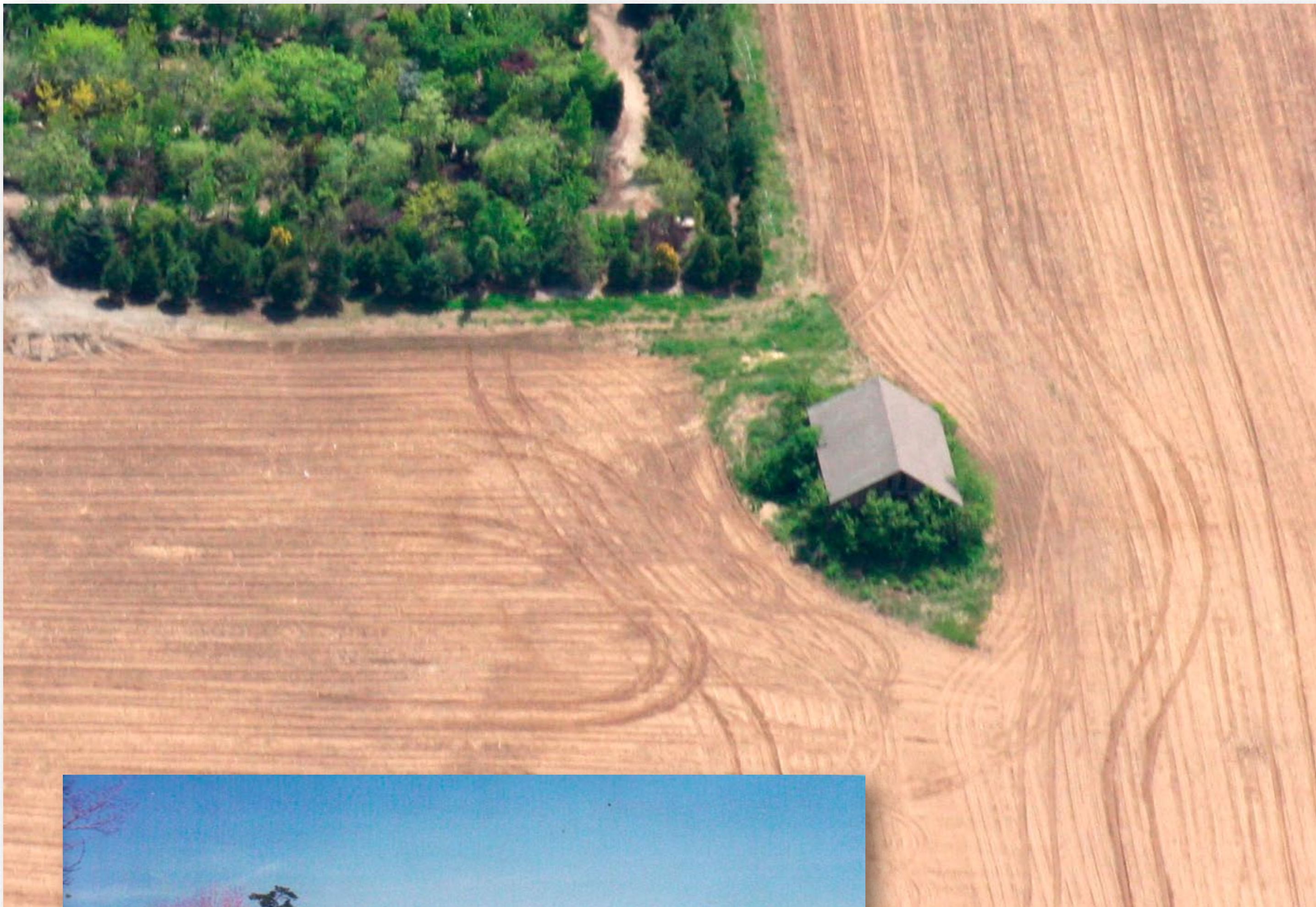


CHAPTER THREE

SOILS

Soils are made up of mineral matter, water, air and organic matter. They form the interface between the lithosphere (rock), atmosphere (air), hydrosphere (water) and biosphere (living things). They sustain life in many forms: natural vegetation, the countless microscopic soil creatures that work the soil, and the food crops that animals and humans feed on. Soils also store, filter and clean our water and air and recycle nutrients and organic wastes.

