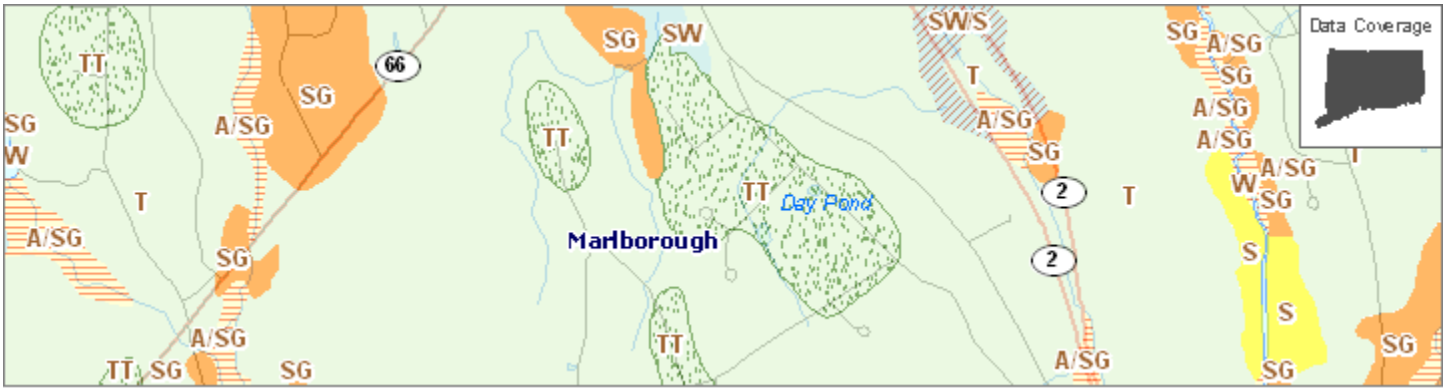
Surficial Materials



Description

Connecticut Surficial Materials is 1:24,000-scale data that describes the unconsolidated glacial and postglacial deposits of Connecticut in terms of their grain-size distribution (texture). This information portrays the areal extent and grain-size (textural) distributions of surficial material deposits such as glacial till, end moraines, fines (silt and clay), sand, gravel, floodplain alluvium, swamp deposits, salt marsh deposits, talus, and artificial fill. The map legend highlights the relationship between the depositional origins and the distribution and character of Connecticut surficial material deposits. These deposits range from a few feet to several hundred feet in thickness, overlie the bedrock surface and underlie the organic soil layer of Connecticut. Surficial Materials are mapped without regard for any organic soil layer that may overly the deposit. Surficial materials were emplaced in Connecticut during the Quaternary Period, which spans from 2.588 ± 0.005 million years ago to the present and includes the Pleistocene (glacial) and Holocene (postglacial) Epochs.

The Connecticut Surficial Materials information was initially compiled at 1:24,000 scale (1 inch = 2,000 feet) then recompiled for a statewide 1:125,000-scale map, the Surficial Materials Map of Connecticut[1]. A companion map, the Quaternary Geology Map of Connecticut and Long Island Sound Basin[2] emphasizes the geologic history and the distribution of depositional environments during the emplacement of unconsolidated glacial and postglacial surficial deposits and the landforms resulting from those events. The quaternary geology and surficial material features portrayed on these two maps are very closely related; each contributes to the interpretation of the other.

Most of Connecticut's surficial material is glacially derived, and can be divided into two broad depositional categories: Glacial Ice-Laid Deposits (nonsorted and generally nonstratified thin till, thick till, and end moraine) which are generally exposed in the uplands, and are the most widespread surficial deposit in Connecticut; and Glacial Meltwater Deposits (sorted and stratified deltaic, river bottom, lake bottom, and inland dune deposits), which are most commonly concentrated in valleys and lowlands. A mapping emphasis is placed on stratified meltwater deposits because their distribution and character have historically influenced development patterns throughout the state. Stratified meltwater deposits include both fine and coarse grained deposits such as silt, clay, sand, and gravel.

