison County, and on the west by Madison and Oswego Counties. West Canada Creek forms an irregular boundary between Oneida County and Herkimer County for a distance of nearly 18 miles, from a point a little north of the village of Poland northward. On the west the boundary line follows Oneida Creek, which rises in the northern part of Stockbridge Town<sup>1</sup> and flows northwestward into Oneida Lake. From the mouth of this creek the boundary follows the south shore of the lake to a point about 1 mile west of the village of Lakeport, extending thence across the lake to the southwest corner of the town of Vienna.

The topographic features of Oneida County are varied, the elevation ranging from about 370 feet to over 1,940 feet above sea level. The lowest part of the county is near Oneida Lake, while the highest points are at Tassel Hill, 1,944 feet above sea level, in the southeastern part of Marshall Town, in the southern part of the county, and at Penn Mountain, 1,806 feet above sea level, in the northern part of Steuben Town, in the northern part of the county.

The upland regions of the county are divided by an old lake-bed plain and river valley. The former is a part of the old glacial Lake Iroquois, which where it enters the county from the west is about 9 miles wide. This gradually narrows until at Rome it merges into the old glacial river channel, about 1 mile in width. This channel is now occupied by the Mohawk River, which flows in a southeasterly direction, leaving Oneida County near Utica.

Extending from each side of this old lake-bed plain into the upland regions are several comparatively narrow valleys. These are traversed by small streams, the most important of which are Oneida, Oriskany, and Sauquoit Creeks, extending southward, and Wood and

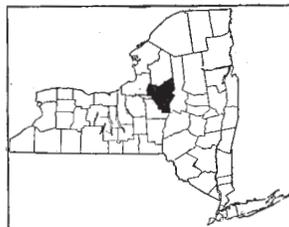


FIG. 1.—Sketch map showing location of the Oneida County area, New York.

<sup>1</sup> The "town" in New York State is synonymous with the "township" of other parts of the country.

Fish Creeks, and the Mohawk River and Ninemile Creek and their branches, extending northward.

The topography of the uplands, including the high, broad hills and narrow valleys, shows the results of glacial action on the old plateau. In the northern part of the county in particular the streams have often cut through the soft underlying shale formations, leaving almost perpendicular shale ravines. Along the Black River and to the east is a region characterized by high sandy terraces, backed by the rough, rugged foothills of the Adirondack Mountains.

The drainage of the northwestern part of the county reaches the Atlantic Ocean through Oneida Lake and its outlet, while that of the northeastern part finds the same outlet through the Black River. The southwestern corner is drained through the Chenango and Susquehanna Rivers, and the southeastern part by the West Branch of Unadilla River, a tributary of the Susquehanna. The central part of the county is drained by the Mohawk and Hudson Rivers.

The drainage of a small group of lakes in the extreme northeastern part of the county, Otter, Long, White, and Round Lakes and Round Pond, flows ultimately into the Black River. Several reservoirs, already constructed or in course of construction, serve as feeders for canals. These are located at Forestport, Delta, and Hinckley.

This county was visited at an early date by white explorers, owing to the easy means of transportation afforded by the Mohawk River. There is evidence that a small "carry" between the Mohawk River and Wood Creek, the only route of transportation between New York and Oswego on Lake Ontario, was used for some time prior to 1705, for the carriage of goods and persons.

The first permanent white settlement within the region of the present Oneida County was made at Whitestown in 1784. Subsequently settlers from sections to the east and from the New England States entered the county, and nearly all these pioneers at once cleared land and engaged in agriculture. The abundant water power encouraged the erection of grist mills, and distilleries, tanneries, and asheries were operated.

The growth of the county in population has been rapid. In a census compiled in 1790, the population of Whitestown, which at that time included almost all of central and western New York, is reported as 1,891. The present boundaries of Oneida County were established in 1816. Four years later the first census obtained after the establishment of the county reports the population as 50,997. In 1855 there were 107,749 people in the county. Then followed the Civil War, during which period there was practically no increase in the population, but since that time the population has steadily increased. In the census of 1910 it is given as 154,157.

Utica and Rome are the only cities in the county, with a population of 74,419 and 20,497, respectively. Other important towns are Whitesboro, with a population of 2,375; Camden, with 2,170; Boonville, 1,794; Waterville, 1,410; Clinton, 1,236; and New Hartford, with 1,195.

Transportation facilities, both by rail and by canal, are of the best. The railroads, of which there are several, maintain excellent schedules, while a number of canals attract freight by their low rates.

Cheap and convenient transportation is also furnished by electric trains over the West Shore Railroad from Syracuse to Utica and over an electric line from Little Falls to Rome.

Excellent markets are available for all products of Oneida County. Only a little over one-fourth of the population is engaged in agriculture, and the result is that there is a strong local demand for agricultural products, while the large cities to the west and the markets of New York are within easy reach.

#### CLIMATE.

The climate of Oneida County is characterized by a wide range in temperatures between the summer and winter seasons. The summers are generally warm, with short periods of extreme heat, while the winters, of 4 or 5 months duration, are cold, and heavy snows are common.

There is a marked difference between the climate of the lowlands and that of the uplands, due mainly to the differences in elevation. The lowlands have a higher temperature throughout the year, while the uplands receive a greater quantity of snow, especially in the northern part of the county.

At the Weather Bureau station at Rome, in the east-central part of the county, at an elevation of 470 feet above sea level, the mean annual temperature is reported as 46° F. The highest temperature recorded at this station is 97° F. and the lowest is -22° F. The temperature for the summer months averages 68° F. July is normally the hottest month. The average temperature for the winter is 22° F., and for the spring and fall 44° F. and 48° F., respectively.

The precipitation is quite evenly distributed throughout the year, though periods of excessive rainfall or of drought sometimes occur. The mean annual precipitation is reported by the Rome station as about 48 inches. The rainfall is heaviest during the summer months, averaging nearly 14 inches. For the winter, spring, and fall it averages between 11 and 12 inches. This county lies partly within the region of greatest rainfall of New York State. The snowfall occurs during the months of December, January, February, and March. For the three winter months the average total depth is reported as 66.2 inches. The snowfall is heaviest in December and January.

The average date of the last killing frost in the spring is May 10, according to the records of the Rome station, and of the first in the fall September 30. The latest date of killing frost in the spring is June 7, and the earliest date recorded in the fall is September 1. There is a normal growing season of about 143 days.

The table below, compiled from the records of the Weather Bureau station at Rome, gives the normal monthly, seasonal, and annual temperature and precipitation at that point, and these figures are fairly representative of the general climatic conditions throughout Oneida County:

*Normal monthly, seasonal, and annual temperature and precipitation at Rome.*

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	25	67	-19	4.2	4.2	4.0	26.2
January.....	21	64	-22	3.4	1.9	5.7	16.7
February.....	21	55	-20	3.7	2.9	4.8	23.3
Winter.....	22			11.3	9.0	14.5	66.2
March.....	30	75	-14	4.5	0.9	4.0	4.0
April.....	45	86	15	2.8	2.6	4.0	T.
May.....	57	95	24	4.0	2.6	7.0	0.0
Spring.....	44			11.3	6.1	15.0	4.0
June.....	66	97	31	4.5	2.0	6.6	0.0
July.....	70	97	42	4.8	3.4	3.2	0.0
August.....	67	94	41	4.3	3.5	5.7	0.0
Summer.....	68			13.6	8.9	15.5	0.0
September.....	60	91	30	3.8	2.5	8.6	0.0
October.....	49	84	20	3.5	2.0	7.3	T.
November.....	36	68	0	4.4	4.3	6.0	.....
Fall.....	48			11.7	8.8	21.9	.....
Year.....	46	97	-22	47.9	32.8	66.9	.....

#### AGRICULTURE.

In Oneida County agriculture was first practiced by the aborigines, who cultivated small patches which were devoted mainly to corn and apples. The early settlers cleared more extensive areas, and grew corn, wheat, and a few vegetables. Corn and wheat were the staple crops, and gristmills were established along the streams. Subsequently oats became an important crop. Large quantities of potash

salts were obtained in asheries from the ashes of the timber which was cut and burned as the land was cleared. Distilleries, sawmills, woolen mills, and tanneries were also important factors in the early development of the county. Hops were first grown about 1820. This crop steadily increased in importance, and at present the vicinity of Waterville is recognized as one of the leading hop-growing districts of the United States.

The 1880 census reports the total area of improved farm land as 541,628 acres, or approximately 72 per cent of the total area of the county. At that time 5,406 acres were devoted to wheat, and a total yield of 89,958 bushels is reported. The wheat crop is now of relatively little importance. The 1910 census reports a total of 555 acres in wheat, with a production of 14,384 bushels. A total of 160,569 acres was used for hay land in 1880, while the census of 1910 reports an area of 178,203 acres in hay and forage crops, with a total production of 321,802 tons of hay. In the 1880 census oats are reported on 31,664 acres, with a yield of 1,092,675 bushels. The production of oats has gradually decreased, in 1910 the production being 721,449 bushels harvested from 26,006 acres. In 1880 corn is reported on 19,622 acres, producing 630,432 bushels. A total of 10,341 acres was devoted to corn in 1909, with a yield of 402,688 bushels. During this same 30-year period the area devoted to rye, buckwheat, and barley has decreased markedly—barley from 2,741 acres to 896 acres, buckwheat from 4,125 to 2,613 acres, and rye from 1,446 to 423 acres. Irish potatoes were grown on 11,847 acres in 1879, with a production of 1,237,213 bushels, and on 8,721 acres in 1909, with a production of 1,192,575 bushels. Beans are reported on 172 acres and peas on 98 acres in the 1910 census, and a total of 8,715 acres is devoted to the production of other vegetables. Hops occupied 2,504 acres, with a total yield of 1,804,878 pounds. The value of fruits and nuts produced in Oneida County in 1909 is reported as \$183,607. In 1909, 6,487 pounds of maple sugar and 21,948 gallons of maple sirup were produced in this county.

According to the 1910 census there is a total of 690,431 acres, or 86.3 per cent of the total area of the county, in farms, and of this, 456,642 acres, or 66.1 per cent, is improved. The average-sized farm contains approximately 100 acres.

In general, the agriculture of Oneida County consists of dairying, the production of hay, grain, some fruit, and hops.

The dairy industry has been important in Oneida County since its early settlement. Before transportation facilities were highly developed dairying was practiced to supply home needs and a small local demand. With the opening of the railroads the industry developed rapidly, and large quantities of cheese and butter were

manufactured. About 1890 the practice of shipping milk direct to New York City became popular. At first the shipments were small, but to-day the production and handling of milk for market receives special attention. The great bulk of all the milk produced in this county is now shipped to New York City, where fair prices are obtained. When the greater part of the milk was made into butter and cheese it was produced mainly during the summer season, but under present conditions it is necessary that the milk be produced during every month in the year. This change affected the feeding system. Silos were constructed to store ensilage for winter use, while more attention was paid to the production of hay and fodder, and the grain ration was increased. The stock was carefully housed. The strict regulations of the boards of health with respect to the sanitation of the barns have done much to improve the quality as well as the quantity of the milk shipped to the large markets. The Holstein is the predominating breed in the dairy herds, some of which include registered stock.

The value of leguminous crops for feed has been more generally recognized within recent years. Since 1900 the acreage of clover has increased about 200 per cent and of alfalfa about 850 per cent. The extension of the acreage has made possible the keeping of a larger number of cows and the production of an increased quantity of stable manure to return to the soil.

Canning factories for preserving peas, beans, beets, corn, tomatoes, etc., are located in several towns in the county, and a relatively large acreage is devoted to the production of these crops. Formerly the scarcity of labor interfered with the development of this industry, but the immigration of large numbers of foreigners has relieved this stringency.

The forests have had an important part in the development of this county. Originally the entire region was heavily forested, and in order to cultivate the land the early settlers cut and burned large tracts with an almost total loss of the timber. This was often done with but little regard for the future management of the land. It is said that nearly one-third of the total area of the county consists of land which can never have a permanent value until it is covered with a properly regulated forest. Such forestation would not only give these lands a permanent value, but would afford protection to the watersheds and help to improve conditions in other parts of the State.

Crop adaptation has been recognized only in a broad way by the farmers of this county. Celery and onions are grown on a small scale on Muck, the only local type of soil well suited to their production. The hill lands are largely devoted to dairying and general farming. The crops for the canning factories are largely grown on

the gravelly loams and lighter textured soils, the best soils for that purpose. Hops and alfalfa are confined largely to the calcareous Ontario loam, from which good yields are obtained. Potatoes and buckwheat are grown to some extent on soils of the Volusia and Mohawk series. The restriction of crops to the soils best adapted to their production has never received careful attention, and nearly all the soils are used to some extent for all the crops commonly grown in the region.

Crop rotation is practiced more because of convenience in farm management than because of its beneficial effects upon the soils and the increase in crop yields. A common rotation is corn one year, oats one or two years, followed by meadow for several years, until the sod runs out. The length of time a field is used for hay production depends upon the soil. On the poorer lands the fields are often left in grass for more than 10 years.

In the southern part of the county, or on the better farms, scientific methods and modern machinery are in use. Deep plowing and thorough cultivation are usually practiced. In the poorer parts of the county, however, the soils are not as a rule properly managed. The barnyard manure is wasted, the plowing is shallow, cultivation is inadequate, and crop rotation is neglected. The farms are large and modern hay loaders are used to harvest the most important crop, hay, which is sold.

These conditions, especially in the northern part of the county, can be improved materially and even permanently by the gradual substitution of a new type of farming to consist mainly of the raising of live stock. At present the production of hay is profitable in only a few cases, because of the high cost of labor and of the fertilizers which are required to maintain the productiveness of the farms. Some wood ashes are used, but the use of lime is not common, while the turning under of green-manuring crops is seldom practiced, and only a small quantity of manure or commercial fertilizer is used. The farms produce fair yields of potatoes and buckwheat.

Throughout Oneida County there is an inadequate supply of farm labor, owing to the opportunities offered in the two large manufacturing cities within the county, and it is necessary for the farmers to plan their work to meet this condition. Wages range from \$25 to \$40 per month. An expenditure of \$904,250 for farm labor is reported for Oneida County in the 1910 census. In harvesting the special crops, such as hops, peas, etc., the laborers employed are mainly foreigners, who are paid on a basis of the work actually performed.

About 79 per cent of the farms in Oneida County are operated by the owners. Farms are usually rented on a share basis. According

to the custom prevalent in this section of the State, the owner furnishes the land, one-half the seed and commercial fertilizer, and part of, or sometimes all the dairy stock, and the gross returns are divided equally.