The soils in Kent are relatively young, most having formed after the retreat of the Wisconsin Glacier some 14,000 years ago, coming into being under temperate, humid climate conditions that produced hardwood forests. The soils are highly variable in character, as Map #5 and the discussion in this chapter will show.

Soils are categorized in a number of ways, including texture, permeability, fertility, stoniness, depth, color and chemistry. In Kent's Rural Districts soils are used as the basis for zoning; these districts account for most of the acreage in town. Soil-based zoning attempts to match the amount of development permissible on a site to the capacity of the soils to accommodate the use without causing environmental degradation. To date, the towns of Kent (since 1982) and Washington (since 1976) are the only towns in the state to use this method. Soil types also form the legal basis for the delineation of wetlands in Kent and throughout the state.

Soil Formation and Topography

Soils are derived from "parent" material that is altered by chemical, mechanical and biological processes, including the actions of weathering, erosion, physical movement and living organisms over many thousands of years. The parent material is the type of bedrock or surficial material the soil is formed in and from and can vary in acidity (designated as pH), texture (particle size distribution), permeability (movement and water storage), and the rate at which it decomposes to form soil. Chemical and biological processes change the upper part of the base material into a living, life-sustaining soil.

Topography or relief also contributes to the formation and character of soils. Topography refers to the steepness of the terrain and position on a hill, hillside, valley, or depression. There is a strong correlation between parent material, topography and soils in Kent.

Most of Kent's hills are made up of acidic bedrock types, described in the preceding chapter, and including gneiss, schist, amphibolite and quartzite. On rounded hilltops up to several feet of glacial till, the unsorted and unstratified debris left behind by the receding glaciers, is usually present, which allowed good farm soils to form over the centuries.

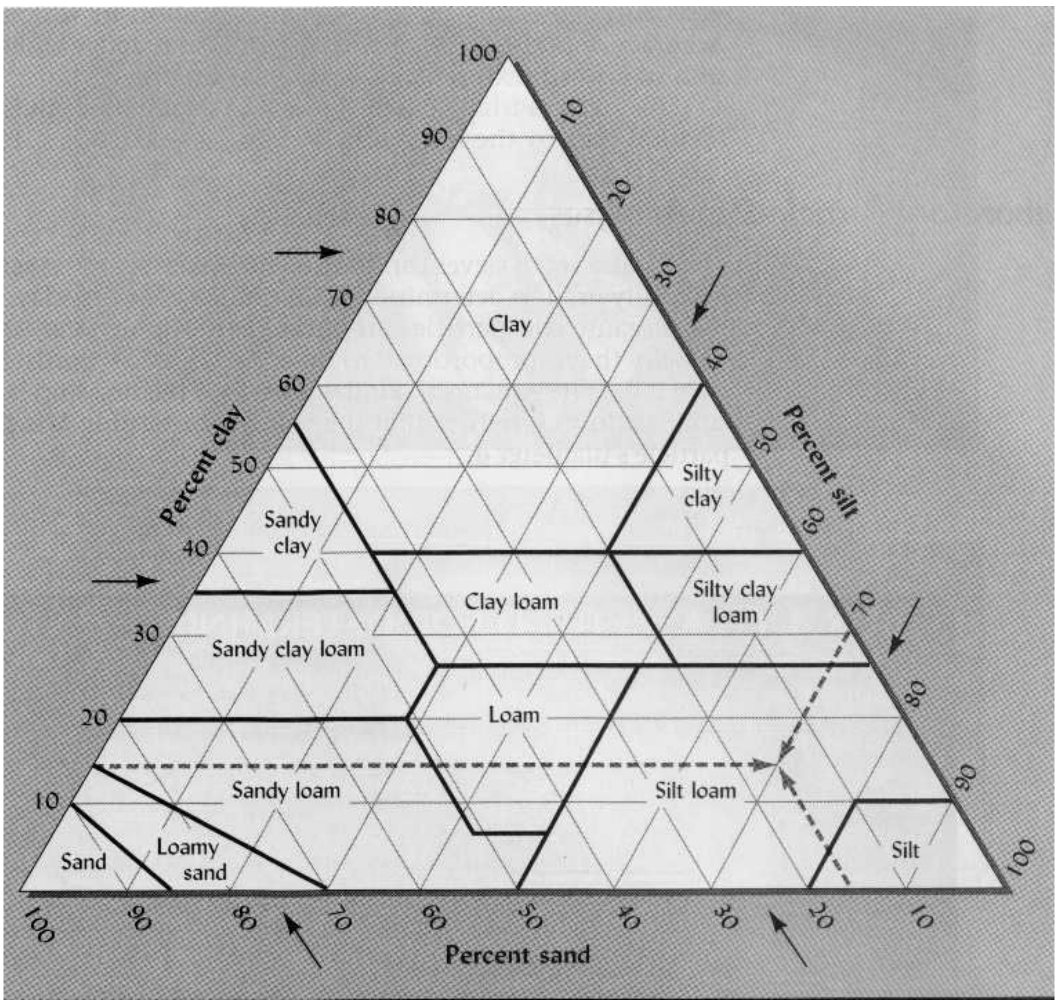
The top sections of most slopes are typically convex in shape. They are prone to erosion and contain thin till deposits or soils formed in weathered bedrock, especially on the steeper parts. Water runs off quickly, but natural vegetation may somewhat stabilize the slope. The middle part of the slope is often straight, with rapid drainage and thin soils formed from weathering bedrock, but characteristics vary with steepness, length of the slope and solar aspect. When the grade is more than 25% erosion is probable unless vegetation is well-established. On south-facing slopes the soils dry out and warm up quickly. On north-facing slopes soils stay wetter leading to the accumulation of more organic material.