Glacial Ice-Laid Deposits (nonsorted and generally nonstratified thin till, thick till, and end moraine deposits) and Postglacial Deposits (flood-plain alluvium and swamp deposits, but also including stream-terrace, talus, dune, tidal-marsh, beach, channel fill, marine delta deposits, and artificial fill) are differentiated from Glacial Meltwater Deposits (sorted and stratified deltaic, river bottom, lake bottom, and inland dune deposits). The meltwater deposits are further characterized using four texturally-based map units (g = gravel, sg = sand and gravel, s = sand, and f = fines). In many places a single map unit (e.g. sand) is sufficient to describe the entire meltwater section. Where more complex stratigraphic relationships exist, "stacked" map units are used to characterize the subsurface (e.g. sg/s/f - sand and gravel *overlying* sand *overlying* fines). The forward slash generally denotes *overlying* glacial meltwater deposits. Where postglacial deposits overlie meltwater deposits, this relationship is also described (e.g. a/s - alluvium *overlying* sand). Map unit definitions (Surficial Materials Code definitions, found in the Legend Description) provide a short description of the inferred depositional environment for each of the glacial meltwater map units.

This map was compiled at 1:24,000 scale, and published at 1:125,000 scale. Grain size textural definitions used in this mapping are modified from the Wentworth Scale (1922) as shown below.

PARTICLE DIAMETER											
10	2.5	.16	.08	.04	.02	.01	.005	.0025	.00015		in.
256	64	4	2	1	.5	.25	.125	.068	.004		mm
Boulders	Cobbles	Pebbles	Granules	Very coarse sand	Coarse sand	Medium sand	Fine sand	Very fine sand	Silt	Clay	
GRAVEL PARTICLES				SAND PARTICLES				FINE PARTICLES			

Grain-size classification used in this report (modified from Wentworth, 1922)

This digital data replicates the mapping presented on Sheet 1 of the 2 sheet map[1]. Consult the original Surficial Materials Map of Connecticut[1] for supporting information regarding the disposition of surficial materials on the landscape of Connecticut. Sheet 2 of the map includes cross sectional interpretations, data sources, and a brief discussion on the mineral composition of surficial materials.

Purpose

Surficial Materials is 1:24,000-scale data suitable for geologic and environmental mapping and analysis purposes. It is not intended for maps printed at map scales greater or more detailed than 1:24,000 scale (1 inch = 2,000 feet). The1:24,000-scale Surficial Material features and the 1:24,000-scale Quaternary Geology features are very closely related; each contributes to the interpretation of the other. The Quaternary Geology data is complemented by the Surficial Geology data in that the grain-size distribution (texture) of individual Quaternary Geology deposits is defined and described in the Surficial Materials data. For example, the Surficial Materials data specifies the texture for a given Quaternary Geology Sediment of Dammed Pond deposit as either comprised of Sand, Gravel, Sand and Gravel, Sand and Gravel overlying Sand, Sand overlying Sand and Gravel, Sand overlying Fines, or another similar combination. Not all Quaternary Geology deposits exhibit the same grain size.

Quaternary Geology Map of Connecticut and Long Island Sound Basin[2] provides information the geologic history and the distribution of depositional environments during the emplacement of unconsolidated glacial and

postglacial surficial deposits and the landforms resulting from those events in Connecticut, whereas the Surficial Materials Map of Connecticut[1] emphasizes the surface and subsurface texture (grain-size distribution) of these materials.

Legend Description

GLACIAL ICE-LAID DEPOSITS

Symbol	*Description*	*Map Label*
GLACIAL ICE-LAID DEPOSITS were derived directly from the ice and consist of nonsorted, generally nonstratified mixtures of grain-sizes ranging from clay to large boulders. The matrix of most tills is predominantly sand and silt and boulders can be sparse to abundant. Some tills contain lenses of sorted sand and gravel and occasionally masses of laminated fine-grained sediment. The lack of sorting and stratification typical of ice-laid deposits often makes them poorly drained, difficult to dig in or plow, mediocre sources of groundwater and unsuited for septic systems. Till blankets the bedrock surface in variable thicknesses and commonly underlies stratified meltwater deposits (see Block Diagram). End moraine deposits (primarily ablation till) occur principally in southeastern Connecticut.		
	Thin Till - areas where till is generally less than 10-15 ft thick and including areas of bedrock outcrop where till is absent. Predominantly upper till; loose to moderately compact, generally sandy, commonly stony. Two facies are present in some places; a looser, coarser-grained ablation facies, melted out from supraglacial position; and a more compact finer-grained lodgement facies deposited subglacially. In general, both facies of upper till derived from the red Mesozoic sedimentary rocks of the central lowland of Connecticut are finer-grained, more compact, less stony and have fewer surface boulders than upper till derived from crystalline rocks of the eastern and western highlands.	t
	Thick Till - areas where till is greater than 10-15 ft thick and including drumlins in which till thickness commonly exceeds 100 ft (maximum recorded thickness is about 200 ft). Although upper till is the surface deposit, the lower till constitutes the bulk of the material in these areas. Lower till is moderately to very compact, and is commonly finer-grained and less stony than upper till. An oxidized zone, the lower part of a soil profile formed during a period of interglacial weathering, is generally present in the upper part of the lower till. This zone commonly shows closely-spaced joints that are stained with iron and manganese oxides.	tt
	End Moraine deposits - Composed predominantly of ablation facies sandy upper till; lenses of stratified sand and gravel occur locally within the till. Surface boulders on end moraine deposits are generally more numerous than on adjacent till surfaces; dense concentrations of boulders are present in some places. Deposits occur as free-standing hummocky landforms, commonly in elongate ridges that trend NNE - SSW, and range in thickness from 10 to 60 ft.	ts