The value of farm lands varies with the location. The river flats between Rome and Utica are generally valued at over \$175 an acre, but this is not strictly its agricultural value. Land in the northern and northeastern part of the county can be purchased for \$1 to \$20 an acre, while that in the southern part of the county near Waterville ranges in value from \$40 to \$75 an acre. The average value of land as given in the census of 1910 is \$22.77 an acre, showing an increase of \$19.10 an acre over the value reported in 1900.

There is a general need throughout Oneida County for an improvement in agricultural conditions. The Worth, Volusia, and Mohawk soils in particular are far below their natural value and productiveness. This is due primarily to poor management, resulting largely from the scarcity of labor. These soils, because of their location and surface drainage, are particularly suitable for dairying and stock raising. In some places, both in the hilly sections and in the lowlands, drainage is needed.

#### SOILS.

According to their origin and mode of formation, the soils of Oneida County fall into four groups, namely, glacial drift soils, residual soils, stream terraces and lake-deposited soils, and alluvial soils. The first of these groups of soils is closely related to the second, as is shown by the rock fragments contained in this glacial drift, together with the outcropping ledges of the parent formations.

The rocks underlying Oneida County embrace sixteen distinct divisions or formations, commencing with the Archean and ending with the Devonian.

The drift or glacio-residual soils cover the larger part of the county. They comprise six divisions. The first division in the extreme southern part of the county is the remains of an old plateau which was badly eroded to a rolling and hilly topography and later covered by a thin deposit of glacial till. This material is relatively shallow and is derived very largely from the underlying formation, the Hamilton shales of the Devonian period. The soils resulting from the shallow till of this region are classed with the Volusia series, which is characterized by its light color and poor agricultural development. Other areas of the Volusia silt loam are developed on the high hills north of Utica, and extensive areas of the Volusia loam are developed at lower elevations west of Utica and south of Rome.

Corresponding in some ways to the Volusia series as found in the southern part of the county is a region to the northeast of Rome,

characterized mainly by a relatively thin glacial mantle. This is immediately underlain by black, soft, thin-bedded, easily eroded Utica and Frankfort shales. As a result of the ice sheet passing over these formations, large quantities of the soft rocks were eroded, ground up, and mixed with other glacial material, leaving a mantle of variable thickness, over which is scattered large glacial boulders, carried down from the Adirondack mass to the north. Owing to the incorporation of the underlying black shales, the resulting soils are of a darker color than the Volusia and are classified as the Mohawk soils, or where of nonagricultural character as Steep broken land.

A later advance of the great ice sheet which covered this entire region left an irregular boundary in the southern part of this county between the feebly glaciated section and a region characterized by a comparatively thick till. There is a marked difference between the soils resulting from this heavy till and the Volusia soils, due to the underlying rock formation. Local rocks have entered largely into the composition of these soils, as is shown by the presence of stone fragments and the coloration from the red shales and sandstone of the Salina and Medina formations. However, there is some foreign material. Along the southern edge of this deep till the underlying rocks are the Hamilton shales. The rock formations encountered to the northward are the Onondaga limestone, Oriskany sandstone, Helderberg limestone and water lime, Salina shale and limestone, Clinton shale and sandstone, Medina sandstone, and Oneida conglomerate. These rocks all contribute largely to the stone content of the soil and have a considerable influence on agricultural conditions. The soils overlying the limestone and those strongly influenced by limestone are mapped as the Honeoye, while those derived largely from the shale formations, with but little limestone influence, belong to the Ontario series.

The fourth division of the glacial drift soils is represented by a section in the northwestern part of the county. This region was at one time covered by the great ice sheet, and it is greatly changed by the heavy glaciation. The underlying Medina and Oswego sandstones of the Hudson River formations have given rise to soils distinguished by their high rock content and light texture. These soils belong to the Worth series, although in this section they are more or less discolored by the Medina sandstone.

Another division of the glacial soils comprises an area in the northeastern part of this county. The underlying rock formation is limestone. As the ice sheet moved down from the Adirondack mass, carrying large granite boulders, it gouged and broke into the underlying Trenton limestone, leaving a soil material of both local and foreign origin, covered with glacial erratics ranging in size from a

few pounds to hundreds of tons. These soils are mapped as the Dover series.

The sixth division of the glacial drift soils is classified with the Gloucester series. These soils occur in the extreme northeastern part of the county on the outer edge of the Adirondack upland. While this series is of glacial origin, the soils are modified to a large extent by residual material from the underlying metamorphic rocks of Archean age, and by a soil-forming material from the same rocks, moved only a short distance by the action of the glacial ice.

The Lockport series includes soils which are partly of glacial and partly of residual origin and derived from the red Salina shales.

The residual soil areas in Oneida County represent localities where there is little or no glacial material upon the surface, the soil being formed by the weathering of the underlying rocks. The Farmington series, found only in small areas, is an example of the work of glacial and residual agencies. This series owes its existence to the erosion of most of the overlying glacial till followed by the weathering down in places of the underlying flaggy limestone.

The Allis soils have resulted from the disintegration of the soft underlying gray and blue shale formations, after the scouring of the underlying shales by the ice, leaving scarcely any deposits.

The soils formed by water action are of large extent. The Chenango series is composed of material laid down as terraces, benches, outwash plains, and deltas where the material is of sandstone and shale origin. The Dunkirk series includes soils derived from lake-deposited material, occurring for the most part in the old glacial Lake Iroquois plain. Associated with the Dunkirk are the Clyde soils, practically all of which were formed in the Lake Iroquois region.

The Merrimac is another terrace series, including soils of granitic origin.

The Fox series is composed of materials laid down as terraces along flowing streams and as outwash plains from the glacial front. This series differs from the Chenango in that it contains a large percentage of limestone gravel.

At the time of the second ice invasion a terminal moraine clogged the valleys of Sauquoit, Oriskany, and Oneida Creeks, in the lower part of the county, and left as topographic features characteristic kames and eskers. These formations also occur in the north-central part of the county. The material shows the effects of having been assorted by water, while cross bedding is often in evidence. These soils, where calcareous, are classed with the Rodman series. The Otisville series bears the same relation to the Chenango as does the Rodman to the Fox. The Hinckley series includes rough terrace areas, kames, and eskers through the crystalline rock region.

The alluvial soils in this county are of recent origin and are added to by depositions which take place with every overflow along the bottoms of all the present streams. The most extensive development of these soils is along the Mohawk River, though the types here are usually darker in color than in any other place in the county.

Muck comprises an accumulation of decomposed vegetable matter in poorly drained positions. It is not extensively developed in this county.

Rough stony land and Steep broken land are miscellaneous types mapped upon the basis of stone content and roughness of topography.

Dunesand consists of small areas of sand which are subject to wind drifting.

The following table gives the name and actual and relative extent of each soil type mapped in Oneida County:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Mohawk loam .....	115,840	14.8	Dunkirk clay loam .....	4,096	0.5
Ontario loam .....	80,960	10.8	Worth loam .....	3,456	.4
Heavy phase .....	3,776		Dunkirk loam .....	3,328	.4
Worth stony loam .....	57,856	7.4	Gloucester fine sandy loam .....	2,944	.4
Chenango gravelly loam .....	41,216	5.3	Chenango shale loam .....	2,880	.4
Honeoye loam .....	40,704	5.2	Lockport clay loam .....	2,816	.4
Meadow .....	37,952	4.8	Worth fine sandy loam .....	2,624	.3
Volusia silt loam .....	33,280	4.2	Volusia stony loam .....	2,560	.3
Worth stony fine sandy loam .....	32,256	4.1	Genesee silty clay loam .....	2,432	.3
Volusia loam .....	30,336	3.9	Rough stony land .....	1,984	.3
Mohawk silt loam .....	24,704	3.1	Merrimac gravelly sandy loam .....	1,920	.2
Merrimac fine sandy loam .....	23,808	3.0	Clyde fine sand .....	1,856	.2
Muck .....	22,528	2.9	Dover stony loam .....	1,728	.2
Otisville gravelly fine sandy loam .....	22,016	2.8	Chenango stony gravelly loam .....	1,664	.2
Dunkirk fine sand .....	21,696	2.8	Honeoye stony loam .....	1,600	.2
Merrimac coarse sandy loam .....	21,056	2.7	Merrimac fine sand .....	1,472	.2
Genesee silt loam .....	17,408	2.2	Hinckley gravelly fine sandy loam .....	1,472	.2
Dover loam .....	14,272	1.8	Farmington loam .....	1,408	.2
Gloucester stony fine sandy loam .....	13,312	1.7	Dunkirk sandy loam .....	1,088	.1
Dunkirk gravelly loam .....	11,200	1.4	Genesee very fine sandy loam .....	896	.1
Dover fine sandy loam .....	10,752	1.4	Chenango sandy loam .....	832	.1
Dunkirk fine sandy loam .....	9,088	1.1	Allis clay loam .....	768	.1
Chenango fine sand .....	7,680	1.0	Dunkirk clay .....	704	.1
Otisville fine sand .....	7,296	.9	Chenango loam .....	576	.1
Hinckley fine sandy loam .....	6,592	.8	Volusia clay loam .....	576	.1
Steep broken land .....	6,400	.8	Genesee shale loam .....	448	.1
Hinckley coarse sandy loam .....	6,144	.8	Clyde clay loam .....	448	.1
Fox gravelly loam .....	5,696	.7	Dunesand .....	320	.1
Rodman gravelly fine sandy loam .....	4,992	.6	Allis silt loam .....	192	.1
Chenango fine sandy loam .....	4,736	.6			
			Total .....	784,640	.....

## ONTARIO SERIES.

The Ontario soils are prevailingly brown to chocolate brown in color, the subsoils being lighter and in many cases grading into yellow. Both soil and subsoil usually contain scattered fragments of limestone. These soils are derived from the weathering of the glacial till of the drumlin region of New York. The topography is undulating to moderately hilly, depending upon the number and shape of the drumlins within a given area. Some of the areas intervening between the drumlinal hills are rather flat. The series includes all soils of this color and character, whether the topography is that of typical drumlins or not. The most important features are the color and calcareous nature of the soil, the thickness of the glacial deposits, and the undulating to rolling topography. In Oneida County the Ontario series is represented by a single type, the Ontario loam.

## ONTARIO LOAM.

The Ontario loam consists of a brown loam, about 10 inches deep, underlain by a heavy loam to silty loam subsoil, which is slightly lighter in color, or almost a yellowish brown. In places the soil and subsoil have a reddish cast as the result of the presence of material from the old Salina shales and Medina sandstone, but such coloration is not characteristic of the type as a whole and has no important agricultural significance. This type is somewhat calcareous, although the stone and gravel content consists of little else than shale and sandstone material. It is comparable with the Honeoye loam in agricultural importance, though in nearly all cases it is slightly less productive.

The type occurs in a broad belt across the southern part of the county. It occupies relatively high, rolling hills, with gentle slopes for the most part, although in the towns of Vernon and Verona the topography is gently rolling. As a whole the drainage is fair, due to the variations in elevation. Tile underdrainage could be profitably used in the more nearly level plains.

This soil is derived from the weathering of glacial till, which as a whole is not so deep as the glacial débris in the lower part of this county. A large part of the till of the town of Rome owes its origin to the Clinton and Salina formations, consisting of shales with some thin-bedded limestone. The type is somewhat calcareous, but not nearly as much so as the Honeoye loam.

The agricultural conditions on the Ontario loam range from only fair to nearly as good as are encountered in the county. Owing to the absence of limestone, this type is less productive than the calcareous soils immediately south of the limestone ledges. The crops grown are corn, oats, some alfalfa, timothy hay, potatoes, etc.

The liberal application of stable manure and commercial fertilizers results in materially increased crop yields. Corn produces 10 to 12 tons of ensilage, oats 35 to 50 bushels, and potatoes 100 to 125 bushels per acre. The type makes fairly good grass land, though it requires special treatment for the introduction of alfalfa. Timothy yields an average of about 1½ tons of hay per acre each year. Some buckwheat is grown, yielding 25 to 40 bushels to the acre. A few good orchards on the more protected slopes receive good care and return fair yields of fruit of good quality. Dairying is an important industry on this type.

The farm buildings on this type are usually in fair condition. The value of the farms varies with the location, condition of buildings, and productiveness. The average land value ranges from \$40 to \$60 an acre.

*Ontario loam, heavy phase.*—The heavy phase of the Ontario loam, to an average depth of about 10 inches, consists of a brown heavy loam. The soil grades into a brown heavy loam, somewhat lighter in color than the surface soil. The soil is retentive of moisture, though not so much so as to prevent good cultivation.

This phase is associated with the typical Ontario loam, and occurs as small areas on the hill slopes to the south, east, and northeast of Farmers Mills and through the lower lying areas between Vernon Center and Oneida. Its topography is characteristically level to very gently rolling, and the surface drainage moves slowly.

The heavy phase of the Ontario loam is suited to about the same crops as the main type. Grass does better on this soil than on the lighter textured loam. The yields of root crops are slightly lower. Land values are approximately the same, though usually a little higher, owing to the accessibility of areas of this phase with respect to shipping points.

#### HONEOYE SERIES.

The Honeoye soils are brown. The subsoils are light brown to yellowish brown in color, uniformly oxidized, and very slightly heavier than the soils. The material is of glacial till origin and of limestone derivation, limestone fragments being common in the subsoil of most of the types. The topography varies from rolling to hilly.

Two types of the Honeoye series, the stony loam and the loam, are recognized in Oneida County.

#### HONEOYE STONY LOAM.

The Honeoye stony loam consists of a brown stony loam resting upon limestone bedrock at shallow depths. Limestone, mainly in the form of ledges, outcrops frequently throughout the type, and

fragments of limestone as well as some partially rounded fragments of shale are scattered over the surface and mixed with the soil material. While in local spots the soil is very shallow usually bedrock is not encountered within 2 feet of the surface. In the deeper phases the soil is very much like the Honeoye loam, except that it is somewhat more stony. It consists of a brown loam to stony loam 10 to 12 inches deep, underlain by a somewhat lighter brown loam or stony loam.

The principal occurrence of the type is in small areas in the southern part of the country, associated with the Honeoye loam. Some of these areas occur on prominent knolls or ridges and others on slopes where, as the result of glaciation, very little soil material was left over the limestone rock. It is partly residual, particularly in the shallower phases, but whether residual or entirely glacial the material is very largely of limestone origin and is quite calcareous.