The lower regions of these slopes are usually concave in shape; surficial and subsurface water runoff from higher up often collects to create periodically wet conditions. Marble or schistose marble, which weather more easily than acidic bedrock types, are high in calcium carbonate or lime (alkaline), giving them a high pH. They underlay thicker deposits of glacial till or glaciofluvial (meltwater) materials. Till derived from marble bedrock is less acidic and usually more fertile than till ground loose from acidic bedrock. In places, particularly on drumlins that date from before the last glaciation, such as Spooner Hill, the thick till was severely compacted into hardpan, a hard subsoil that inhibits drainage and root penetration. Where the till is several feet deep and friable, the soils are fertile.

Kent's larger valleys are carved out of marble bedrock. The grades are usually less than 8%. Coarse glaciofluvial deposits (also called stratified drift) up to 200 feet in depth and rich in sand and gravel, may be present. In other places these have been covered by wind-deposited layers of sand, or by alluvial layers of silt, sand and gravel deposited by rivers in their floodplains. Drainage can be very good, or in coarse materials, excessive. When excessive, soils dry out quickly during droughts and any contributions of human or animal effluent can easily pollute groundwater. Alluvium can be very fertile, especially sandy and silty loams. Valley bottoms have been extensively used for farming and habitation, as Kent's settlement pattern clearly demonstrates, but floodplains are subject to occasional inundation.

Depressions are characterized by poor drainage. They can occur in valleys, on lower slopes, at the headwaters of valleys, or on mountain saddles. With insufficient slopes for excess water to run off and underlain by compact subsoil or solid bedrock, they often produce wetlands. In more extreme wetland conditions where there is not enough oxygen available for complete decomposition of the plant material growing there, organic soils such as peat and muck result.

Soil Composition



In typical topsoil the ratio of its four constituent parts—mineral matter, organic matter, air and water—is approximately 45-5-25-25% by volume. The fifth constituent—living organisms such as plant roots, earthworms, nematodes, mites, fungi and bacteria—is harder to quantify, but is vital for a healthy soil.

Mineral matter is divided into several texture classes according to particle size: Clay has the smallest grain size, <2 micron (0.002 millimeter); when wet, clay soil becomes sticky. Silt has a grain size of 2-50 microns and feels like flour. Sand ranges from 50-2000 microns; individual grains of sand are visible to the naked eye. Gravel is >2000 microns (>2 millimeters). Most soils are combinations of sand, silt and clay and are called loam. These can be further subdivided based on their relative proportions, for example clay loam, silt loam, and sandy loam (see texture table above).