GLACIAL MELTWATER DEPOSITS

Symbol	*Description*	*Map Label*
GLACIAL MELTWATER DEPOSITS (stratified deposits) were laid down in glacial streams, lakes and ponds which occupied the valleys and lowlands of Connecticut as the last ice sheet melted away to the north.		

Symbol	*Description*	*Map Label*
They are often composed of layers of well-to-poorly sorted sands, gravels, silts and clays with few to no boulders, and owing to their water-related depositional origins they have many characteristics that are favorable for development. Because water is a better sorting agent than ice, glacial meltwater deposits are commonly better sorted, more permeable, and better aquifers than ice-laid deposits. They can be good sources of construction aggregate, and are relatively easy to excavate and build highways and buildings on.		
Fine Deposits		
	Fines (very fine sand, silt, and clay) - Composed of well-sorted, thin layers of alternating silt and clay, or thicker layers of very fine sand and silt. Very fine sand commonly occurs at the surface and grades downward into rhythmically bedded silt and clay varves (lake-bottom deposits)	f
Coarse Deposits		
	Gravel - Composed mainly of gravel-sized particles; cobbles and boulders predominate; minor amounts of sand within gravel beds, and sand comprises few separate layers. Gravel layers generally are poorly sorted and bedding commonly is distorted and faulted due to postdepositional collapse related to melting of ice. Gravel deposits are shown only where observed in the field; additional gravel deposits may be expected, principally in areas mapped as unit SG (proximal fluvial deposits or delta-topset beds)	g
	Sand and Gravel - Composed of mixtures of gravel and sand within individual layers and as alternating layers. Sand and gravel layers generally range from 25 to 50 percent gravel particles and from 50 to 75 percent sand particles. Layers are well to poorly sorted; bedding may be distorted and faulted due to postdepositional collapse. It is likely that some deposits within this map unit actually are gravel or sand and gravel overlying sand. It is less likely that some of these deposits are sand (fluvial deposits or delta-topset beds)	sg
	Sand - Composed mainly of very coarse to fine sand, commonly in well-sorted layers. Coarser layers may contain up to 25 percent gravel particles, generally granules and pebbles; finer layers may contain some very fine sand, silt, and clay (delta-foreset beds, very distal fluvial deposits, or windblown sediment)	s
Stacked Coarse Deposits		
	Gravel overlying Sand and Gravel - Gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand and gravel (proximal deltaic deposits)	g/sg
	Gravel overlying Sand - Gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand (proximal deltaic deposits)	g/s
	Sand and Gravel overlying Sand - Sand and gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker, inclined layers of sand (deltaic deposits)	sg/s
	Sand and Gravel overlying Sand overlying Sand and Gravel - Sand and gravel is generally less than 20 ft thick, horizontally bedded, and overlies thicker inclined layers of sand; thickness of sand and gravel at the base of the section is variable (deltaic deposits overlying slightly older, more proximal deposits)	sg/s/sg
	Sand overlying Gravel - Sand of variable thickness overlies gravel of variable thickness (younger distal deltaic or fluvial sediments overlying older, more proximal	s/g