On account of the stony character of this type it is not used to any extent for cultivated crops, but nearly all of it is cleared and used for pasture land. The areas with the deepest soil are the ones usually cultivated, and give good yields of corn, oats, and hay. Alfalfa thrives even in the shallower phases, but the type as a whole is too stony to be used for this crop.

#### HONEOYE LOAM.

The surface soil of the Honeoye loam consists of a brown loam, with an average depth of about 10 inches. The subsoil is a light-brown or yellowish-brown, rather compact loam. In some places the soil is a light-textured loam, but the subsoil is invariably a loam. Both the soil and subsoil contain many angular and rounded rock fragments, mainly limestone from the near-by parent formations. Small quantities of shale and sandstone are also present.

The Honeoye loam is agriculturally one of the most important soil types within the county. It occurs as a belt across the southern part of the county in the towns of Augusta, Marshall, and Paris, together with small strips extending into the towns of Sangerfield and Bridgewater. The topography is gently rolling, with but few steep slopes, although the elevation ranges from about 800 to 1,500 feet above sea level. As a rule the natural drainage is adequate, though there are a few scattered areas in which artificial under-drainage is necessary. The soil-moisture conditions are good, owing to the heavy subsoil, so that crops on this type, with ordinary care, are not injured by droughts.

Practically all of this type has been cleared and is under cultivation. It is recognized as the best farming land in the county. The crops grown are corn, oats, alfalfa, clover, and timothy hay, potatoes, hops, sweet corn, and peas for canning. A very large part of

the hops produced in the county are grown on this type. Among the fruits grown, apples receive the greatest attention, but they do only moderately well, because of the severe winters. Dairying is important on practically every farm.

The Honeoye loam where best drained is well suited to alfalfa, which springs up even when uncultivated. The presence of the many limestone fragments throughout the soil section undoubtedly has an important influence on its growth. Nearly every farm has at least one field of this legume. Three cuttings are secured in a season with an average yield of 3 tons per acre. These meadows remain for an average of 10 years.

This type was formerly the predominating wheat soil of the county, but to-day the acreage is not important. Corn is grown mainly for ensilage, and produces 10 to 15 tons per acre. Where grown for the grain, yields of 75 to 80 bushels per acre are secured. Oats yield from 40 to 60 bushels per acre. The potato crop is important. The yields generally range from 125 to 150 bushels per acre where modern methods are practiced. Good fields of timothy and clover produce an average of 2 tons of hay to the acre.

The agricultural conditions on this type are far above the average for the county, and are as good as may be found in this section of the State. The farm buildings are kept in good condition. The farms are generally within easy hauling distances of shipping points. This land is valued at \$50 to \$75 an acre.

#### VOLUSIA SERIES.

The soils of the Volusia series are predominantly light brown in color, ranging from gray to brown. The subsoils range from pale yellow in the lighter members to mottled gray and yellow in the heavier members of the series. They are derived from sandstone and shale material of ice-laid accumulation, though the layer is often thin, the underlying parent shale and sandstone often occurring at a depth of less than 3 feet. The topography as a whole is rough, the series occurring mainly on the dissected plateau of southern New York, Pennsylvania, and Ohio. Four types of the Volusia series occur in Oneida County, the stony loam, loam, silt loam, and clay loam.

#### VOLUSIA STONY LOAM.

The surface soil of the Volusia stony loam is a light-brown, loose, friable loam or fine sandy loam, with an average depth of 8 inches. The soil grades into a lighter colored light stony loam, which in the lower part is almost yellow or pale yellow. The soil and subsoil contain both rounded gravel and angular sandstone fragments. Usually these are of small size, but the quantity is sufficiently great to make cultivation more or less difficult.

The type is inextensive in this county. It occurs in the town of Verona, near the villages of Higginsville and New London, and west of the city of Rome, in Rome Town.

The topography is nearly level to gently rolling, while the elevation varies from about 400 to 450 feet above sea level. Drainage is fairly well developed.

The Volusia stony loam owes its origin to glacial action upon the underlying sandstone formation, followed by the deposition and the subsequent weathering in place of a shallow mantle of till. There are a few foreign boulders scattered over the surface.

Agriculturally this type is not highly developed. Where the stones are less numerous, fair yields of corn, oats, and hay are obtained. Dairying is the main occupation and most of the land is devoted to grass and pasturage.

As a rule the buildings are in poor condition. Land values range from \$30 to \$45 an acre.

#### VOLUSIA LOAM.

The soil of the Volusia loam consists of 6 to 10 inches of a brownish-gray to yellowish-brown silty loam. The subsoil is a loam to heavy loam, varying from brown to gray or mottled gray, brown, and yellow in color. The soil and subsoil usually contain many glacial rock fragments mainly of local derivation. These fragments interfere with cultivation in only a few places.

This type occurs principally south of the Mohawk River in the towns of New Hartford, Whitestown, Westmoreland, and Rome, and south of Wood Creek in the town of Verona. The topography is undulating to gently rolling. Local areas are somewhat hilly. Areas with good surface slope are well drained, but in the depressions there is evidence of poor drainage conditions.

Nearly all of the Volusia loam is cleared, but a large part of the cleared area is used for pasture. The cultivated areas are devoted to the general farm crops and the yields obtained are about the same as on the Volusia silt loam. Corn produces 10 to 12 tons of ensilage per acre, oats about 20 to 30 bushels, and hay from 1 to 1½ tons per acre. Dairy farming usually accompanies the production of these crops.

#### VOLUSIA SILT LOAM.

To an average depth of about 7 inches the Volusia silt loam is a light brownish gray to grayish-brown silt loam. The subsoil is a yellow or pale-yellow heavy silt loam to a depth of 16 to 24 inches, while below this it is a yellow and gray mottled silt loam to silty clay loam. Throughout the soil section there is a high percentage of flat, angular shale fragments, together with a few rounded gravel. In many places the underlying shale formations are encountered within the 3-foot section. The type is easily tilled.

The Volusia silt loam occurs on the higher elevations, principally in the towns of Marcy, Deerfield, New Hartford, Sangerfield, and Bridgewater. It has its most typical development in the southern part of the county. The type is characterized by a wide range in elevation and local relief. Owing to this uneven topography, drainage is good, although there are always some local wet spots formed from seepage from the many springs. The soil is retentive of moisture, which is often a hindrance to cultivation during the spring.

In the eastern part of the county the type is fairly productive, but in the town of Sangerfield conditions are typical of the abandoned farm sections of southern New York. Many of the houses are unoccupied, while the buildings are fast going to ruin. In many places the fields are not even mowed for hay or used for pasturage, but support only a growth of poverty grass and weeds, with a scattered growth of scrub timber.

On the better farms of this type the most profitable crops grown are Irish potatoes, buckwheat, hay, and oats. Potatoes yield 100 to 225 bushels per acre, buckwheat 25 to 30 bushels per acre, oats about 25 bushels per acre, and hay about 1 ton per acre. Owing to the distance from shipping points this type is best adapted to stock raising.

The poor condition of this type is largely due to the common practice of renting to tenants who sell off all the hay they can cut. The land is left in sod until the yields are not worth harvesting, when it is poorly cultivated for a year or two, before being returned to meadow. Stable manures are not generally used, and but little commercial fertilizer is applied.

Deeper and more thorough tillage, the addition of humus-forming matter, the growing of cover crops, and systematic crop rotation are needed. Some areas can even be reforested with profit.

Farms upon this type can be purchased for \$6 to \$35 an acre. But few farms change hands, and then only the better ones. The average value of this land is about \$12 an acre.

#### VOLUSIA CLAY LOAM.

The soil of the Volusia clay loam is a light grayish brown or yellowish-brown heavy loam extending to a depth of 7 to 10 inches. The subsoil is a yellowish-brown to pale-yellow clay loam. Throughout the soil section there is a large quantity of local rock fragments, shale and sandstone, with some foreign glacial material.

This type is of small extent in Oneida County, occurring in several small bodies in the towns of Marcy and Deerfield. The topography is gently rolling to nearly level, and the natural drainage is poor.

The general farm crops are grown upon this type, though it is devoted mainly to grass and to pasturage, for which it is well adapted. The land is valued at \$20 to \$30 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Volusia clay loam:

*Mechanical analyses of Volusia clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161942.....	Soil.....	1.2	2.6	3.4	13.2	14.7	43.1	21.9
161943.....	Subsoil.....	1.8	3.5	3.9	14.8	15.4	40.8	19.6

#### MOHAWK SERIES.

The soils of the Mohawk series are dark brownish gray to rather dark brown, and the subsoils are grayish brown or brownish gray, with a slight tendency to mottle in some areas. The topography is rolling to high hilly, and drainage is fairly well to well established. These soils are derived from dark shales, usually somewhat calcareous. Their characteristic dark color is due more to the original dark color of the shales from which they are derived than to a high content of humus. This series is represented in Oneida County by two types, the Mohawk loam and silt loam.

#### MOHAWK LOAM.

The soil of the Mohawk loam to an average depth of 10 inches is a brown to rather dark brown loam. This is underlain by a brown to grayish-brown loam. The soil is mellow, friable, and easy to work. Both soil and subsoil contain a moderate amount of sandstone and shale fragments, while foreign glacial boulders are scattered over some of the areas nearest the Adirondack region. Occasionally small limestone fragments occur throughout the soil section, the underlying black shales being slightly calcareous.

This type represents the extensive upland soils of the east-central and northeastern parts of the county. It is most extensively developed in Marcy, Deerfield, Floyd, Trenton, Steuben, Western, and Boonville Towns. It occupies the high, rolling hills of the upland country, and low, gentle slopes or foothills, to the north of Utica, varying in elevation from a little over 500 feet to about 1,600 feet. In general the natural drainage is good. In the vicinity of South Hill in the town of Floyd there are a few poorly-drained depressed areas. Excepting these, the type does not require artificial drainage.

Naturally the Mohawk loam is a good dairy soil, but here it is often used for that purpose in an indifferent manner. The crops grown are corn, oats, buckwheat, potatoes, and hay. The herds are of good breeds, mainly Holstein, some of which are registered stock. Fruits are not grown extensively because of the long and severe winter

season. Almost all the land is cleared, though there is some second-growth timber on the steeper slopes.

Corn produces an average of 10 to 12 tons of stover per acre. Oats yield 30 to 40 bushels, buckwheat 30 to 40 bushels, potatoes 125 to 150 bushels, and mixed hay 1½ tons or more per acre. The fields usually remain in sod at least four years.

The farmers living in the vicinity of shipping stations usually follow progressive methods and make the best use of this type. The farmers farther back pay less attention to the saving of stable manure and to tillage operations. Some commercial fertilizers are used.

There is a general need throughout this type for the establishment of good crop rotations, by which more organic matter can be returned to the land, the more careful saving and proper use of stable manure, deeper plowing, and the improvement of the cattle.

Farm values range from \$35 to \$50 an acre, depending upon location, and the condition of farm buildings, fences, etc.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Mohawk loam:

*Mechanical analyses of Mohawk loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161983.....	Soil.....	1.6	4.8	4.4	11.4	15.4	44.1	18.4
161984.....	Subsoil.....	1.7	5.4	5.0	13.2	15.2	44.5	14.9

#### MOHAWK SILT LOAM.

The Mohawk silt loam to an average depth of 8 inches is a brown to grayish-brown silt loam, underlain by a light-brown or grayish-brown heavy silt loam, which becomes heavier and more compact with increasing depth. The subsoil may be mottled slightly with yellow and brown at lower depths. The type is relatively free from coarse rock fragments, although small pieces of shale and sandstone are abundant.

This type occurs, as a rule, upon the higher elevations within areas of the Mohawk loam, especially in the towns of Western, Ava, and Boonville, with smaller areas in the towns of Lee, Rome, Floyd, Trenton, and Steuben. The surface is hilly, the hills being broad and rather flat topped, with sloping sides. The surface drainage in general is good, with only a few small areas that are low and require ditching or the laying of tile drains.

The Mohawk silt loam differs but little from the Mohawk loam in mode of formation, except that it is not as deep and that the under-

lying black shales are often encountered within the 3-foot section. Limestone fragments are seldom present, while glacial boulders occur in smaller quantities than over the lower lying types.

The original forest growth consists of maple, beech, pine, and hemlock. The greater part of this has long been removed. Pastures contain the native wild grasses, though in some cases weeds and brush predominate. Agricultural conditions correspond to those on the Volusia silt loam in other parts of this State.

The crops grown are oats, buckwheat, corn, and potatoes. Dairying is carried on to some extent. At present the meadows produce about 1 ton of hay per acre, oats yield 30 to 35 bushels, buckwheat 30 to 40 bushels, and potatoes 150 to 175 bushels per acre. Corn does not do well because of the short growing season.

At present the farmers on this soil are not in a prosperous condition. The farms are large, the buildings are in bad condition, the fences are poor, and many of the dwellings have been abandoned. The fields are allowed to remain in sod until they become unproductive before they are plowed and planted to cultivated crops, and even these are poorly cared for. Potatoes constitute the best money crop on this soil, but the haul to shipping points is long.

Because of the distance from markets and shipping points, this type is best suited to grazing and stock raising.

While but little of this land changes hands, its value ranges from \$12 to \$20 an acre, depending on its location and productiveness.

#### GLoucester Series.

The soils of the Gloucester series are light brown, ranging to grayish; the subsoils are yellow. Scattered rocks and large boulders occur in places, and small quantities of mica are sometimes present. The topography ranges from gently undulating to rolling or hilly, the hills usually being high, broad, and rounded. Drainage is fair to good and in places excessive. The soils are derived from a rather local glaciation of crystalline rocks, consisting chiefly of granite and gneiss, with a small amount of schist, the material being left as a thin mantle of ground moraine. These soils are developed in northeastern United States.

In Oneida County two types of the series are recognized, the Gloucester stony fine sandy loam and the Gloucester fine sandy loam.

#### GLoucester Stony Fine Sandy Loam.

The Gloucester stony fine sandy loam consists of a brown stony fine sandy loam, underlain at about 8 inches by a yellowish or grayish to brown sandy loam. The soil and subsoil carry a variable, though usually large, quantity of gravel, stones, and boulders of granite

and gneiss. This till varies in depth from a few inches to many feet. It rests upon the Archean rocks. The abundance of stones prevents easy cultivation.