Decaying organic matter or humus enriches the soil in several ways: it binds the mineral particles into aggregates, improves the water holding capacity of sandy and gravelly soils, increases the permeability of silt and clay soils, and adds nutrients to sustain soil fauna and plant roots.

Air and water are found between the soil particles and are essential for plant growth and soil organisms. Clay soils can hold quite a bit of water and are good at binding plant nutrients, but they limit free drainage and aeration and easily become waterlogged. Sand, on the other hand, drains quickly and is well aerated, but it has low water and nutrient retention capacity. Silt has a good water-retention capacity but is prone to erosion. Gravel and pebbles cannot retain water unless underlain by a layer with poor permeability such as clay, in which case they can store a large amount of water (see aquifers in Water Resources).

The best air and water availability and soil stability is achieved in humus-rich sandy loam. Fortunately, sandy loam is much more common in Kent than clay, silt or sandy soils. Rocks and boulders are often mixed in and the soil rarely reaches the depth found in the Midwestern farm belt states.

Most plants prefer loamy soil because of its moisture and good drainage, but certain plants do better on dry, sandy soils. Others still are well adapted to heavier clay soils or wetland soils. Most plant root development is found in the topsoil, but some plants send out deep taproots, even into rock crevices.

Soil Acidity

Soil pH is a measure of soil acidity. Results can range from 0 to 14, with pH 7 being neutral, pH <5 strongly acid, and pH >8.5 strongly alkaline, sometimes referred to by farmers as “sweet” or “chalky.” Outside those mid-range values many nutrients become less available to plants. Most plants, including food crops, prefer a pH of 5.5-7, but ericaceous plants (belonging to the heath family and including azaleas, rhododendron, mountain laurel, holly and blueberries) prefer a more acid soil, pH 4-5. Most tree seedlings grow best in soils with a pH of 4.5 to 6, a range present in most of Kent’s forest soils. Lilacs and clematis are two plants that thrive in somewhat alkaline soils.

Precipitation acidifies soils in humid climate zones like ours. Coniferous vegetation (softwoods such as pines and spruces) and oak trees also acidify the soil as their needles and leaves fall and slowly decompose. In this way even the soils on marble substrate and on marble-derived till are usually acidic in the upper part of the profile, though where the marble lies close to the surface the soil is more likely to be neutral or even alkaline.

Marble soils are usually more fertile than acidic soils, and of high value for agriculture; witness the fertile fields of the Kent Land Trust’s Marble Valley Farm between the Housatonic River and Rte. 7, where the farmer reports needing little or no soil amendment to make these fields productive. As truly alkaline soils and alkaline wetlands are quite rare in the Northeast, in those few locations where lime-loving vegetation has remained undisturbed over long periods it is possible to find unique plant communities thriving. (See Chapter EIGHT Critical Habitats and Wildlife)

Soil Horizons

Soil formation is an on-going process in which parent material is converted to a life-sustaining medium. It can take many thousands of years to develop a few inches of new material. Soil conservation should therefore be a high priority.

As soil forms, it develops horizontal layers called soil horizons, which are distinct in color, texture, structure, organic matter content, and chemical and biological characteristics. The horizons are caused by weathering of the parent material, together with the accumulation of dead plant material, the breakdown and transport of the dead organic matter by bacteria, fungi and soil microfauna, and by movements of the groundwater table and the leaching of nutrients and minerals by heavy rains. Erosion, sedimentation and tilling by farmers can further alter the horizons.

When a vertical cut is made in the soil (soil profile), the following horizons can typically be seen: Topsoil, also known as A-horizon, is the uppermost layer and provides the critical support layer for vegetation and animal life. Good topsoil is dark, and rich in organic matter (humus) that is well mixed with the mineral soil by an abundance of soil organisms. In forest areas a layer of decomposing leaves, needles and other natural litter sits on top of A-horizon to create the so-called “O” (organic) horizon. In well-drained, undisturbed sites the topsoil layer may range from 2 to 10 inches in depth.

Below the topsoil is the subsoil layer or B-horizon, which is typically poor in organic matter and biological activity and paler in color. Here minerals and clay particles washed down from above accumulate. B-horizon in the Kent area is often yellowish-brown or grey-brown.