Symbol	*Description*	*Map Label*
	fluvial or deltaic sediments)	
	Sand overlying Sand and Gravel - Sand of variable thickness overlies sand and gravel of variable thickness (distal deltaic or fluvial sediments overlying slightly older proximal fluvial or deltaic sediments)	s/sg
Stacked Coarse Deposits Overlying Fine Deposits		
	Gravel overlying Sand overlying Fines - Gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker inclined beds of sand which in turn overlie fines of variable thickness (proximal deltaic deposits overlying lake-bottom sediments)	g/s/f
	Gravel overlying Fines - Gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker thinly bedded fines (proximal fluvial deposits overlying lake-bottom sediments)	g/f
	Sand and Gravel overlying Sand overlying Fines - Sand and gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker inclined beds of sand which in turn overlie thinly bedded fines of variable thickness (deltaic deposits overlying lake-bottom sediment)	sg/s/f
	Sand and Gravel overlying Fines - Sand and gravel is generally less than 20 ft thick, horizontally bedded and overlies thicker thinly bedded fines (fluvial meltwater terrace deposits overlying lake-bottom sediment)	sg/f
	Sand overlying Fines - Sand is of variable thickness, commonly in inclined foreset beds and overlies thinly bedded fines of variable thickness (distal deltaic deposits overlying lake-bottom sediment)	s/f
Stacked Fine Deposits Overlying Coarse Deposits		
	Fines overlying Sand and Gravel – Fines of variable thickness, commonly in thinly bedded layers overlie sand and gravel of ariable thickness (lake-bottom deposits overlying slightly older collapsed proximal fluvial or deltaic deposits); in a few places sand or sand and gravel, generally less than 25 ft. thick occurs on top of the f/sg unit and is indicated as s/f/sg and sg/f/sg on the map, respectively.	f/sg
	Fines overlying Sand - Fines of variable thickness, commonly in thinly bedded layers overlie sand of variable thickness (distal lake-bottom deposits overlying slightly older more delta-proximal lacustrine sediment)	f/s

POSTGLACIAL DEPOSITS

Symbol	*Description*	*Map Label*
POSTGLACIAL DEPOSITS (primarily floodplain alluvium and swamp deposits) are less widely distributed and are typically thinner than the glacial deposits that they overlie, but they are locally important ecological, agricultural, commercial, and recreational resources. Talus, a result of rockfall at the base of steep bedrock (primarily trap rock) cliffs, provides a cool damp ecological niche. Beach, marsh and swamp deposits are key ecological elements of coastal and poorly drained inland settings. Deposits of floodplain alluvium are largely composed of sands, gravels and silts that have been reworked from glacial deposits and mixed with organic matter which increases their fertility. Despite their flood-prone nature, low, flat, fertile floodplains have		

Symbol	*Description*	*Map Label*
historically been attractive for agricultural uses and development related to water-dependant commerce.		
	Floodplain Alluvium - Sand, gravel, silt, and some organic material, on the floodplains of modern streams. The texture of alluvium commonly varies over short distances both laterally and vertically, and is often similar to the texture of adjacent glacial deposits. Along smaller streams, alluvium is commonly less than 5 ft thick. The most extensive deposit of alluvium on the map is along the Connecticut River where the texture is predominantly fine to very fine sand and silt; here and along other larger rivers, it may be as much as 25 ft thick. Alluvium typically overlies thicker glacial stratified deposits, the general texture of which is indicated by the stacked unit.	a
	Alluvium overlying undifferentiated Coarse deposits (g, sg, s)	a/sg*
	Alluvium overlying Sand	a/s
	Alluvium overlying Fines	a/f
	Alluvium overlying undifferentiated Coarse deposits overlying Fine deposits	a/s/f*
	Alluvium overlying undifferentiated Fine deposits overlying Coarse deposits	a/f/g*
	Swamp deposits - Muck and peat that contain minor amounts of sand, silt, and clay, accumulated in poorly drained areas. Most swamp deposits are less than about 10 ft thick. Swamp deposits are underlain by glacial deposits or bedrock. They are often underlain by glacial till even where they occur within glacial meltwater deposits. Where swamp deposits are known or inferred to be underlain by sand and/or fines, they are shown on the map by the stacked unit.	sw
	Swamp deposits overlying Sand	sw/s
	Swamp deposits overlying Fines	sw/f
	Swamp deposits overlying Sand overlying Fines	sw/s/f
	Swamp deposits overlying Fines overlying Sand	sw/f/s
	Salt-Marsh and Tidal-Marsh deposits - Peat and muck interbedded with sand and silt, deposited in environments of low wave energy along the coast and in river estuaries. Marsh deposits are dominantly peat and muck, generally a few feet to 35 ft thick. In the major estuaries marsh deposits may overlie estuarine deposits which are sand and silt with minor organic material as much as 40 - 90 ft thick. These deposits are generally underlain by the glacial material shown adjacent on the map; either till or sand and gravel. Where they are known or inferred to be underlain by sand or fines, they are shown on the map by stacked units.	sm
	Salt-Marsh and Tidal-Marsh deposits overlying Sand overlying Fines	sm/s/f
	Salt-Marsh and Tidal-Marsh deposits overlying Fines	sm/f