This type is found only in the extreme northeastern corner of the county, in the town of Forestport. The topography is rolling to hilly, this being the foothill region of the Adirondack Mountains. The stony, sandy character of this soil permits thorough drainage.

This land was at one time heavily forested with white pine, hemlock, beech, maple, etc., but only a relatively poor second growth is all that remains. A few small patches are under cultivation. The type affords some grazing throughout the season. It is probably best suited to forestry.

Throughout this type land values are based upon its timber rather than upon its agricultural possibilities. It is valued at \$5 to \$10 an acre.

GLoucester FINE SANDY LOAM.

The surface soil of the Gloucester fine sandy loam consists of a light-brown fine sandy loam which has an average depth of about 8 inches. The subsoil is a fine sandy loam which is somewhat lighter in color, being a grayish brown to yellowish brown. Varying quantities of angular rock fragments of granite and gneiss are scattered throughout the soil and subsoil. This type is easily tilled.

The Gloucester fine sandy loam occurs as a small area in the vicinity of White Lake Corners, in the town of Forestport. The topography is gently rolling, and the elevations vary from about 1,300 to 1,480 feet. The natural drainage is good.

This type was originally forested, but the timber has been removed and the land is used for agriculture. The principal crops are oats, hay, and potatoes, of which fair yields are secured.

This soil is deficient in organic matter, and there is a general need throughout the type for the systematic rotation of crops and more thorough tillage methods. The farm buildings on it are in only fair condition. Land of the Gloucester fine sandy loam is valued at \$10 to \$20 an acre.

The results of mechanical analyses of samples of the soil and subsoil of the Gloucester fine sandy loam are given in the following table:

*Mechanical analyses of Gloucester fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161985.....	Soil.....	2.7	9.2	8.6	16.8	31.6	21.8	9.3
161986.....	Subsoil.....	3.2	10.8	9.8	19.4	31.0	21.5	4.5

## DOVER SERIES.

The Dover series includes types with light-brown or dark-brown to reddish soils, and light-brown to yellowish or reddish subsoils. Limestone fragments are scattered over the surface and throughout the soil and subsoil. These soils occur in those limestone lowland belts of the Appalachian region which have been subjected to glaciation. The topography is undulating to hilly, and drainage is good. Outcrops of limestone are common. The soils are derived from glacial till material which has been considerably modified by the admixture of local limestone material. Three members of the Dover series, the stony loam, fine sandy loam, and loam, are encountered in Oneida County.

## DOVER STONY LOAM.

The soil of the Dover stony loam to a depth of 8 to 12 inches is a brown to grayish-brown, friable loam, thickly strewn with granite boulders and fragments of limestone. The subsoil is a brownish-gray to yellowish-brown loam or stony loam and this rests upon the Trenton limestone at a shallow depth. In places the limestone outcrops and gives rise to a very stony condition.

The type, which is inextensive, occurs in the northern part of the county in association with other Dover soils. It has an irregular, rolling topography, and is naturally well drained.

On account of the irregular topography and the large quantities of stone on the surface very little of the type is cultivated. Practically all of it is cleared, however, and it makes good pasture land. Its best use is for forestry and pasture.

## DOVER FINE SANDY LOAM.

The surface soil of the Dover fine sandy loam is about 10 inches deep and consists of a dark grayish brown to brown fine sandy loam to very fine sandy loam, underlain by a subsoil somewhat lighter in color and of similar texture. The color of the soil varies with the state of cultivation and also with the moisture content. Areas under cultivation have a darker appearance, while those in a poor condition are more of a yellow or tan color. The surface soil is usually slightly heavier than the subsoil, which is probably due to a higher organic-matter content. A few small stones are scattered through the soil section, and the surface of the type is dotted with glacial erratics, weighing from a few pounds to many tons. These boulders greatly interfere with cultivation. In some places the land is thickly strewn with large limestone fragments, broken from the underlying formations. For the main part the rocks are of foreign origin, consisting principally of granite and gneiss, though there are some fragments of limestone.

The Dover fine sandy loam occurs as a narrow belt extending through the town of Boonville into the towns of Steuben and Remsen. The topography is gently rolling, the elevations ranging from 1,060 to 1,360 feet above sea level. The natural drainage is only fair. There are numerous local, poorly drained areas throughout the type.

While a part of the Dover fine sandy loam supports a second growth of elm, spruce, and hemlock, the greater part is cleared. Dairying, the only type of agriculture to which this land is adapted, is carried on in a general way. The crops grown are corn, oats, potatoes, and hay. A few silos have been constructed and modern farm machinery is used.

Corn does only fairly well because of the short growing season. However, it produces an average of about 10 tons of silage per acre. Oats yield 35 to 40 bushels per acre, potatoes 100 to 200 bushels, with 125 bushels as an average, while grass ordinarily cuts 1½ to 2 tons per acre. Where the fields are cleared of the bowlders, better yields than these are obtained. Some fields have not been plowed for about 15 years, yet they are in fair condition, as they receive frequent applications of stable manure and the weeds are kept out. Some commercial fertilizers are used.

The greater part of this type is best suited to hay production and pasturage. Frequent top dressings of stable manure and the addition of lime are beneficial. Potatoes are probably the best money crop. Alfalfa could probably be grown successfully, judging from the success on some other calcareous soils of the county.

Land values vary according to the improvements, averaging about \$30 an acre.

The following table gives the average results of mechanical analyses of samples of the soil and subsoil of the Dover fine sandy loam:

*Mechanical analyses of Dover fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161974, 161991.....	Soil.....	4.2	6.5	7.4	28.0	21.2	27.1	5.7
161975, 161992.....	Subsoil.....	1.5	5.5	9.7	38.5	17.6	19.5	8.0

DOVER LOAM.

The soil of the Dover loam to a depth of 10 inches is a brown mellow and friable loam, grading into a grayish-brown loam. Sometimes the soil is a silty loam. Throughout the soil section there are varying quantities of angular rock fragments, mainly granite, gneiss, and limestone, with a small quantity of shale. The large foreign bowlders

are also prominent over this soil. Where the stones are not too numerous cultivation can be carried on to some advantage.

This type covers an area of about 22 square miles east of the New York Central & Hudson River Railroad, in the town of Remsen. The topography over most of the type is gently rolling, with a few hills. The elevation ranges from 1,100 feet to about 1,400 feet above sea level. The drainage of the rolling land is fair, but in the more nearly level areas there are many small depressions, which require artificial drainage.

All of this type has been cleared of its native forest growth, and where the stones are not too thickly scattered over the surface it is cultivated.

Dairy farming is the most important type of agriculture practiced, while the crops grown are corn, oats, potatoes, and hay. A few small patches of alfalfa were planted at one time, but after a year or two they died out. Corn yields 10 to 15 tons of ensilage per acre; oats, 30 to 35 bushels; potatoes, about 100 bushels; and hay, 1½ to 2 tons per acre.

Where dairying is practiced an excellent method is to use the best-drained fields for alfalfa, which furnishes excellent forage. For the successful production of alfalfa and the improvement of the clover crops, the use of lime is generally necessary. While there is some lime in the subsoil, it is often lacking in the surface soil.

In general, agricultural conditions on this type are good, the buildings and fences are in good repair, and the fields well cultivated. Farm values range from \$20 to \$30 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Dover loam:

*Mechanical analyses of Dover loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161978.....	Soil.....	2.6	4.4	4.6	15.4	20.9	42.9	9.2
161979.....	Subsoil.....	3.2	5.8	5.0	15.5	23.6	37.9	8.9

#### WORTH SERIES.

The Worth soils are light brown or yellowish brown in color, and overlie subsoils of similar or slightly lighter color, and occasionally mottled. More or less angular, relatively thick-bedded arenaceous shale is found in the soil and subsoil of most members of the series. The material is derived from glaciation of the thicker-bedded shales of the Hudson River and possibly other formations of the Ordovician period lying north of the Allegheny Plateau. The topography

is rolling to hilly and somewhat rough, with elevations ranging to over 1,500 feet, although usually less than that of the Volusia soils. The Worth series in Oneida County comprises four types, the stony loam, stony fine sandy loam, fine sandy loam, and loam.

#### WORTH STONY LOAM.

The surface soil of the Worth stony loam is a light-brown to yellowish-brown stony loam with an average depth of about 8 inches. The subsoil consists of a light yellowish brown to grayish-brown stony loam, usually heavier than the soil. Both soil and subsoil contain a high percentage of sandstone fragments of varying size. Material from the Medina sandstone formations have in this region colored the soil, giving it a reddish-brown cast. Owing to the large quantity of rock fragments scattered over the surface, cultivation is not easy, though the soil is itself mellow to the point of leachiness.

This type is extensively developed in the northwestern part of the county, in the towns of Florence, Camden, Annsville, Vienna, Lee, and Ava. It is closely associated with the Worth stony fine sandy loam. The surface is rolling to hilly, with but few steep slopes. The elevation varies from about 500 feet, near Oneida Lake, to over 1,200 feet, in the town of Florence.

In Oneida County the Worth stony loam owes its origin to heavy glaciation over the Oswego and Medina sandstones, underlying the type, resulting in a deep till, characterized by an abundance of flat sandstone fragments. There are only two rock outcrops of the underlying formation in this region.

At an early period this type was covered with a good growth of native timber. This was removed and the lands were cultivated as well as conditions permitted. The cultivation of sweet corn, commenced at an early date near Camden for one of the first canning factories erected in the county, continued until within recent years. At present this soil is devoted to general farming. Corn, oats, and hay are the most important crops. Corn yields 40 to 60 bushels of ears per acre, and oats about 30 bushels per acre, while hay yields vary widely, ranging from one-half ton to 1½ tons per acre. A few cattle are kept.

The agricultural conditions prevailing over the section occupied by the Worth stony loam are poor. This region is best suited to the raising of stock, either cattle or sheep. Labor is scarce and expensive, while the land is too stony and rough for general farming. Many areas are suitable only for forestry.

The farm buildings and fences are in poor condition throughout this type. Many of the owners are nonresidents, the farms being operated by tenants. Very little of the Worth stony loam changes hands, and land values rarely exceed \$5 to \$10 an acre.

## WORTH STONY FINE SANDY LOAM.

The Worth stony fine sandy loam to a depth of about 6 inches is a light-brown fine to very fine sandy loam. Below 6 inches the soil grades into a light fine to very fine sandy loam of a yellowish-brown to grayish-brown color. The type as a whole is rather light textured, and contains a large quantity of gravel and angular sandstone fragments, coming from the Oswego and Medina formations. Cultivation is somewhat hindered by the great abundance of these rock fragments.

The type occupies the lower situations and is associated with the Worth stony loam. Its most extensive development is in the towns of Florence, Camden, Vienna, and Annsville in the northwestern part of the county. The topography is rolling to hilly or shows a true moraine development. The natural drainage is good to excessive.

Underlying sandstones contributed to the glacial material giving this type in Oneida County. The absence of shale is a noticeable feature.

General farming is practiced on the Worth stony fine sandy loam, the main crops being corn, oats, and hay. Yields are generally low. Potatoes do fairly well. Small quantities of wood ashes are applied to the land, and a small quantity of commercial fertilizer is used.

This type requires the same treatment as the Worth stony loam and is adapted to the same uses, as the surface is too broken for profitable cultivation. Land values range from \$5 to \$10 an acre.

## WORTH FINE SANDY LOAM.

The Worth fine sandy loam consists of a brown to light-brown or yellowish-brown fine sandy loam about 9 inches deep, underlain by a yellowish-brown to gray fine sandy loam. The soil and subsoil contain varying quantities of rock fragments, both angular and rounded, of all sizes. Where the rock content is not too high the type is easily cultivated.

The Worth fine sandy loam is mapped in several small areas in the northwestern part of the county, the largest occurring about a mile west of Glenmore. Another important area lies just east of Lorena. The topography is gently rolling. The drainage is good and often excessive, owing to the open structure of the soil and subsoil.

The Worth fine sandy loam is devoted mainly to general farming. A few cattle are kept, while the crops grown are corn, buckwheat, and grass. The yields are low.

The type is probably best kept forested with white pine and spruce. Land values are low, the farms having a value of not more than \$15 an acre.

The results of mechanical analyses of samples of the soil and subsoil of the Worth fine sandy loam are given in the following table:

*Mechanical analyses of Worth fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
1619108.....	Soil.....	1.1	3.5	7.8	38.2	16.4	25.0	7.8
1619109.....	Subsoil.....	1.0	3.0	5.4	38.0	20.6	24.2	7.9

#### WORTH LOAM.

To an average depth of about 8 inches the Worth loam is a light-brown, light-textured loam. Below this occurs the subsoil, consisting of yellowish-brown to gray loam. The soil is mellow and friable, and contains some sandstone fragments, usually flat and angular, but the quantity of such coarse material is not great enough to interfere with cultivation.

This type is encountered only in the towns of Lee and Annsville, where it occupies the broad uplands lying between an elevation of 1,020 and 1,130 feet above sea level. The surface is gently rolling and the natural drainage good.

Practically all of this type is cleared and cultivated. It is utilized mainly for general farming, though a few dairies are maintained. The principal crops grown are potatoes, oats, buckwheat, and hay. Some corn for silage is grown, producing 8 to 12 tons per acre. Potatoes yield an average of 130 bushels, oats about 30 bushels, buckwheat less than 20 bushels, and hay 1 ton to 1½ tons per acre.

Agricultural conditions on this type, while generally poor, are the best in this general region. Dairying is carried on in an indifferent way, because of the scarcity of labor and the distance to markets.

The farms are usually in large holdings.

The type is best suited to the raising of stock, either sheep or cattle, with Irish potatoes as a cash crop. The more careful saving and use of stable manure, together with applications of lime, and more thorough cultivation are needed.

Land values correspond quite closely to those prevailing throughout this region. But few farms change hands. The average value for the Worth loam is about \$15 an acre.

#### LOCKPORT SERIES.

The Lockport soils are light brown, brown or slightly reddish brown, with subsoils of distinctly Indian red color, frequently mottled with yellow and light gray. These soils occur in the low Ontario Lake Plain in northern New York, and are usually thin, the subsoils fre-

quently grading into broken-up and more or less decomposed red Medina sandstone and shale, fragments of which frequently occur in the subsoil and sometimes at the surface. The soils have been formed both through the weathering of the underlying Medina formation and through the lacustrine sediments which have been left upon the recession of former Glacial Lake Iroquois. Drainage is usually poor, and artificial drainage is generally necessary. The Lockport series is represented in Oneida County by a single type, the clay loam.