At a still deeper level is a transitional zone of soil, C-horizon, which is material that is somewhere in the weathering process between the B-horizon and the unaltered parent material or bedrock (R-horizon) below. Biological activity in the C-horizon is minimal.

Soil colors can be a useful indicator of drainage problems. Iron, for example, turns the soil orange when oxidized.

When subjected to long-term water saturation (groundwater) it adds a blue-green to grey tinge. If "mottles" occur above the saturated zone, either orange blotches against a grey background, or grey blotches against orange-brown, it indicates a zone where the groundwater table fluctuates over the year and drainage is impeded. When hardpan is present in the subsoil as a result of clay mineral accumulation and mechanical compaction, this can lead to seasonal saturation and mottling just below the surface.

Soil Classification and Soil Mapping

Soil scientists classify and identify soil types based on their soil profile—the vertical layering of horizons, their thickness, color, texture, structure, hydrological characteristics, organic matter content, consistency, acidity, mineral composition and parent material. In Connecticut another classification criterion is the slope of the terrain.

Soil surveys are available from the Natural Resources Conservation Service of the U.S. Department of Agriculture (USDA). For many years towns relied on the 1970 Litchfield County Soil Survey maps and its accompanying guide book. Kent's own soil-based zoning in its Rural Zoning District, adopted in 1982, was based on this publication. In recent years, however, the entire state has been remapped on the basis of an amended soil classification survey finished in 2005. The new survey has since been made available to the public via the Internet web site websoilsurvey.nrcs.usda.gov. This free interactive web site allows the user to delineate geographical areas and then find the soil units superimposed on aerial photographs, together with written descriptions. The site also offers tables of various soil characteristics, soil suitability and limitations for various uses.

Soil Map #5 in this report and the larger display versions available from the Land Use office at Town Hall are derived from this USDA web site. Each map unit is named according to the dominant soil, but other soils may be present within the same unit, which simply means that there may be more variability in the field than is shown. Be aware that the minimum mapping unit size in the NRCS survey, and therefore on the Kent Conservation Commission maps, is three acres. Units smaller than 10 acres could not be labeled on the soil map in this report but do have a soil type number on the larger-scale display map in the Land Use office. This display map shows the soil types colored in by parent material.

A Soil Data Table appears as Appendix A at the back of this report. In it you will find a number of additional details useful in understanding Kent's soil and terrain characteristics. For example, to help readers navigate between the old and new system of soil classification we list the old letter codes next to the new numerical codes. Even here, some confusion is inevitable as not all the old code names fully match the new codes, and vice versa. Further, many units shown on the old maps do not line up with the new ones. Nor do the soil names remain the same in all cases.

The soil table also provides a guide to Connecticut's system of subdividing soil types according to percentage of gradient (slope), which is indicated by a capital letter following the number, as follows:

A <3% is nearly level;
B 3-8% is gently sloping;
C 8-15% is moderately gentle;
D 15-25% is moderately steep;
E 25-45% is steep;
F >45% is very steep.

Where inclines are greater than 8% care must be taken to avoid soil erosion; grades above 15% place many limitations on farming and construction. Above 25% these limitations become particularly severe. Map #7 "Development Constraints" shows the distribution of Kent's steeper slopes.

The first block of soils described in the table (2-18 and 100-109) are the wetland soils (see the expanded discussion under "Wetland Soils" below). These cover about 9.8% of the town area, with open water covering another 2.6%. Numbers 100-109 are alluvial and floodplain soils. These soils are all unsuitable for building or for supporting septic systems, but some are well suited for farming.

Numbers 21-39 are soils developed on glaciofluvial deposits, found mostly in the valleys. These soils are deep and most are well-suited for many uses. But some have a high groundwater table, while some others are so coarse water drains away very quickly, making them both prone to dryness and to polluting groundwater and neighboring streams. This group covers 10.3% of the town.

Numbers 45-95 are mostly upland soils. As a whole, they cover three-quarters of the town's area: Numbers 45-47 (Woodbridge) and 84-86 (Paxton and Montauk) have evolved from older, compacted till. Often thick, their dense subsoil creates more or less serious problems for development. Numbers 60-62 (Charlton soils) are generally favorable soils on friable till. Numbers 75, 76, and 95 (Hollis, Chatfield and Farmington soils) are the rockiest and shallowest of this large group and are unsuitable for development or farming. Mostly forested at present, they alone cover 22.5% of Kent.

