

DEPARTMENT OF THE INTERIOR
U.S. GEOLOGICAL SURVEY

DESCRIPTION OF MAP UNITS

A layer of windblown sand and silt, generally mixed with underlying glacial deposits, is present over most of the map area but is not shown.

- sm **SALT MARSH DEPOSITS**—Partly decomposed organic material mixed or interbedded with estuarine silt, clay, and sand
- sw **FRESH-WATER SWAMP AND MARSH DEPOSITS**—Muck, peat, silt, and sand underlying poorly drained lowland areas. Thicknesses range from a few feet to perhaps tens of feet. Swamp deposits along streams generally contain less peat and more silt and sand than do deposits away from streams.
- al **ALLUVIUM**—Sand, silt, and a little gravel in flood plains along present day streams. Deposits probably 10 ft thick or less and underlain by adjacent deposits. Included with swamp and marsh deposits where water table is at the surface.
- mn **MARINE NEAR SHORE GRAVEL AND SAND**—Pebble, cobble, and boulder gravel and sand. Reworked from glacial deposits by marine wave and current action. Produced at the time of marine submergence, during and after ice retreat. Some deposits are beaches formed at a former shoreline; others were formed at depths of a few feet to a few tens of feet below water level.
- ms **MARINE SAND**—Fine to locally coarse sand, a few feet to as much as 10 ft thick, deposited on the sea bottom; may contain thin beds of silt and clayey silt. Generally intertongues downward and seaward with marine silt and clay (msc) and in places forms a thin blanket a few feet thick over the marine silt and clay. Laps onto older surficial deposits such as stratified glacial sand and gravel (gs) and till (t). Shoreward, may coarsen upward into gravelly near shore deposits (mn).
- msc **MARINE SILT AND CLAY**—Clayey silt, silty clay, and fine sand deposited on sea bottom. In some places grades upward and is interbedded with marine sand (ms). Highly variable in thickness. Unconformably overlies older glacial deposits and bedrock.
- gs **STRATIFIED GLACIAL SAND AND GRAVEL**—Sand, and pebble to cobble gravel, well- to poorly sorted and stratified as much as 50 feet thick. Deposited by glacial meltwater streams from the retreating ice sheet. Most deposits are deltas built into the high sea, which at the time of ice retreat ranged from about 140 ft above present sea level at the southeast corner of the map to about 180 ft at the northwest corner. The deposits in the quadrangle probably represent successive northward-retreating positions of the ice margin. The original form of the deposits in the quadrangle is unknown because of reworking by wave and current action and partial covering by the resulting deposits. The material reworked is not shown on the map.
- t **TILL**—Poorly to non-sorted mixture that ranges from clay-size particles to large boulders but is dominantly silt to pebble sized. Locally includes small irregular masses of sorted and stratified sand and gravel. Matrix ranges from very loose and sandy to very compact and silty. Consists of material deposited directly by the ice sheet, with little or no modification by meltwater. In some places, mantles bedrock thinly (to about 10 ft) and discontinuously. Includes drumlins, which are streamlined hills of thick till as much as 80 feet thick-built and shaped beneath moving glacial ice. Exposures in drumlins elsewhere in southern New England indicate that they generally are composed of very compact and silty till with a preserved weathered zone (such as exposed in Long Hill in Newmarket); this till is believed to represent an older glaciation.
- af **ARTIFICIAL FILL**—Earth-fill material in road and railroad embankments and made land. Heavy small bodies not shown on map.
aft — sanitary land fill
- BEDROCK EXPOSURES**—Ruled pattern indicates areas of numerous outcrops and discontinuous, thin (less than 10 ft) surficial cover
- Contact**
- 35w → **Glacial grooves and striations**—Observation is a tip of arrow. Number is in degrees east or west of south
- o **Long axis of drumlin**—Generally parallel to inferred direction of ice movement. Not shown on drumlins that are irregular or nearly circular in shape, or whose alignment has been altered by wave erosion (for example, Long and Grapevine Hills in Newmarket).
- **Direction of dip of delta foreset beds**
- **Direction of deposition of near shore gravel and sand**
- h **Pit in surficial materials**—Extent of large pit shown by hachures
- 28(65) **Well or test boring reported as ending at or in bedrock.** Number is depth to bedrock. Altitude of bedrock surface in feet above mean sea level is shown in parentheses. Information from Water Well Board, New Hampshire Department of Environmental Services, Water Resource Division

MATERIALS OBSERVATIONS

Surficial materials in exposures. Letters indicate texture in decreasing order of abundance. Numbers indicate thickness in feet, generally not given where less than about 3 feet

- b boulder
- c cobble
- p pebble
- s sand (as separate beds; not including sand in matrix of gravel)

TEXTURE OF STRATIFIED DEPOSITS—Indicated to depth at least of 5 ft

- Gravel
- Mixed sand and gravel
- Sand, minor silt
- Silt and clay



Geology mapped by Manrico Delcore 1985,
modified by Carl Kotoff 1988

This report is preliminary and has not been reviewed
for conformity with U.S. Geological Survey
editorial standards and stratigraphic nomenclature

**SURFICIAL GEOLOGIC MAP OF THE NEWMARKET QUADRANGLE,
ROCKINGHAM AND STRAFFORD COUNTIES, NEW HAMPSHIRE**

BY
MANRICO DELCORE AND CARL KOTOFF

1989