Symbol	*Description*	*Map Label*
	Talus - Loose, angular blocks (mostly boulders) accumulated by rockfall at the bases of steep bedrock cliffs. Talus forms steep unstable slopes and is generally less than 10 ft thick. It occurs most extensively along the linear basalt and diabase ridges within the central lowland.	ta
	Beach deposits - Sand and and gravel deposited along the shoreline by waves and currents and by wind action. The texture of beach deposits varies over short distances and is generally controlled by the texture of nearby glacial materials exposed to wave action. Beach deposits are generally well sorted and rarely more than a few feet thick. Many sand beaches along the Connecticut coast have been 'restored'; these have not been distinguished from natural beaches on this map; however, extensive beaches that consist totally of 'made-land' are mapped as artificial fill.	b
	Artificial Fill - Earth materials and manmade materials that have been artificially emplaced. Artificial fill is common throughout the map area but has been shown on this map only where extensive areas of 'made land' occur, principally along the coast.	af
* Alluvium may be overlying any of the Coarse deposits (g, sg, s)		
	Water	w

Use Limitations

Surficial Materials is not intended for maps printed at map scales greater or more detailed than 1:24,000 scale (1 inch = 2,000 feet). It is not intended for analysis with other digital data compiled at scales greater or more detailed than 1:24,000 scale. This information is based on 7.5 minute U.S. Geological Survey 1:24,000-scale topographic quadrangle maps with a 10-ft contour interval. Surficial geologic maps exist in various forms (either published, open-filed, or unpublished) for 98 quadrangles. The authors of the Surficial Materials Map of Connecticut[1] reviewed all of these maps, and did reconnaissance mapping in the remaining quadrangles. In the course of compiling this large body of data to create both the statewide Surficial Materials Map and the statewide Quaternary Geology Map, the authors applied a consistent interpretive rationale; the result is that, in some cases, the original studies have been reworked or revised.

Related Information

Surficial Materials Map of Connecticut[1] – state map in PDF format (27 Mb)
Surficial Materials – CT ECO Basic Data Guide
Surficial Materials GIS metadata – Contains technical documentation describing the Surficial Material data and the data sources, process steps, and standards used to collect, digitize, and store this information in a geographic information system (GIS).

Data Collection Date

1992 (Publication date of Surficial Materials Map of Connecticut[1])

Status

Complete, no updates planned

Map Scale

The source map scale for the Quaternary Geology data is 1:24,000 (1 inch = 2,000 feet). This information was compiled on a series of 7.5 minute U.S. Geological Survey 1:24,000-scale topographic quadrangle maps with a 10-ft contour interval.

Contact

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Additional Documentation

Quaternary Geology Map of Connecticut and Long Island Sound Basin[2] – state map with map pamphlet report in PDF format (56 Mb).
Quaternary Geology – CT ECO Complete Resource Guide
Quaternary Geology GIS metadata – Contains technical documentation describing the Quaternary Geology data and the data sources, process steps, and standards used to collect, digitize, and store this information in a geographic information system (GIS).
Thickness of Glacial Sediments in Connecticut and the Long Island Sound Basin – GIS Metadata

Originators

U.S. Geological Survey
CT Department of Energy and Environmental Protection
Connecticut Geological and Natural History Survey

GIS Data Download

Surficial Materials data in GIS format is downloadable from DEEP GIS Data.

Connect GIS and AutoCAD software to this information online using the Geology CT ECO Map Service.

[1] Stone, J.R., Schafer, J.P., London, E.H., DiGiacomo-Cohen, M.L., Lewis, R.L., and Thompson, W.B., 2005, U.S. Geological Survey Scientific Investigation Map 2784, 2 sheets, scale 1:125,000

[2] Stone, J.R., Schafer, J.P., London, E.H. and Thompson, W.B., 1992, U.S. Geological Survey Special Map, 2 sheets, scale 1:125,000, and pamphlet, 71 p.