Numbers 232-309 are man-made soils. They are built over, filled in, or excavated. Examples are found in the village center, the old landfill, some school grounds and quarries. They cover 1.2% of Kent.

The large display soil map shows a total of 110 soil types in Kent, categorized as follows:

- Poorly drained wetland soils: soil types 2, 4, 7, 12, 13 and 14 (also 103,107 and 109).
- Poorly and very poorly drained wetland soils: 3 and 8.
- Very poorly drained wetland soils: 15, 16, 17 and 18 (also 108).
- Alluvium and floodplain soils: 100, 101, 102, 103, 105, 106, 107, 108 and 109.
- Acidic glaciofluvial soils: 21, 23, 24, 29, 30, 32, 34, 36 and 38.
- Alkaline glaciofluvial soils: 22, 31 and 39.
- Acidic compact till: 45, 46, 47, 84, 85 and 86.
- Acidic friable till: 50, 51, 52, 57, 58, 59, 60, 61, 62, and 73.
- Alkaline till: 48, 49, 90, 91, 92, 93, and 94.
- Acidic bedrock: 75 and 76.
- Alkaline bedrock: 95.
- Manmade/disturbed soils: 232, 234, 238, 302, 305, 306, 307, 308 and 309.
- Open water is indicated as "W"

Soil-based Zoning

As mentioned earlier, Kent uses soil-based zoning in its Rural District, which comprises 99% of the town. Soil-based zoning has as its central premise that development densities should not exceed the capacity of the soils and terrain to handle septic system effluent. The Rural District has no central sewerage, so lots have to be capable of treating septic waste onsite through percolation and distribution in the soil. Soil-based zoning also seeks to accommodate buildings and driveways without excessive grading or offsite drainage.

Section 6.3.5 of the Zoning Regulations lists five rural zoning categories and the assigned soil types (from the 1970 soil survey). The Planning and Zoning Commission plans to adopt the new soil classification and soil map. One of the columns in the Soil Data Table lists the zoning category that corresponds to the new soil types, based on the interpretation of the Conservation Commission and its consultant Jos Spelbos. The KCC has translated the old soil types to the new numerical ones based on conversion tables provided by the NRCS and DEP. We assigned zoning classes to soil types that were merged or newly introduced in the new soil classification by comparing their characteristics with similar soil types. It is up to the P&Z to either validate and adopt our interpretations or amend them.

Map #6 depicts Kent's soil-based zones according to our interpretations and does not represent the town's official Zoning Map. Furthermore, the P&Z and the IWC usually require applicants to have soils and wetlands field-mapped by a registered soil scientist at a more detailed scale. Map #6 does, however, give an idea of what can be expected on an individual parcel; by overlaying the Tax Parcel Map #2, one can see where the town's buildable soils are.

Below is a description of the rural zoning classes. The table, "Soil Types by Rural District Class", which follows lists the corresponding soil types:

Class I (RU-I) soils pose no major obstacles to construction or onsite septic systems. The minimum lot size allowed is one acre. In this class fall soils such as Canton and Charlton (60 and 62), Nellis (92-93), and Gloucester (58-59), with grades of less than 15%. These soils are formed in thick, friable till or glaciofluvial material. They are well-drained, with a depth to bedrock and to the groundwater table of more than six feet. Altogether this class covers 11.7% of the town.

Class II (RU-II) soils pose obstacles to development. Grades are less than 15%, but the existence of a hardpan (Paxton and Montauk 84-86) or of excessively-drained soil (Windsor 36, Hinkley 38, Groton 39) may pose difficulties for septic systems. The minimum lot size is two acres. This class also includes the fertile Copake (31), Haven and Enfield (32), Merrimac (34), soils and the alkaline till-derived Stockbridge soils (90-91) soils. Class II soils cover 13.8% of Kent.