#### LOCKPORT CLAY LOAM.

The surface soil of the Lockport clay loam to an average depth of 10 inches is an Indian-red to reddish-brown heavy loam. The subsoil quickly grades into the soft underlying red Salina shales. The soil and subsoil are often mottled with yellow and brown. On the more nearly level slopes the depth of the soil increases, owing to a sprinkling of glacial till over the shales, but upon the steeper slopes, where it is subject to erosion, the soil is shallow and in many places entirely lacking. Owing to the tendency of the soil to bake when dry, it can be cultivated only within a narrow range of moisture conditions.

The Lockport clay loam is developed on the slopes leading to the uplands, in the towns of Vernon, Kirkland, and Westmoreland. The topography varies from gently rolling to steep. The drainage is good.

This soil is devoted to general farming. Fair yields of corn, oats, and hay are obtained where there is a sufficient depth of soil. The farms are improved, and have about the same value as on adjoining types.

#### ALLIS SERIES.

The soils of the Allis series range from brownish to drab or gray and are about 8 inches deep. The subsoil is usually light gray, but sometimes mottled red and gray. The soils occupy steep slopes or elevated positions, and the topography is so rolling that surface drainage is good. On account of the heavy character of the subsoil, however, artificial underdrainage is frequently necessary. The soils are derived through weathering of light-colored soft shales, the structure of which is often preserved in the deep subsoil. Two members of the Allis series, the silt loam and clay loam, are mapped in Oneida County.

#### ALLIS SILT LOAM.

The soil of the Allis silt loam is a mellow silt loam, light brown to brownish gray in color and almost free from stones. The subsoil is encountered at about 10 inches and consists of a gray to olive-colored silt loam. Occasional fragments of soft shale are encountered in the soil section. This type where well drained is easily worked.

The Allis silt loam is found in three small areas. Two of these occur in the southwestern part of the town of Vernon and the third in the northern part of the town of Augusta. The topography is level to rolling and the drainage is good.

The Allis silt loam is adapted to the general farm crops, and moderate yields of corn, oats, and grass are secured.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Allis silt loam:

*Mechanical analyses of Allis silt loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161936.....	Soil.....	0.2	0.6	0.7	3.0	8.3	67.8	19.3
161937.....	Subsoil.....	.2	1.2	1.2	2.5	8.5	64.7	21.5

#### ALLIS CLAY LOAM.

The Allis clay loam to an average depth of 7 inches is a light-gray silty clay loam. This grades into a plastic, tenacious clay or heavy clay loam, often mottled with yellow and gray. The type is underlain by light-colored shales. Where cultivated in a wet condition, the soil breaks into large clods. Proper moisture conditions must be observed in order to secure the best results in tillage.

This type occurs only in a few small bodies in the town of Verona. The topography is gently rolling to nearly level. The drainage is poor, because of the heavy structure of the soil and its position.

A part of this type supports a second growth of elm, beech, and maple. Where properly drained, the Allis clay loam is adapted to the general farm crops. It is used mainly for pasture. The type has only a low agricultural value.

#### FARMINGTON SERIES.

The Farmington soils are predominantly light brown in color and are of slight depth, the soil layer often resting directly upon the shaly limestone which forms bedrock. Angular fragments of limestone and a small percentage of glacial gravel and stones are found throughout the soil mass. The topography is level, and drainage is usually good. The soil is partly residual and partly glacial. Only one member of this series, the Farmington loam, is recognized in Oneida County.

#### FARMINGTON LOAM.

The Farmington loam is a light-brown to yellow, loose, mellow silty loam. The depth of the soil is variable, averaging about 10 inches. Where the underlying shaly limestone is within 10 inches of the surface the subsoil is absent, but sometimes the depth of the soil

section is 2 feet, in which case the subsoil is of about the same color and texture as the soil, though lacking in organic matter. The shallow soil contains varying quantities of flat, angular limestone fragments, together with some glacial gravel. Where the stone content is high cultivation is difficult.

The greatest development of this type is northeast of Oneida in Verona Town. A small area is located about 2 miles south of Boonville. The topography is usually level or very gently rolling, and the drainage is good.

Where the soil is of sufficient depth, the Farmington loam is considered a good type for general farming. Corn produces 10 to 12 tons of silage per acre, oats 25 to 40 bushels, potatoes 100 to 125 bushels, and hay 1 ton to 1½ tons. The shallower areas of the type are devoted to pasturage.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Farmington loam:

*Mechanical analyses of Farmington loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161922.....	Soil.....	4.0	11.0	10.0	22.0	5.7	32.8	14.5
161923.....	Subsoil.....	2.6	8.6	8.7	19.2	7.0	36.0	18.0

#### CHENANGO SERIES.

The soils of the Chenango series are prevailingly brown, ranging to reddish brown. The subsoils are brown to reddish brown or yellowish. The occurrence of stratified gravel and coarse sand at a depth of 3 feet or more is characteristic of the series. These soils occur in the Northeastern and Central States. They are developed along the streams in those sections of the glaciated region where the upland soils result from the glacial grinding of sandstone, shale, and limestone rocks, with an admixture of small quantities of material from areas of igneous and metamorphic rocks. The Chenango material was deposited by relatively rapidly flowing waters from the melting and receding ice masses. Upon the disappearance of the ice and the subsequent deeper erosion by streams, this material was left as terraces which are not now subject to overflow. The Chenango soils are often associated with the Dunkirk series, of lake deposition, forming southward extensions of similar material along old glacial drainage ways.

Seven members of the Chenango series are encountered in Oneida County. These are the fine sand, the stony gravelly loam, the gravelly loam, the shale loam, the sandy loam, the fine sandy loam, and the loam.

## CHENANGO FINE SAND.

The surface soil of the Chenango fine sand consists of a brown to light-brown fine sand, varying in depth from 8 to 12 inches. This is underlain by a yellow fine sand. In the Little River Valley, in the town of Vienna, the color of the soil section has been influenced by the breaking down of the Medina sandstone, which results in a pinkish cast in the sand. The type contains but little gravel, except that in the deeper subsoil there may be beds of coarse sand and fine gravel. The soil is loose and mellow and easily cultivated.

This type occurs principally in the towns of Camden, Vienna, and Annsville. A few smaller areas are scattered throughout the lowlands. The topography is variable, ranging from level to gently undulating. In general the natural drainage is good.

The original forest growth consisted of pine and hardwoods, while at present the greater part of the type supports a natural growth of brakes, ferns, briers, and scrub timber. It constitutes a large part of the waste land of the county. Large areas are burned over every summer.

The texture and structure of the Chenango fine sand are such as to make this soil a good type for the production of early truck crops, such as early cabbage, radishes, cucumbers, strawberries, etc. The type is in need of organic matter. Special crops require heavy fertilization.

There are but few good buildings upon this type. Land values range from \$5 to \$30 an acre for the larger tracts.

## CHENANGO STONY GRAVELLY LOAM.

The fine earth of the Chenango stony gravelly loam consists of a light-brown loam, underlain at an average depth of about 10 inches by a yellowish-brown loam. The soil section carries a high percentage of flat, angular stones, as well as large waterworn gravel and cobbles. The rock fragments are of both local and foreign origin. This type is not easily cultivated because of its high stone content.

The Chenango stony gravelly loam occurs only in narrow valleys or at the mouths of narrow valleys in the upland region occupied by the Worth series. The areas are generally small. The type is encountered in the towns of Camden, Florence, and Annsville. The topography is that of a well-defined terrace or outwash apron, nearly level to gently rolling. Because of the open structure of the soil section the natural drainage is good, and in periods of dry weather the type is susceptible to drought.

Only a part of this type is cultivated, because of the high stone content. The cultivated areas are devoted to general farming, with corn, oats, buckwheat, and grass as the main crops. Only fair yields are secured.

The agricultural possibilities of the Chenango stony gravelly loam are restricted by the difficulty of working the land, as well as by its distance from markets.

#### CHENANGO GRAVELLY LOAM.

The surface soil of the Chenango gravelly loam consists of a brown loam, with an average depth of 10 inches. The subsoil is a loam, usually lighter than the soil in texture and light brown to yellowish brown in color. Large quantities of rounded, waterworn gravel of all sizes, and mainly of sandstone and shale, are scattered over the surface and throughout the soil section. Very little of the gravel is limestone. Owing to its open structure, this soil is easily cultivated under a wide range of moisture conditions.

The Chenango gravelly loam occurs in widely scattered areas throughout the larger valleys in the upland regions of the county. It is probably most typically developed in the towns of Rome, Westmoreland, Whitestown, and New Hartford, along the Mohawk River and its tributaries. It occupies level to undulating plains or terraces having an elevation above sea level of 400 to nearly 900 feet. The drainage of the type is good, owing to the presence of underlying beds of sand and gravel.

This type is recognized as one of the best corn soils in the county. It is also an excellent soil for oats, grasses, potatoes, beans, and cabbage. The yields are good. Corn is grown both for ensilage and for the grain, and yields an average of 15 tons of the former and 40 to 100 bushels of the latter to the acre. Oats yield from 40 to 75 bushels, with an average of 45 bushels. Mixed hay yields  $1\frac{1}{2}$  to 2 tons and potatoes from 75 to 125 bushels per acre. The growing of alfalfa is being gradually introduced, and where the soil is limed fair returns are obtained.

Tillage methods are usually good; the plowing is of good depth, while stable manure and commercial fertilizers are generally used. The farm buildings are adequate for the system of farming practiced and are generally well cared for. The type is worked mainly by the owners, and practically none of it is on the market. Land values range from about \$50 to \$100 an acre where the improvements are good.

#### CHENANGO SHALE LOAM.

The surface soil of the Chenango shale loam, extending to an average depth of about 8 inches, is a light-brown or grayish-brown loam. This is underlain by a yellowish-brown loam. Both the soil and subsoil contain a high percentage of small shale fragments, with occasionally some gravel. The soil in many places consists of a silt loam, while pockets of sand are frequently encountered in the lower

part of the soil section. This type, as a rule, is mellow and easily tilled.

The Chenango shale loam occupies a terrace position along the foothills in the towns of Rome and Floyd. The elevation ranges from about 500 to 640 feet above sea level. The drainage is usually adequate.

The Chenango shale loam owes its origin to the deposition of local material by an old glacial stream which undoubtedly flowed along the foot of the upland region through the town of Floyd. The erosive effect of this stream is apparent in the thinly covered ledge of soft shales adjoining this type. The shales have weathered to a considerable extent.

The native vegetation on this type consists of wild grasses and brush. Although a little of this soil is under cultivation, it serves mainly as pasture.

Fair yields of corn, potatoes, and grass are obtained, with the liberal application of stable manure. Thorough cultivation, heavy dressings of manure, and the growing of cover crops are highly beneficial. The type is probably best suited to the production of potatoes and buckwheat, in conjunction with dairying.

#### CHENANGO SANDY LOAM.

The Chenango sandy loam consists of 8 to 10 inches of a brown sandy loam, underlain by a yellowish-brown sandy loam or loamy sand extending to a depth of 20 to 24 inches, where beds of sand or gravel are encountered. A sprinkling of gravel on the surface and through the soil is characteristic of most areas.

The type is not extensive. It occurs in the vicinity of South Hill Church and southeast of Steuben as nearly level well-drained terraces. The terraces consist of stratified deposits laid down by running water during glacial times. Some of the gravel is granitic, but the larger part of it is from sandstone and shales.

Nearly all of the Chenango sandy loam is under cultivation and the farms are generally well improved. It is used for corn, oats, and other general crops and to a limited extent for the production of potatoes. It is an especially desirable soil for potatoes and a wide variety of vegetables, but is rather too light for general farming, not giving as satisfactory yields as the Chenango gravelly loam. Land values range from \$25 to \$50 an acre.

#### CHENANGO FINE SANDY LOAM.

The surface soil of the Chenango fine sandy loam, extending to an average depth of about 10 inches, is a brown fine sandy loam, mellow and easily worked. The subsoil is a light-brown to yellowish-

brown fine sandy loam. Some small gravel is usually distributed through the soil section.

The Chenango fine sandy loam occurs most extensively in the towns of Floyd and Rome, and smaller areas are found in the towns of Annsville, Camden, Lee, Western, Steuben, Marcy, and Trenton. The topography is gently rolling to nearly level, and the elevation ranges from 440 to 660 feet above sea level. The drainage of this type is good, though not excessive.

The Chenango fine sandy loam has the origin typical of the series. The large area east of Rome was undoubtedly formed by material brought down by Ninemile and Sixmile Creeks and deposited over the till formation in that vicinity. This region is composed of high terraces with deeply cut stream channels. The depth of the water-deposited material upon the underlying till varies from a few inches to many feet.

This type is low in organic matter and the crop yields are relatively low. The best use of this soil is for dairying, together with the growing of potatoes and beans. Much of the type is in pasture, although corn, potatoes, oats, and buckwheat are grown as general farm crops. Corn yields 6 to 8 tons of ensilage, potatoes 75 to 125 bushels, buckwheat 20 to 35 bushels, and oats about 30 bushels per acre. Some hay is produced, but as a rule the sod is thin and yields are low. But little stable manure is utilized.

Agricultural conditions upon this type are not very good, and the land can be purchased for \$15 to \$40 an acre, depending on location and improvements.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Chenango fine sandy loam:

*Mechanical analyses of Chenango fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161972.....	Soil.....	0.8	5.9	11.6	43.9	13.0	14.8	9.6
161973.....	Subsoil.....	1.1	4.7	12.0	49.8	14.0	11.6	6.9

#### CHENANGO LOAM.

The surface soil of the Chenango loam to a depth of 9 inches is a brown to light-brown, mellow, and friable loam. The subsoil is a brown loam. The entire section contains a moderate quantity of gravel from foreign and local rocks, mainly shales. The type is easily worked.

The Chenango loam is of small extent, occurring mainly along the Mohawk River and its tributaries, in the towns of Western, Steuben, Ava, and Boonville. The topography is nearly level to gently rolling,

and the natural drainage is good. There is considerable range, from about 540 to 1,100 feet, in elevation.

The original forest growth on the Chenango loam consisted largely of hardwoods. Nearly all the type is cleared and in cultivation. It is a good general farming soil, although it occurs only in small bodies. It seems to be well suited to small fruits, and to corn, potatoes, and oats. Good yields of the staple crops are obtained. This soil is held as a part of upland farms, which are devoted mainly to dairying.

