U.S. Department of the Interior
U.S. Geological Survey

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PLATE 2 of 3

EXPLANATION

STRATIFIED-DRIFT DEPOSITS

ALLUVIAL DEPOSITS (ALLUVIUM)

Alluvial deposits are sediments that were deposited by running water (as opposed to standing water in lakes) such as by rivers or streams. Alluvial deposits are fluvial sediments that were deposited by rivers or streams. Most alluvial sediments were deposited by channeled flow (by rivers and streams), however, some alluvium is deposited during floods when flow rises above the stream banks and inunates low areas of the valley.

ALLUVIAL DEPOSITS OF HOLOCENE AGE

al — **Channel and flood-plain alluvium**—Stream-deposited gravel, sand, silt, and clay. In most regions, the map unit is alluvium beneath flood plains and low terraces and in stream channels. The thickness of the channel and flood-plain alluvium generally is 5–25 ft.

af — **Alluvial-fan deposits**—A complex of gravel, sand, silt, and clay deposited as fans by upland tributaries where they join the main valley. The thickness of the fan deposits generally is 0–50 ft.

ALLUVIAL (INWASH) DEPOSITS OF LATE WISCONSIN AND HOLOCENE AGES

isg — **Inwash sand and gravel**—Chiefly sand and gravel that were transported by upland tributary streams or outlets to proglacial lakes and that were deposited in the valley, some of which were deposited on top of or adjacent to the glacier. Where the sediments were deposited on or adjacent to the ice, a hummocky landform resulted after the ice melted and sediments collapsed. Upgradient from the ice, the sediments formed smooth sloping fans and aprons. Many of these tributaries continue to modify these deposits. The thickness of the inwash sand and gravel generally is 5–50 ft.

PALUDAL (MARSH AND SWAMP) DEPOSITS

SWAMP DEPOSITS OF HOLOCENE AGE

hs — **Fresh-water swamp deposits**—Chiefly (1) muck, mucky peat, and organic residues mixed with fine sand, silt, and clay or (2) organic debris, muck, and, locally, peat mixed with fine sand, silt, and clay in areas that intermittently are covered by standing water. The deposits are on former lake beds, in abandoned glacial melt-water channels and sluiceways, in ice-block depressions and other shallow depressions, and in other poorly drained areas. The thickness of the swamp deposits generally is 2-10 ft; locally, it is >20 ft.

LACUSTRINE (LAKE) DEPOSITS

GLACIAL AND POSTGLACIAL LAKE DEPOSITS OF HOLOCENE AND LATE WISCONSIN AGE

lss — **Silt and sand**—Chiefly off-shore and near-shore deposits of former glacial and postglacial lakes; some deposits are in small separate basins. The deposits are thin and discontinuous in some areas. In some regions, extensive areas of silt and sand are overlain by swamp deposits or alluvial-fan and flood-plain alluvium. The thickness of the lake silt and sand generally is 20–75 ft; locally, it is >100 ft.

GLACIOFLUVIAL (OUTWASH AND ICE-CONTACT) DEPOSITS

Glaciofluvial (outwash) deposits consist of stratified gravel, sand, and silt deposited in melt-water streams. The sediments were not deposited on or against active or stagnant glacial ice as were ice-contact sediments. However, in some areas not far from glacial ice, blocks of floating ice in the streams were grounded and then buried by the outwash sediments. In some places, ice-block depressions pockmark the outwash surfaces (the deposits in those areas are referred to as pitted outwash). The materials transported by, and deposited in, the streams were derived chiefly from melting glacial ice upstream. In some regions, the distinction between glacially derived outwash and either nonglacial alluvium or alluvium that was derived from reworking and redeposition of outwash is arbitrary. The lithology of clasts (granules, pebbles, cobbles, and boulders) in outwash is extremely variable. In most places it reflects the composition of clasts in the till and ice-contact sediments and the composition of bedrock upstream in the drainage basin.

Ice-contact deposits consist of stratified gravel, sand, and silt deposited in melt-water streams, or in lakes, on, against, or adjacent to glacial ice. Characteristically, the sediments are folded, faulted, and tilted, indicating that collapse, slump, sliding, and flow occurred when the ice subsequently melted. Landforms composed of ice-contact sediments include kames, kame end moraines and interlobate moraines, kame terraces, kame deltas, kame fans, eskers, and crevasse fillings. The lithology, or composition (for example, shale, sandstone, limestone, granite, gneiss), of clasts (granules, pebbles, cobbles, and boulders) in ice-contact sediments is extremely variable; in most places it is similar to that of the associated till.