Class III (RU-III) soils pose severe restrictions to development. The restrictions may be due to a slope of >15%(code D), to shallow or rocky soil (Charlton-Chatfield complex 73 and Farmington-Nellis complex 94), or to a high groundwater table (Sutton soils 50-52, Woodbridge 45-47, Georgia and Amenia 48-49, Ninigret and Tisbury 21 and Hero 22). P&Z regulations require a minimum of five acres per unit. Class III soils cover 18.6% of the town.

Class IV (RU-IV) are the wetland soils. They cover 9.8% of Kent (or 3,129 acres). Their use is regulated by the Kent Inland Wetlands Commission.

A Miscellaneous Class (RU-M) includes the steepest terrain with slopes of >25% (code E and sometimes D), and the shallowest and rockiest soils with numerous rock outcroppings (especially the Hollis complex soils 75-76). This class also includes the manmade and disturbed soils. These soil types include some of the most variable soil units. No minimum acreage is set; rather the P&Z requires on-site investigation and testing to determine if, in its judgment, any development is possible. This heterogeneous class of soils accounts for the largest area, at 42.7%.

Open water ("W") covers 2.6%.

The remaining 0.8% of Kent acreage falls outside the Rural District. Located in the Village Center and the tiny roadside Commercial District at Bull's Bridge, it is not covered by soil-based zoning.

SOIL TYPES BY RURAL DISTRICT CLASS, ranked from highest to lowest acreage:					
	RU-I	RU-II	RU-III	RU-IV	RU-M
> 1000 acres	62C		73C	3	75E
					62D
					73E
					75C
					76F
100-1000 acres	61C	84B	86D	W	76E
	60B	84C	52C	18	38E
	61B	86C	47C	107	39E
	60C	31B	84D	8	306
		34B	94C	108	94E
		38C	49C	109	308
		85C	21A	16	
		34A			
		85B			
		34C			
		32A			
		31C			
		32B			
<100 acres	92B	39C	45B	14	95E
	92C	91C	22A	17	305
	93C	32C	90D	15	59D
	59C	90C	60D	12	309
	58B	90B	22B	2	302
	58C	38A	51B	103	
		36B	46B	101	
		31A	46C	13	
		36A	50B	106	
		29C	45C	4	
		29B	48B	105	
		57B	49B	100	
		29A	48C	102	
		30B	91D	7	
		36C	45A		
		57C	95C		
			92D		
			23A		
			24A		
			50A		

Wetlands Soils

Wetlands soils are found primarily in valleys and depressions, including in shallow upland basins without outlets or where drainage is impeded by impermeable subsoil or bedrock; they also turn up below groundwater seeps on slopes. Their critical functions in the ecosystem are described in greater detail in Chapter Four (Water Resources).

Activities in wetlands in the U.S. are heavily regulated to limit further losses of these very important ecosystems. In Connecticut, unlike most other states, wetlands are defined based on their soil hydrology. All soils designated as poorly or very poorly drained, or as alluvial or floodplain by the Natural Resource Conservation Service of the U.S. Department of Agriculture, are legally wetland soils. Most activities on these soils, within 100 feet from such wetlands or within 200 feet from a watercourse require a permit from the Kent Inland Wetlands Commission. An exception is made for farming, recreation, and for certain maintenance activities.

Poorly drained soils occur where the water table is above or close to the ground surface for part of the year, usually late fall to early spring. The soil is saturated periodically during the growing season. The terrain is nearly level or gently sloping. In Kent these wetlands are usually found along small upland streams. The soils are mostly composed of mineral materials: gravel, sand, silt, and clay.

Very poorly drained soils have a water table at or above the surface for most of the year, including most of the growing season. They occur in level or depressed areas. The soils are often strongly organic, consisting of muck and peat. Marsh and swamp vegetation predominate on these soils.

A third type of wetland soils under the law are alluvial and floodplain soils. These are water-transported sediments along watercourses that are subject to occasional to frequent flooding. They are not all water-saturated. Indeed, drainage can vary from very poor to excessive. Well-drained alluvial soils are excellent farmland soils despite their wetlands soils classification.