The general agricultural conditions upon this type are good, the farm buildings, though small, are well cared for, and the fields are carefully tended and kept in a good producing state.

Farms of this type vary in price according to their accessibility and improvements. In general the land values range from \$20 to \$40 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Chenango loam:

*Mechanical analyses of Chenango loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161964.....	Soil.....	2.3	9.0	8.8	10.6	7.9	40.9	20.2
161965.....	Subsoil.....	1.8	11.6	11.3	10.7	6.0	38.5	20.1

#### DUNKIRK SERIES.

The surface soils of the Dunkirk series range from brown to gray in color, and the subsoils from brown to yellow or gray, and sometimes mottled. The series is derived from glacial-lake deposits, and includes lighter colored soils formed from such material. The topography varies with the thickness and character of the deposits as well as with the character of the original topography. It ranges from smooth to rough, the former being the more characteristic. The important criteria in distinguishing these soils are: (1) The derivation from glacial-lake deposits, determined by (a) the nature of the material (clay, silt, gravel), (b) the smoothness of the topographic outline, and (c) the stratification of the material, and (2) the color of the soil and subsoil.

In Oneida County the Dunkirk series is represented by seven types, the Dunkirk fine sand, gravelly loam, sandy loam, fine sandy loam, loam, clay loam, and clay.

#### DUNKIRK FINE SAND.

The soil of the Dunkirk fine sand to a depth of 6 to 10 inches is a brownish-gray to light-brown, slightly loamy fine sand. The subsoil is a yellowish-brown or yellow fine sand, grading at a depth of 3 feet or more into a light brownish gray fine sand.

There is a beach phase of this type, which, in places, has a small quantity of gravel on the surface and through the soil, but the extensive areas west and northwest of Rome which are almost flat in topography are free of gravel in the soil or subsoil.

Areas occurring as beach ridges are found along the southern edge of the old glacial Lake Iroquois plain and in the lake plain near the end of Oneida Lake.

The more extensive areas which occur below the level at which the old lake stood represent a delta formation. The beach areas are naturally well drained, but in the extensive flat areas the water table is high and numerous local areas are imperfectly drained.

A very large part of the type has never been under cultivation, although most of the timber of any value was removed long ago. Some areas that were once under cultivation have been abandoned. The small areas now cultivated are devoted principally to corn crops and to other general crops of the region, which do not give satisfactory yields as a rule. Irish potatoes are grown in a small way, and where properly handled good yields are obtained.

It seems that the type could be used to good advantage in growing a variety of early truck crops, including vegetables, potatoes, raspberries, blackberries, and strawberries.

#### DUNKIRK GRAVELLY LOAM.

The surface soil of the Dunkirk gravelly loam has a depth of 8 to 12 inches and consists of a light-brown to brown gravelly loam. The subsoil is a light-brown to yellowish-brown gravelly loam, which grades at a depth of 18 to 36 inches into a very gravelly loam or beds of gravel.

The typical development of the Dunkirk gravelly loam is in the beach lines of the old glacial Lake Iroquois, in the west-central part of the county. In these beach areas there is a sprinkling of gravel on the surface and throughout the soil, ranging from very small to about 3 inches in diameter. As a rule there is not enough gravel present seriously to interfere with cultivation. Other important areas of the type occur to the north and east of Rome as an almost level plain. These areas and another area at Blossvale, in Annsville Town, are below the level at which the old lake stood, but they occupy essentially a terrace position with reference to the streams along which they occur, and the soil in most places is a good gravelly loam, corresponding with the general type description. North and east of Rome, bordering the Mohawk River, are some very gravelly areas, the surface being almost completely covered with rounded gravel and cobbles.

The more gravelly areas of the type are rather difficult to handle satisfactorily, and general farming is not followed to any extent. Near Rome, however, such areas are being used quite successfully in

growing heavy truck crops, including peas and beans. The less gravelly areas are considered excellent land for corn, oats, and grasses, and for potatoes, beans, cabbage, etc. The corn is largely cut for ensilage. Where grown for this purpose yields of 10 to 20 tons are secured. Where grown for the grain, the yields range from 35 to 75 bushels per acre.

Land values on this type range from \$30 to \$100 an acre, depending upon location and improvement.

#### DUNKIRK SANDY LOAM.

The surface soil of the Dunkirk sandy loam to an average depth of 10 inches is a brown to light-brown, loose friable sandy loam. The subsoil is a brown to light-brown, compact coarse sandy loam to loamy coarse sand. The soil and subsoil contain a few small, rounded gravel. Owing to the light texture of the soil, it is easily handled.

This type occurs only in a few small areas, three near the city of Oneida, along Oneida Creek, and one southeast of Camden, in the town of Camden. These areas occupy terrace positions, and have a level topography and good natural drainage. The area of Dunkirk sandy loam in the town of Camden is underlain by strata of clay at depths varying from 4 to 10 feet. This clay strata constitutes a reservoir for soil moisture, although it is rather deep.

In the vicinity of Camden these flat terrace lands were at one time esteemed for the production of sweet corn for the canning factories. Their productiveness has diminished, however, owing to improper management. The present crops grown include oats, corn, potatoes, and hay. Oats yield about 25 bushels per acre, corn 35 to 50 bushels, potatoes 100 to 125 bushels, and hay an average of 1 ton per acre. In the vicinity of Oneida better yields are obtained.

Root crops and garden and truck crops do well on this soil. The addition of organic matter and better tillage methods, together with the application of lime, are needed to restore this land to its natural state of productiveness.

The type is conveniently located with respect to shipping points, and can be purchased at \$15 to \$35 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Dunkirk sandy loam:

*Mechanical analyses of Dunkirk sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161934.....	Soil.....	0.8	7.4	16.8	38.8	10.4	16.2	9.4
161935.....	Subsoil.....	2.0	9.2	21.4	33.4	7.2	13.3	13.7

## DUNKIRK FINE SANDY LOAM.

The surface soil of the Dunkirk fine sandy loam is a brownish-gray fine sandy loam or loam, with a depth of 8 to 10 inches. This is underlain by a lighter brown fine sandy loam which extends to a depth of 3 feet or more in some places, and in others grades at a depth of 15 to 18 inches into a yellowish-brown and gray, mottled clay loam. The soil and subsoil are practically free of gravel.

The Dunkirk fine sandy loam occurs in several small areas in the towns of Verona, Rome, and Vienna, being confined to the old Glacial Lake Iroquois basin. The topography of typical areas is nearly level to very gently undulating, and a large part of the type has imperfect drainage.

The Dunkirk fine sandy loam is used mainly for general farming. Corn yields 40 to 60 bushels of ears per acre, oats 40 to 60 bushels, and hay about 1½ tons. A few truck crops are grown and produce satisfactory yields.

Agricultural conditions on this type vary from good to poor. In the more progressive communities the stable manure is returned to the land and crops of legumes are grown annually. The buildings and improvements are good. The value of the farms varies according to the location. Some lands sell for \$10 to \$15 an acre, while others are held at \$25 to \$40 an acre.

## DUNKIRK LOAM.

The Dunkirk loam to an average depth of 8 to 10 inches is a brownish-gray to grayish-brown loam, varying to a fine sandy loam. The subsoil ranges in texture from that of the soil to a compact clay loam, the color ranging from brownish gray to mottled gray and brown. In places the subsoil has a slight purplish tinge on account of some influence from the Medina sandstone. Both the soil and subsoil are practically stone and gravel free, and the substratum usually consists of heavy gravel-free material.

The Dunkirk loam is not extensive, being confined to a few areas through the old Glacial Lake Iroquois basin, in the western part of the county. The topography varies from flat to very gently undulating, and the elevation ranges from 380 to about 480 feet above sea level. As a whole the natural drainage is not sufficient, and artificial drainage is necessary.

The Dunkirk loam is composed of materials, essentially of a non-calcareous nature, transported by water from foreign locations and deposited in their present position.

The native forest growth upon this type consisted largely of elm, beech, and white pine.

This type is considered a fairly good general farming soil. The principal crops grown are corn, oats, and hay. Corn yields 60 to 100

bushels of ears to the acre, oats 40 to 50 bushels, and hay  $1\frac{1}{2}$  to 2 tons.

The average agricultural conditions upon the Dunkirk loam are good. Farm values vary according to the improvements and distance to market, ranging from about \$35 to \$75 an acre.

#### DUNKIRK CLAY LOAM.

The Dunkirk clay loam to a depth of 6 to 8 inches varies from a fine sandy loam to silty clay loam of a brownish-gray color. The subsoil is a mottled gray and yellow or gray, brown, and yellowish mottled silty clay loam to clay. At depths of 20 to 36 inches the clay sometimes grades into a mottled purplish, sticky fine sandy loam. The type is quite free from rock fragments and gravel. It can be cultivated only within a narrow range of moisture conditions, for if plowed when too wet it clods badly.

This type occurs mainly in the towns of Rome and Verona. Its most typical development is about 2 miles southeast of Higginsville. The topography varies from flat to slightly irregular. Drainage is only fair because of this topography and the heavy texture of the material.

The type is devoted mainly to dairy farming. Some corn is grown, and yields average about 10 tons per acre. Oats yield about 30 bushels per acre. Timothy, the crop to which this soil is best adapted, produces from  $1\frac{3}{4}$  to  $2\frac{1}{2}$  tons of hay per acre. Some alfalfa is grown. The type is best suited to the production of grass and to dairying.

Tile underdrainage is needed, together with deeper plowing. As a whole, agricultural conditions upon this type are good.

#### DUNKIRK CLAY.

The surface soil of the Dunkirk clay consists of a grayish-brown clay with an average depth of about 6 inches, and the subsoil is a grayish-brown, heavy, compact, tenacious clay, often mottled gray and brown. The type is practically free from rock fragments. Owing to its compact structure and its tendency to bake upon drying, it is a very difficult soil to till and requires careful handling, for if plowed when either too wet or too dry it becomes so packed and clodded that several seasons are required to restore good tilth.

The Dunkirk clay is developed in but one area in the county, located about 2 miles west of Dunbarton, in the town of Verona. This type has a nearly level topography, but the drainage is good, except when excessive rains are experienced.

The area of Dunkirk clay in this county is fairly well developed agriculturally, and is used for general farming. Hay averages about 2 tons per acre. Stable manure is returned to the land and some commercial fertilizer is used. The buildings generally are in a good condition.

## FOX SERIES.

The Fox soils are brown to gray in color. The topography is level, except where varied by potholes or eroded valleys. The material from which the soils are derived was deposited as outwash plains or as terraces along streams within the glacial area or flowing out of it. It is wholly or mainly of glacial derivation and consists largely of limestone. The series occurs in the northeastern United States. Only one member—the Fox gravelly loam—is encountered in Oneida County.

## FOX GRAVELLY LOAM.

The soil of the Fox gravelly loam to an average depth of 12 inches consists of a brown, heavy sandy loam, containing both small and large, rounded gravel. Much of this gravel is of limestone, though a considerable part is from rocks occurring farther to the north. Gravel is abundant upon the surface of this type. The subsoil is a brown or reddish-brown loam to heavy loam, carrying rounded gravel. At depths greater than 36 inches beds of gravel are encountered. The quantity of gravel present in the soil seldom interferes with tillage operations.

Areas of Fox gravelly loam are confined to the limestone region in the southern part of the county. The most typical development is within the town of Bridgewater, while smaller areas occur in Paris, Marshall, and Sangerfield Towns. The type occupies nearly level terrace areas, having an elevation above sea level of about 1,200 to nearly 1,300 feet. The natural drainage is for the most part good.

The Fox gravelly loam is recognized as one of the best farming soils of the county. It is particularly well adapted to corn. It is also well suited to potatoes, oats, alfalfa, clover, and timothy. The yields are generally good. Corn averages 75 to 100 bushels of ears or from 8 to 12 tons of ensilage per acre. The yield of potatoes ranges from 100 to 200 bushels per acre. Oats yield 40 to 60 bushels. Alfalfa does particularly well, producing an average of 3 tons per acre in a season. Clover and timothy yield from 1½ to 2½ tons of hay of excellent quality per acre.

The agricultural conditions upon the Fox gravelly loam are good. The buildings are adequate and well cared for. The land values range from \$50 to \$75 an acre, according to improvements.

## MERRIMAC SERIES.

The surface soils of the Merrimac series are brown. The subsoils are predominantly yellow, and consist largely of sand and gravel. The series occurs in the northern part of the United States, and comprises high glacial terraces along the streams of this region. The

material is derived from crystalline rocks. Four types of this series are recognized in Oneida County—the Merrimac fine sand, gravelly sandy loam, coarse sandy loam, and fine sandy loam.

#### MERRIMAC FINE SAND.

The surface soil of the Merrimac fine sand has an average depth of about 6 inches and is light brown in color. It is underlain by a yellowish-brown fine sand. The soil is loose, mellow, and easily cultivated.

This type occurs as a single area to the east of Holland Patent, in Trenton Town, in the eastern part of the county. The surface is nearly level to gently rolling. Owing to the topography and the loose structure of the soil, drainage is good.

The original growth of pines and hardwoods has been removed. The present native vegetation consists of sand grass, berry bushes, and scrub timber.

Only a small part of this type is under cultivation, the greater part being used for pastures. Low yields of corn, buckwheat, and potatoes are secured.

This soil is adapted to the growing of early truck crops. The incorporation of stable manure and the use of cover crops, together with the liberal application of commercial fertilizers are highly beneficial.

#### MERRIMAC GRAVELLY SANDY LOAM.

The Merrimac gravelly sandy loam to an average depth of 8 inches is a brown or light-brown gravelly sandy loam. The subsoil is slightly lighter in color and varies from a gravelly sand to a gravelly coarse sandy loam. The gravel is usually of small size and composed of granite and gneiss. It is not present in sufficient quantities to hinder cultivation.

This type occurs in the northeastern corner of the county in the towns of Boonville and Forestport and farther south in the town of Trenton. The topography is nearly level, or that typical of a terrace soil. Owing to the loose structure of the material and its position, the drainage is often excessive.

This type lies in the mixed pine forest region of the State and was heavily timbered before the land was cleared for agricultural use.

The Merrimac gravelly sandy loam is used for general farming. Corn, oats, buckwheat, and potatoes are the chief crops grown. Only fair yields are secured. But little stable manure is saved, and very little commercial fertilizer is used. Some timber is cut for pulp wood. The area of this soil south of Trenton receives good tillage and produces higher yields.