GLACIOFLUVIAL (OUTWASH) DEPOSITS OF LATE WISCONSIN AGE

osg — **Outwash sand and gravel**—Chiefly sand and gravel beneath terrace remnants; as valley trains and beneath outwash plains; as fans and aprons; as delta topset beds. The surfaces of the deposits generally are smooth, undulating, or gently rolling; locally, they are pitted with ice-block depressions. The thickness of the outwash sand and gravel generally is 15–75 ft; the maximum thickness is >100 ft.

os — **Outwash sand**—Chiefly sand or sand and silt containing scattered pebbles. Outwash sand may not be distinguished as a map unit; it is included in outwash sand and gravel. The surfaces of the deposits generally are smooth, undulating, or gently rolling; locally, they are pitted with ice-block depressions. The thickness of the outwash sand and gravel generally is 10–40 ft; the maximum thickness is >75 ft.

ICE-CONTACT (KAME) DEPOSITS OF LATE WISCONSIN AGE

k — **Ice-contact (kame) sand and gravel**—Chiefly in kames, interlobate moraines, kame deltas, kame fans, eskers, and ice-fracture fillings. Hummocks, mounds, ridges, and knobs typically characterize the landscape. Ice-block depressions are common in some areas. In some places, boulders litter the surface. Locally, the ice-contact sediments are overlain by till or flow till as thick as 15 ft. The thickness of the ice-contact deposits generally is 10–50 ft; locally, it is >75 ft.

ke — **Kame end-moraine deposits**—Kame end-moraine deposits are (1) linear or arcuate, ridgelike accumulations of ice-contact deposits; (2) kame complex accumulations of ice-contact deposits in mounds, knobs, and hummocks or in irregular, imbricated, or overlapping ridges; or (3) ice-contact deposits in belts of any or all of the latter landforms. The sediments were deposited at or near a stagnating glacial ice margin. Kame end-moraine deposits in some places grade laterally into, or are abruptly replaced by, till end-moraine deposits. The thickness of the ice-contact deposits generally is 10– 50 ft; locally, it is >75 ft.

UNSTRATIFIED GLACIAL-DRIFT DEPOSITS (TILL)

Till is a predominantly nonsorted and nonstratified, generally heterogeneousmixture of clay, silt, sand, granules, pebbles, cobbles, and boulders deposited directly by glacial ice. In some places, the till was modified by collapse, creep, flow, and other surface processes subsequent to deposition. The till matrix is the finer grained (clay, silt, and sand) material in which larger particles or clastsare embedded. The texture of till is the relative proportion of sand, silt, and clay in the matrix. The composition (for example, shale, sandstone, limestone, granite, gneiss) of clasts (granules, pebbles, cobbles, boulders, and blocks) in till varies greatly in some regions, and it varies both laterally and vertically in some exposures. It reflects the composition of the bedrock and surficial deposits and materials that were incorporated by the ice. Ground moraine is a sheet or layer of till that characteristically blankets the bedrock hills and may be found in some places within or on top of stratified drift in the valley. In some areas, the map unit is thin, discontinuous patches of till separated by other kinds of deposits or materials or by numerous or extensive bedrock outcrops.

TILL OF LATE WISCONSIN AGE

tl — **Ground-moraine deposits in the uplands (mostly lodgment till)**—Consists of subangular to angular clasts (fine pebbles to boulders) embedded in a matrix consisting chiefly calcareous loam, silt loam, sandy loam, sandy clay loam, or silty clay loam. The clasts are derived mostly from eroded local bedrock but there may also be present some rare amounts of erratics that were transported from eroded outcrops to the north-as far away as Canada and the Adirondacks. The till is generally thicker (25-150 ft thick) on south-facing slopes (till-shadow hillsides) than on hilltops and north-facing slopes (0-25 ft thick).

tv — **Ground-moraine deposits in valley fill (valley facies)**—Till that typically consists of subround to rounded clasts (fine pebbles to cobbles) derived mostly from reworked glaciofluvial deposits that became embedded in a fine-grained matrix. The composition of the matrix depended on whether the glacier advanced over mostly coarse-grained glaciofluvial sediments (which resulted in a sandy matrix) or over lacustrine sediments (which resulted in a silt loam, sandy clay loam, or silty clay loam). The clasts are comprised of significantly more erratics that are more rounded than till found in the uplands which contains predominantly of local angular stones. Sometimes this unit may be misidentified as till (commonly referred to by drillers as hardpan) where it actually may be silty gravel. The thickness of the till generally is 5 to 50 ft.

tm — **End-moraine deposits**—End moraine is (1) a thickened, broad, low, ridgelike accumulation of till; (2) a complex deposit of narrow, sharply defined, concentric or overlapping ridges of till; or (3) a thickened belt of till that formed at or near the margin of an active ice sheet. Some end-moraine deposits have hummocky surface topography and some are pitted by ice-block depressions.The matrix is chiefly calcareous loam, silt loam, sandy loam, sandy clay loam, silty clay loam, or clay loam. The thickness of the till generally is 5 to 50 ft.

OTHER UNCONSOLIDATED DEPOSITS, FEATURES, AND WATER

Made land—Fill may be comprised of well sorted sand gravel topoorly sorted gravel, sand, silt, clay, and debris. Railroad beds typically are comprised of cinders.