State-defined alluvial and floodplain soils do not necessarily correlate with the floodplains defined by the Federal Emergency Management Agency (FEMA). FEMA has identified floodplains based on the likelihood an area will flood on average at least once every hundred years, or stated differently: the area where there is greater than 1% chance in any given year of flooding. These days development in these areas is severely restricted by local zoning laws. The Development Constraints Map #7 shows the 100-year floodplain boundaries, as well as the 500-year floodplain, which at a slightly higher elevation has a lesser chance of flooding.

Farmland Soils

Prime farmland soils are, as the term suggests, the best soils. Their distribution in Kent is shown on Map #10. They are composed of silt loams and sandy loams with a slope of <8%, have good drainage and are neither too acid, too alkaline, too shallow nor too stony. The second category, referred to as "Additional Farmland of Statewide Importance," consist of soils that are nearly as good, but have somewhat steeper slopes (8-15%) or are wetter. Soil Map #5 shows Kent's distribution of soils is an intricate patchwork of soils of widely differing qualities. This makes modern farming, which generally relies on larger scale operations and mechanization, more difficult.

Most of Kent's farmland soils are found in the Housatonic River Valley, in the Kent Hollow area, along Macedonia and Cobble Brook, and on the top of Skiff Mountain. They cover 9.5% (3,035 acres) and 7.7% (2,448 acres) respectively of Kent's total surface area. As the map indicates many of these prime and important farmland soils are not currently under cultivation. Some have been turned into subdivisions, especially east of Rte. 7 North in the area of Studio Hill Rd. and the several dead end roads north of it. Others are forested or are in the process of reverting from farmland to field and second growth forest.

Cobble Brook

Preserving quality farmland soils, especially soils that are now under cultivation, is very important, as locally grown produce is gaining new importance to many people, both as a matter of taste and nutrition and as a matter of environmental policy. Small-scale farming also preserves the scenic character and provides a type of wildlife habitat that is becoming ever-rarer in Connecticut.

RECOMMENDATIONS

1. Restrict construction on slopes to >25%.
2. Revise Section 6.3.5 of Kent Zoning Regulations as soon as possible to conform to the new soil classification system, and notify surveyors, engineers and applicants of the changes and of the new resources available to them.
3. Make preservation of prime and important farmland soils a priority, with particular attention focused on preserving farmland still under cultivation or in a condition that can easily be brought back to full vigor.
4. Strengthen enforcement of soil erosion and sedimentation controls.
5. If housing development becomes unavoidable on prime farm lands, require cluster development, with units sited away from best soils and open fields, and the agricultural land protected with conservation easements.

REFERENCES

Bridges, E.M. (1970) *World Soils*. Cambridge University Press.

Callahan, Kate. (1993)*An Inland Wetlands Commissioner's Guide to Site Plan Review.* Connecticut Dept. of Environmental Protection, Bureau of Water Management.

Connecticut Dept. of Environmental Protection. (1998) *Soil Catenas of Connecticut.* In cooperation with USDA Natural Resources Conservation Service.

"Conversion Legend for State of Connecticut" (April 1996) Litchfield County. Received from Shawn McVey of the CT USDA.

Jorgensen, Neil (1978) *A Sierra Club Naturalist's Guide to Southern New England*. Sierra Club Books.

Kent Inland Wetlands Commission (1988 revised through 2005) *Inland Wetlands and Watercourses Regulations for the Town of Kent, CT.* www.kentct.org

Kent Planning & Zoning Commission, (1965 revised through 2007), *Zoning Regulations for the Town of Kent, CT.*

Lenik, Edward J., *Stories on Stone,* unpublished excerpt provided by Bill Arnold of the Kent Land Trust

Metzler, K. & R. Tiner, (1992) *Wetlands of Connecticut*. DEP State Geological and Natural History Survey of Connecticut, in cooperation with the U.S. Fish and Wildlife Service National Wetlands Inventory.

National Cooperative Soil Survey. (1970) *Soil Survey of Litchfield County*, *Connecticut*. USDA Soil Conservation Service in cooperation with Connecticut Agricultural Experiment Station and Storrs Agricultural Experiment Station.

dep.state.ct.us/gis/dataguides from the CT Dept. of Environmental Protection

websoilsurvey.nrcs.usda.gov from the USDA Natural Resources Conservation Service

soils.usda.gov and ct.usda.gov from the U.S. Dept. of Agriculture