## MERRIMAC COARSE SANDY LOAM.

The surface soil of the Merrimac coarse sandy loam varies in depth from 6 to 10 inches. It consists of a brown loamy sand or coarse sand, and is underlain to a depth greater than 36 inches by a grayish-yellow or grayish-brown sand. The texture of the subsoil becomes coarser with depth, until at 36 inches it is a coarse sand or fine gravel. Some small gravel is scattered over the surface and throughout the soil section. Because of its light texture this soil is easily tilled.

The Merrimac coarse sandy loam is encountered in the north-eastern part of the county, in the towns of Boonville, Forestport, Remsen, and Steuben. The topography is nearly level to gently rolling, and the elevation ranges from about 800 to 1,500 feet above sea level. The type is traversed by several streams, which afford adequate drainage to all sections.

The Merrimac coarse sandy loam formerly supported a heavy growth of hemlock, pine, and spruce. This was removed during the settlement of the region, and the native growth now consists of only a poor second growth of pine, hemlock, spruce, poplar, white birch, and soft maple, with a scant growth of huckleberry bushes, briers, and brakes.

The type is not adapted to general farming in its present condition. Some cultivation is carried on, but only in a desultory manner. With the application of commercial fertilizers, fair yields of potatoes of good quality are secured. A little pulp wood is cut each year.

This soil is easily built up by careful management. The application of stable manures, the use of cover crops, and a uniform depth of plowing are needed in its improvement.

The type is held in large tracts by nonresidents, who acquired the land before the timber was removed. Probably the best use of this soil is for forestry. Several small patches of white pine have been set out and are in a thrifty condition.

Land values vary according to the quantity and quality of the timber. They range from \$1 to \$10 an acre.

## MERRIMAC FINE SANDY LOAM.

The surface soil of the Merrimac fine sandy loam varies in depth from 6 to 10 inches and consists of a light-brown fine sandy loam. The subsoil to depths greater than 36 inches is a grayish-brown to light-brown loamy fine sand to fine sandy loam. The material throughout the soil section is loose and mellow. Some small gravel is commonly scattered over the surface of this type. A stratum of clay is encountered at depths varying from 10 to 15 feet. This soil

is easily tilled, and can be cultivated under a wide range of moisture conditions.

The Merrimac fine sandy loam is typically developed in the north-eastern part of the county, in the towns of Boonville and Forestport. Other areas of smaller extent are found in the adjoining town of Remsen and along West Canada Creek, in the town of Trenton. The topography is level or nearly so, and the natural drainage is good.

The original forest growth on this type was chiefly pine, with hemlock, some hardwood, and spruce. Where this timber was removed the land grew up in hemlock, maple, and beech. Since the original timber has been cut off large areas have been burned over, and in such places the present forest growth consists of poplar.

The sand deposits of this type are extensively worked in the vicinity of Boonville and Hawkinsville, and a high grade of building sand is shipped by canal and railroad to large cities.

Some areas of this soil are adapted to early truck crops, such as cantaloupes and early potatoes, though the greater part of the type is suitable only for forestry.

A very small part of the Merrimac fine sandy loam is under cultivation. Corn yields 4 to 8 tons of ensilage per acre, oats 20 to 25 bushels, buckwheat 20 bushels, hay about 1 ton, and potatoes an average of 100 bushels. The methods of farming are generally poor. Little organic matter is returned to the land and only a few cattle are kept. Conditions in the vicinity of Prospect, in Trenton Town, are somewhat better than the average. The soil is underlain by limestone, and the farmers use good cultural methods and secure correspondingly good yields. In general, this type is in need of organic matter, the addition of which renders it more resistant to drought.

The greater part of this type is better suited to the growing of timber than to the production of cultivated crops. Much of it is forested with poplar and a poor quality of hardwood. Some large areas have but little growth of any kind, and these could profitably be reforested.

Land values vary according to location, improvements, and forest growth. Some of the cultivated farms sell for \$30 to \$50 an acre, while large tracts in the town of Forestport are held at \$1 to \$5 an acre.

A marked variation of the Merrimac fine sandy loam occurs in a small area 2 miles east of Forestport Station in the town of Forestport. In this area the soil to an average depth of 6 inches is a light-brown fine sandy loam, and is underlain by a yellowish-brown to brownish-gray fine sandy loam. The soil and subsoil are loose and mellow. The surface of this area is thickly strewn with rounded glacial erratics of all sizes, making cultivation difficult.

The topography of this area is gently rolling, but a large part of it receives the seepage from the hills and is therefore wet throughout the greater part of the year. The manner of formation of this small area is not definitely understood.

This area formerly supported a forest growth typical of this region. It now affords scant pasturage. A mixed growth of maple, hemlock, and poplar furnishes some pulp wood. This land is valued at about \$5 an acre.

#### OTISVILLE SERIES.

The surface soils of the Otisville series are brown and the subsoils yellowish in color. The topography varies from rolling to hilly. The soils are encountered in the northeastern section of the United States. They are derived from noncalcareous kame and esker material, and differ from the soils of the Rodman series in this absence of limestone as an important constituent. Drainage is usually good. The Otisville fine sand and gravelly fine sandy loam are mapped in Oneida County.

#### OTISVILLE FINE SAND.

To an average depth of about 8 inches the surface soil of the Otisville fine sand is a dull-brown to grayish-brown, loose fine sand. The subsoil to depths greater than 36 inches consists of a yellowish-brown to light-yellow, incoherent fine sand. A small quantity of small gravel is sometimes scattered through the surface soil and subsoil.

The Otisville fine sand occurs in the upland region of the county, associated with the Worth stony loam, in the towns of Ava and Lee, and also in the towns of Annsville, Camden, and Vienna. The topography varies from rolling to hilly, the type being characterized by kames and eskers. Owing to the loose and incoherent nature of the material, the drainage is excessive.

The type supports a mixed growth of birch, soft maple, hemlock, poplar, brush, and ferns, with some native grass. Very little of this type is under cultivation, most of it being waste land. The Otisville fine sand is best reforested.

The buildings upon this land are in poor condition. The value of the type ranges from \$3 to \$8 an acre.

#### OTISVILLE GRAVELLY FINE SANDY LOAM.

The surface soil of the Otisville gravelly fine sandy loam to a depth of 8 to 10 inches varies from a light-brown gravelly fine sandy loam to very fine sandy loam. The subsoil is a yellowish-brown gravelly fine sandy loam. The entire section is characterized by a large content of rounded and subangular coarse and fine gravel composed of quartz and sandstone, and the deep subsoil consists of stratified gravel beds.

The Otisville gravelly fine sandy loam is irregularly distributed throughout the glaciated, upland region, except in the limestone and crystalline rock sections of the county. It is most extensively developed in the northwestern part of the county, in connection with the Worth series.

The topography is broken and irregular, the type including ridges and elevations rising from a few feet to over 100 feet in some cases above the surface of the surrounding soils. Because of the high gravel content and the light texture of the soil, the drainage is often excessive.

In the more gently rolling areas of this type some cultivation is carried on, although the crop yields are easily affected by the seasons. Corn averages 6 to 8 tons of silage per acre, potatoes yield 75 to 125 bushels, oats an average of about 25 bushels, and mixed hay usually less than 1½ tons per acre.

Upon these easier tilled lands the addition of organic matter and better tillage methods result in marked improvement.

The greater part of the Otisville gravelly fine sandy loam is best suited for use as pasture and forest land. Its value is low, ranging from \$5 to \$30 an acre.

#### RODMAN SERIES.

The soils of the Rodman series range from light brown through grayish to yellowish brown with a reddish shade. The subsoils are yellowish. They are derived from material predominantly of limestone derivation occurring in the form of hilly waterlaid deposits. They are found in the glacial region of the United States. Only one member of this series, the Rodman gravelly fine sandy loam, is recognized in Oneida County.

#### RODMAN GRAVELLY FINE SANDY LOAM.

The soil of the Rodman gravelly fine sandy loam to a depth of about 8 inches consists of a light-brown or yellowish-brown fine sandy loam, containing a large percentage of rounded and angular gravel and stones. The subsoil is of the same character as the soil, though lighter in color and frequently more gravelly. The gravel is of both foreign and local origin. The presence of limestone is the determining factor in the correlation of this type. Except for the high gravel content and rough surface of some areas, the type is easy to cultivate.

The most extensive areas of this type are found in the southern part of the county near Clayville, Oriskany Falls, and Waterville. A small area is located farther north at Holland Patent, in the town of Trenton. The topography is gently rolling to rough and broken. The natural drainage is good.

Where the surface is not too broken, this type is well suited to the cultivation of corn, oats, potatoes, and grass. Corn yields 8 to 10 tons of ensilage, potatoes 100 to 125 bushels, oats about 30 bushels, and hay an average of  $1\frac{1}{2}$  tons per acre. A large part of the type, however, is unsuitable for cultivation and is used either for pasture or wood lots. A small quantity of commercial fertilizer is used, and stable manure is applied. As a rule the type is fairly well farmed, considering the natural difficulties encountered.

Land values range from \$5 to \$40 an acre, depending on improvements and topographic features.

#### HINCKLEY SERIES.

The surface soils of the Hinckley series are brownish gray to brown, and the subsoils grade from yellowish brown in the upper part to brownish gray and gray at depths of 2 feet or more. The deeper subsoil consists mainly of beds of sand or sand and gravel. This series has a very irregular topography, including kames and rough terrace and outwash plain areas. The material was originally laid down by running water, and the irregular topography is apparently due in part to wind action. The soil material is mainly granitic. Three types are encountered in Oneida County, the Hinckley coarse sandy loam, gravelly fine sandy loam, and fine sandy loam.

#### HINCKLEY COARSE SANDY LOAM.

The surface soil of the Hinckley coarse sandy loam, extending to an average depth of about 8 inches, is a brown medium to coarse sandy loam. The subsoil is a grayish-yellow to brown coarse sandy loam. Small crystalline stones and gravel occur throughout the region occupied by this type.

The Hinckley coarse sandy loam is encountered in the northeastern part of the county in the towns of Trenton, Remsen, Boonville, and Forestport. The topography is hilly to rolling, showing a kame formation. The drainage is good, though seldom excessive.

Owing to its surface configuration, this type is not adapted to cultivation. It is used for pasturage, to which it is best suited.

The agricultural value of the Hinckley coarse sandy loam is low, probably averaging not more than \$8 to \$15 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

*Mechanical analyses of Hinckley coarse sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161987.....	Soil.....	7.0	28.1	18.2	17.2	7.6	12.1	10.0
161988.....	Subsoil.....	8.2	29.6	25.8	27.4	3.6	3.5	2.0

## HINCKLEY GRAVELLY FINE SANDY LOAM.

The soil of the Hinckley gravelly fine sandy loam to a depth of 7 to 10 inches is a brownish-gray to light-brown fine sandy loam, carrying a large quantity of rounded and subangular gravel. The subsoil is a yellowish-brown gravelly fine sandy loam to a depth of 18 to 36 inches, grading below into beds of sand and gravel. The gravel is mainly granitic.

The Hinckley gravelly fine sandy loam is of small extent, occurring only in the northern part of the county in the vicinity of Boonville, North Pond, and Alder Creek. The surface is very irregular, the type having a distinctly kame topography. The drainage is excessive.

Very little of the type is farmed, although most of it has been cleared of timber, and some areas are fenced for pasture land. Small areas, where the surface is comparatively smooth, are used for the production of potatoes, which give fair to good yields, and for corn and oats, with generally low yields. Corn is grown mainly for ensilage. The rougher areas are best suited to forestry.

## HINCKLEY FINE SANDY LOAM.

The soil of the Hinckley fine sandy loam to a depth of 7 to 10 inches is a light-brown to yellowish-brown fine sandy loam. The subsoil is a yellowish fine sandy loam to sandy loam to a depth of 18 inches or more, grading below into beds of stratified sand or sand and fine gravel. The soil and subsoil are free from stone fragments, but some small gravel is frequently scattered over the surface.

The type occurs in the northeastern part of the county. It occupies knolls, hillocks, rough kame ridges, and steep slopes. The drainage is excessive.

Some areas are of kame origin. Other areas possibly are the result of wind action over former level terrace or outwash plain areas, while still others are the result of erosion. The type as a whole is derived from stratified deposits. It differs from the Merrimac fine sandy loam in having a much rougher topography.

The Hinckley fine sandy loam is not used for agriculture. Like the Merrimac soils it supports a scattered forest growth, but the timber is of little value. The type is probably best suited to forestry.

## CLYDE SERIES.

The Clyde soils are prevailing black in the surface section, but vary to dark gray or dark brown, the strength of color being related to the quantity of organic matter present. The subsoils are gray, yellowish gray, and mottled gray and yellow, and are usually heavier than the soils. The Clyde types occur in flat or depressed, poorly drained areas, distributed throughout the northeastern quarter of the United States. They are derived from materials of mixed origin;

either water-laid deposits in lakes or ice-laid deposits that have been subjected to conditions of deficient drainage. This series is represented in Oneida County by two types, the Clyde fine sand and the Clyde clay loam.

#### CLYDE FINE SAND.

The surface soil of the Clyde fine sand is a dark-brown to black fine sand. It has a depth of about 10 inches. The subsoil is a fine sand, the color of which varies from brown to gray and is frequently bluish in the lower part. The surface soil is often quite loamy, owing to its high organic-matter content.

The Clyde fine sand is encountered in two narrow strips at the head of Oneida Lake. These areas are only a little above the level of the lake and are consequently poorly drained, with water standing within a few inches of the surface throughout the year.

The type is composed of water-laid material which has been subjected to poor drainage conditions for a long period. The decay of organic matter has resulted in the dark color of the soil. Very little of this type is under cultivation. With proper drainage it is capable of producing fair yields of truck crops, particularly celery, lettuce, and onions.

#### CLYDE CLAY LOAM.

To an average depth of about 8 inches the Clyde clay loam is a dark-brown clay loam, underlain by a drab heavy clay loam or clay which is very plastic and tenacious. Care is necessary in the handling of this type, owing to its tendency to clod if worked when too wet.

This soil is encountered only in a few small, poorly drained areas in the western part of the county. The topography is nearly level and the drainage is poor.

The natural vegetation consists of water plants, together with such trees as elm, basswood, and willows. A small part of the type has been partially drained and is devoted to grass. The remainder of the type is either used for pasture or is waste land.