Sand and gravel pit

ud — **Undifferentiated alluvial sand and gravel (unknown origin)**

w — **Water**

CONSOLIDATED DEPOSITS

r — **Bedrock**—Mostly Devonian-age shale, siltstone, and sandstone with some limestone and dolostone units. Beds are gently folded and dip south from 20 to 60 ft per mile.

C—C′ — **Line of geologic section**

STRATIFIED-DRIFT AQUIFER BOUNDARIES

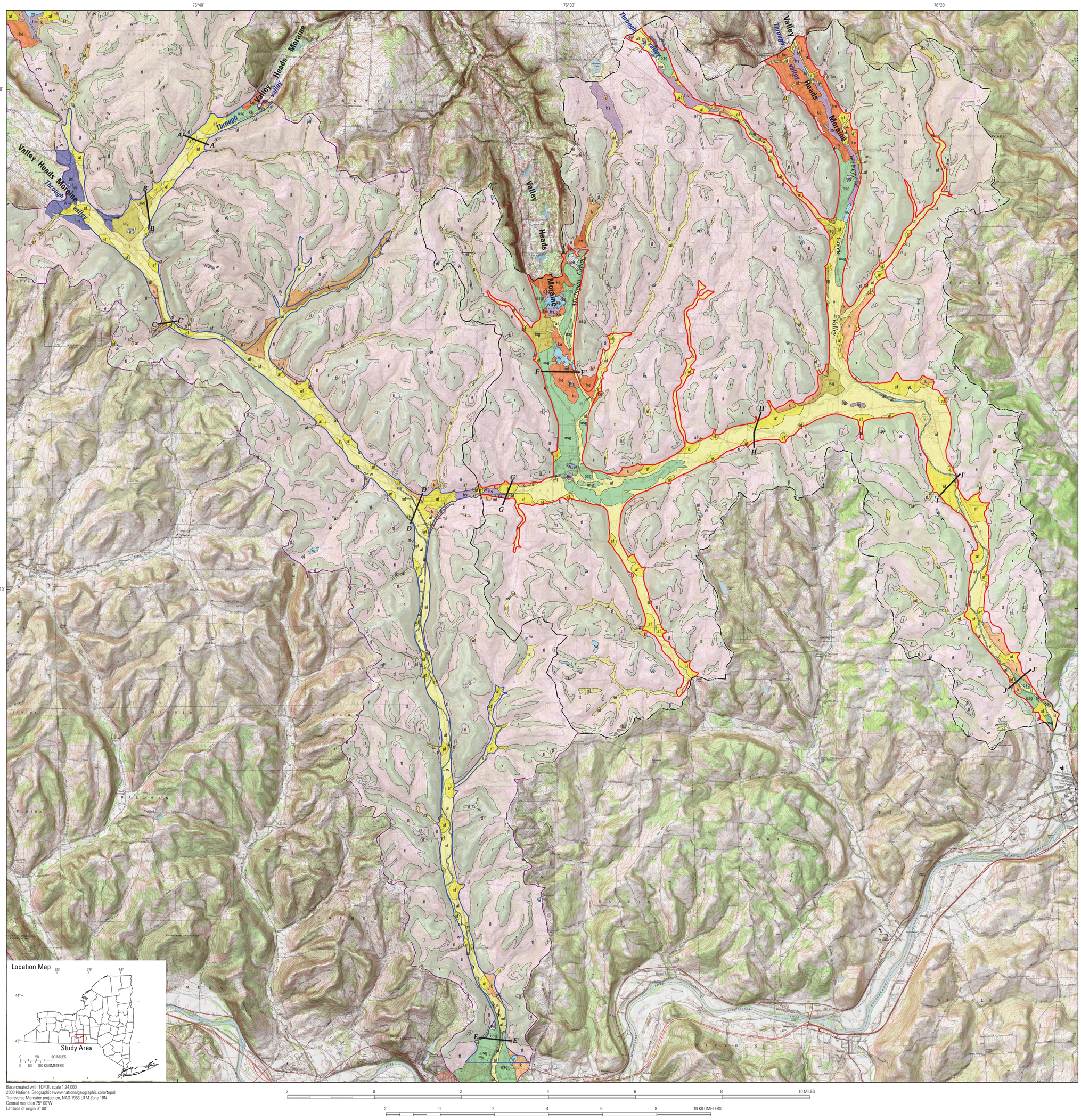
Cayuta Creek valley stratified-drift aquifer boundary

Catatonk Creek valley stratified-drift aquifer boundary

DRAINAGE BASINS

Cayuta Creek Basin boundary

Catatonk Creek Basin boundary



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Latitude of origin 0° 00′

Surficial Deposits and Lines of Geologic Sections in the Cayuta Creek and Catatonk Creek Valleys, in Parts of Tompkins, Schuyler, Chemung, and Tioga Counties, New York

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2012

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