#### GENESEE SERIES.

The Genesee soils range in color from dark brown to grayish brown. They occur along the major streams and their tributaries throughout the northeastern glaciated region, particularly where the Dunkirk, Volusia, Miami, and Ontario series constitute the principal upland soils. The Genesee series extends a short distance south of the glaciated area, where the main streams have their headwaters in areas of the above-named series. The material consists of alluvial sediments. These soils are subject to annual or seasonal overflow.

Four members of the Genesee series, the shale loam, very fine sandy loam, silt loam, and silty clay loam, are mapped in Oneida County.

GENESEE SHALE LOAM.

The soil of the Genesee shale loam to a depth of 10 to 15 inches is a dark-brown heavy loam, containing numerous small black shale fragments. The subsoil is a brown to dark-brown silty loam, carrying a high percentage of shale fragments. These fragments have often weathered down to form a heavy-textured soil.

The Genesee shale loam occurs in the valleys through the shale upland region and is of alluvial origin. It is found only in small areas along the valley of the Lansing Kill and the Mohawk River. The drainage of the larger areas is good.

Only small areas of this soil type are under cultivation, but these produce good yields of corn, oats, buckwheat, potatoes, and grass. The greater part of the type is best suited to pasturage.

GENESEE VERY FINE SANDY LOAM.

The surface soil of the Genesee very fine sandy loam consists of a light-brown very fine sandy loam extending to a depth of about 9 inches. The subsoil is a lighter brown to grayish-yellow fine sandy loam. In general, the material is coarser nearer the streams, and finer farther away from the swifter current.

This Genesee very fine sandy loam occurs only in a few small areas along some of the larger streams of the county. These first-bottom areas are subject to overflow. The topography is level or nearly level, and the drainage is usually deficient.

But little of this type is under cultivation. It is mainly devoted to meadow and pasture, for which it is best suited.

GENESEE SILT LOAM.

The Genesee silt loam consists of a brown to dark-brown silt loam, about 10 inches deep, underlain to a depth of 36 inches by a light-brown compact silt loam. The subsoil is frequently mottled with gray or drab. The type as a whole is characterized by its high organic-matter content. Along the Mohawk River and its tributaries the areas of this soil are usually slightly darker colored than the typical, owing to the influence of the black Utica shales of the region. The entire soil section is free from rock fragments. The Genesee silt loam is easily tilled, the soil being soft, mellow, and friable.

The largest body of Genesee silt loam in the county occurs along the Mohawk River flats between Utica and Rome. Smaller areas of this type are encountered along nearly all of the larger streams of the county. The type has a smooth topography.

Along the Mohawk River the valley floor occupied by this type was partially formed from river sediments during glacial times. At the present time the level of the river is usually 6 to 12 feet below the surface of the land, and good surface drainage is possible. But with every period of high water the river overflows its banks, and the entire valley floor is inundated. Each flood deposits fine sediment over the surface. The smaller areas of this type occupy low flood plains, which are as a rule fairly well drained. The small streams have rather rapid currents, and these areas are seldom overflowed for any length of time.

When this region was first settled these river bottoms were heavily forested with hardwood. Subsequently they were cleared and cultivated. The native vegetation now consists of bluegrass and timothy. Only a small part of this type is under cultivation at present. The greater part of it is utilized for mowing lands, to which it is best suited. Hay yields from 1 to 3 tons per acre, with an average of about 1½ tons.

Nearly all of the Genesee silt loam is subject to overflow, and there are but few buildings located on it. Land values range from \$20 to \$100 an acre.

#### GENESEE SILTY CLAY LOAM.

The soil of the Genesee silty clay loam to an average depth of about 12 inches consists of a brown to grayish-brown heavy silt loam. Beneath this occurs a drab to bluish silty clay or clay loam, which is plastic and tenacious, and mottled with brown and yellow. In the vicinity of Fish Creek Landing, in Vienna Town, the entire section is distinctly mottled with yellow and gray. The type is free from stones and gravel, but owing to the unfavorable structure and poor drainage good tilth is difficult to obtain.

The Genesee silty clay loam is encountered in several scattered areas throughout the county. It occurs along the Mohawk River near Rome, between Wood and Fish Creeks near Fish Creek Landing, along the West Branch Unadilla River near Bridgewater, and in two areas bordering the Sangerfield Swamp, in Sangerfield Town. It occurs as first-bottom overflow land along these streams, and is poorly drained. The different areas are characterized by depressions which are generally filled with water.

The Genesee silty clay loam is of comparatively recent origin, and with each overflow new soil-forming material is deposited.

The original vegetation consisted of elm, soft maple, and evergreens, together with swamp grasses. Where well drained the type is suited to the production of oats, hay, and pasturage. It is used mainly for mowing and hay land, as but little drainage has been attempted. Its agricultural value depends mainly upon drainage conditions.

The results of mechanical analyses of samples of the soil and sub-soil of this type are given in the table following:

*Mechanical analyses of Genesee silty clay loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	<i>Per cent.</i>
161903.....	Soil.....	0.0	0.2	0.2	2.0	11.4	62.0	24.2
161904.....	Subsoil.....	.0	.2	.3	5.2	12.0	52.5	29.7

## MISCELLANEOUS MATERIAL.

## STEEP BROKEN LAND.

The steep, broken areas, not stony enough to be classed as Rough stony land, but too rough to be used for agriculture, are classed as Steep broken land. The largest areas of this kind occur along the Mohawk River and its tributaries in the northern part of the county.

The soil is a very shaly loam which varies from grayish brown to dark brown in color and rests upon beds of partially decomposed shales at a shallow depth.

Formerly these slopes supported a heavy growth of native trees, including maple, hemlock, and white pine, but most of the timber has been removed. Over most of the type, therefore, there is now a poor second growth of scrub trees and brush. In a few places erosion prevents the growth of plants.

The areas of Steep broken land afford scant pasturage. This land is best used for forestry. Its value is low and depends upon the timber growth.

## ROUGH STONY LAND.

Rough stony land comprises areas unsuited to cultivation or any use except as pasture and forest lands. These areas are covered with large boulders and include rocky slopes and rock outcrops.

Land values for the areas mapped as Rough stony land are based upon the forest growth, and the scant pasturage they afford. The values are low, as most of the good timber has been cut, the type now supporting a second or third growth.

## MUCK.

The areas mapped as Muck in Oneida County vary widely in size, color, depth, drainage, etc. The material consists of brown to black decomposed vegetable matter, varying in depth from about 12 inches to several feet. The underlying material ranges from sandy deposits to heavy clays, usually mottled and very plastic.

A large number of areas of Muck are distributed throughout both the uplands and lowlands of the county. They vary in size from a few acres to several square miles, the largest occurring southwest of Rome, in the vicinity of Verona Station, and southwest of Sangerfield.

All the areas occupy low-lying positions, and are naturally poorly drained, though the greater part of the type can be drained artificially. The poor drainage is responsible for the formation of this soil material. Water-loving plants flourish in such areas, and the high organic-matter content of the soil is due to the growth and decay of this vegetation.

This type is still in process of formation. Nearly all of the areas of Muck in the county support a dense growth of cedar, hemlock, soft maple, elm, and underbrush. The Sangerfield Swamp, in the southern part of the county, supports a heavy growth of cedar, pine, balsam, hemlock, black ash, and elm, providing hop poles for the use of a large number of farmers who own small tracts of this swamp land.

Where well drained, Muck constitutes a good special-purpose soil, and is better suited to the production of celery and onions than any other soil in the county. It is also a good soil for growing potatoes, cabbage, carrots, beets, etc. In this county only a few small areas are devoted to truck crops, the remainder being used for mowing and pasture land or left as waste land.

#### MEADOW.

Meadow includes poorly drained areas not suitable for cultivation or for any other use except pasturage. Such areas are usually encountered along the streams, and are low, wet, and rather swampy. The texture of the soil varies widely, and is subject to change with each overflow. The surface soil is usually dark colored, while the lower part of the section is mottled gray and brown.

Meadow occurs in small, scattered areas throughout the county. Some areas are too small to be shown satisfactorily on the soil map. The topography is flat, and the drainage is poor.

The native vegetation consists of water-loving grasses and weeds, together with elm, ash, and willow. Artificial drainage is not practicable for this type, because of its position along the water courses. It is used only for pastures.

#### DUNESAND.

Dunesand includes areas of loose, incoherent sand, bare of all vegetation and subject to wind drifting. This sand dries out quickly. The type occurs only in small areas in the sandy region of the county, especially within the types of the Dunkirk and Merrimac series. Dunesand has no agricultural value.

#### SUMMARY.

Oneida County lies just northeast of the center of New York State. It has an area of 1,226 square miles, or 784,640 acres.

The county comprises two broad upland regions, separated by an old lake-bed plain and glacial river channel. Elevations range from about 370 to nearly 1,950 feet above sea level.

The climate is typical of this section of the State. The winters are cold with heavy snows, and the summers are characterized by short periods of extreme heat. The rainfall is usually sufficient for crop production.

All parts of the county are supplied with good transportation by railroads and canals.

Oneida County was settled early in the eighteenth century. The abundant water power and productive lands encouraged the development of the county. Its population is given in the 1910 Census as 154,157.

Dairying is the main agricultural pursuit. Milk and other dairy products are shipped to New York City. The principal crops grown are hay, potatoes, and oats.

The adaptation of crops to soils is recognized only in a general way, and the use of regular crop rotations is not general. Permanent pastures are common, and mowing sods are maintained for long periods. Commercial fertilizers are used to a small extent. But little stable manure is applied to the land. Labor is scarce and often unskilled. A large part of the county is suitable only for forestry.

The soils of the county range from light sands and gravels to heavy clays.

Fifty-eight soil types are recognized. These represent 19 series and 5 miscellaneous types. The soils, on the basis of origin of the material and processes of formation, are divided into four general groups, glacial or ice-laid soils, water-laid soils (alluvial and lacustrine), residual, and cumulose.

The glacial-till, or glaciated, soils occupy the uplands, and are by far the most extensive and most important in the county. They have a gently rolling to hilly topography and good drainage.

The Honeoye series is one of the more important of the glacial group. It is represented by two types. The Honeoye loam, containing limestone fragments, is the best upland soil in the county. It is used for general farming and dairying. The yields of all crops grown are good. The stony loam is a productive soil, but is too stony for cultivation. It makes good pasture land.

The Ontario series is extensively developed, but includes only one type, the loam. This type does not contain limestone fragments, and is less highly developed than the Honeoye loam. It requires careful crop rotations and thorough cultivation.

The Mohawk series comprises two types, which are devoted mainly to dairying. The loam is the most extensive of this upland series, and as a whole is in a fair state of productiveness. With good tillage the yields on this type are easily increased. The silt loam is composed of a shallow till and is less extensive than the loam. It is best suited to some form of stock raising, with Irish potatoes as the cash crop. This series is capable of a higher development.

The Volusia loam and silt loam have an extensive development in the county, and are used for dairying and general farming. The silt loam occupies higher elevations in association with the loam. This is recognized as one of the poor soils of the county. Poor management is in part responsible for its present condition. Stock raising would build up this type. Buckwheat and potatoes are the principal crops grown. The clay loam and stony loam are used for general farming, dairying, and the production of hay and pasturage.

The Worth series, developed through glacial action over sandstone, includes extensive upland soils in the northwestern part of the county. It is represented by four types. These soils have a high stone content and are largely waste land. Some dairying and general farming are carried on. They are well suited to sheep and cattle raising. A part of this series is best devoted to forestry. The land values are usually low.

The Dover soils consist of glacial till overlying limestone formations. Three types are recognized in this county. The series is devoted mainly to dairying. Where the glacial erratics are not too thickly strewn over the surface these soils are fairly productive. Too little attention is paid to crop rotation and crop adaptation.

The Gloucester series, including two types, occurs only in the extreme northeastern part of the county. These soils are best devoted to forestry. The value of land is low. All of the first-growth timber has been removed.

The Farmington loam is a gently rolling type, mainly of residual origin, resting upon limestone. It is a good grass soil, and is best used for dairying.

The Lockport and Allis series, the former comprising one type and the latter two types, are of relatively small extent in this county. These soils, although mainly residual, contain more or less glacial material. They are usually held in connection with dairy farms and are mainly used for pasturage, although some of the general farm crops do well upon them.

The Chenango series is represented by seven types, some of which were not very important. These soils were laid down as terraces, outwash plains, lake beaches, and deltas. The fine sand is not developed agriculturally, but comprises large areas which are in either waste land or timber lots. It is adapted to early truck crops. The stony gravelly loam and gravelly loam are quite variable in texture. These soils are highly developed throughout the county. They are well suited to special crops and to general farming, and the farms are in a prosperous condition. The other types are used mainly for general farming, to which they seem well adapted. More thorough cultivation and more regular crop rotations are needed for this series as a whole.

The Dunkirk series comprises seven types. These are old lake-bottom soils which are imperfectly derived and not very well developed.

The Merrimac series, encountered in the northeastern part of the county, consists of glacial materials laid down as delta or terrace formation. This series includes four types, representing a large part of the lighter textured soils of the county. Agricultural conditions are only fair, and much of this land supports a poor forest growth or is waste land. A large part of these soils is suitable only for forestry.

The Hinckley series includes rolling to rough terrace areas, kames and eskers. Three types are classed with this series. They are not used for agriculture.

The Clyde soils are of dark color and usually poorly drained. They are not extensively developed and are used mainly for meadows and pasturage. The Clyde series includes two types in this county, the fine sand and clay loam.

The Otisville soils are composed of coarse-textured, noncalcareous materials, and are so uneven in topography and so droughty that their agricultural value is low.

The Rodman series includes but one type. This soil consists of calcareous material laid down in the form of kames and eskers. In the more nearly level areas general farm crops give good yields.

The Fox gravelly loam is a calcareous soil, laid down as terrace material along old glacial streams in the southern part of the county. It is well suited to general farming, and agricultural conditions are good. Land values are relatively high.

The Genesee series is represented in Oneida County by four types. These soils are of recent origin. They are composed of material laid down by stream action. The silt loam is the most extensive type of this series. It is well adapted to the production of grass. Drainage is the greatest problem in the handling of this type, and of the entire series. The other three types of the Genesee series are not highly developed, being used mainly for pasturage and for meadows. The value of these soils varies according to their location and drainage.

Muck, although not developed agriculturally within this county, is a valuable soil for heavy truck, celery, cabbage, etc., where properly drained.

A part of the area of Steep broken land, Rough stony land, and Meadow is used for pasturage, while some areas are best utilized for forestry.

Areas designated as Dunesand have no agricultural value.

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