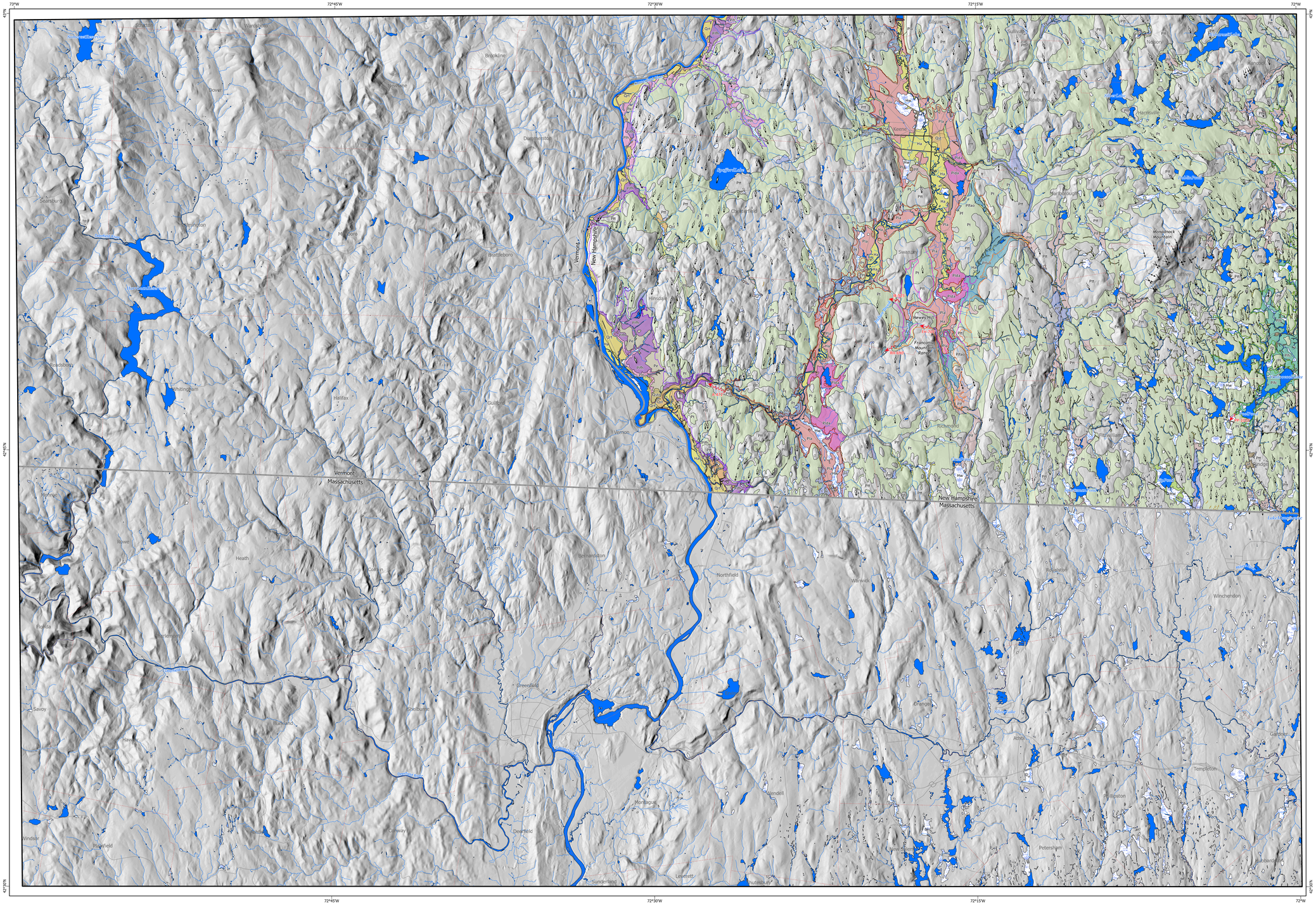
Surficial Geologic Map of the Keene 30x60’ Quadrangle, New Hampshire, 2023



DESCRIPTION OF MAP UNITS

Water

af — **Artificial fill (late Holocene)** — Sand and gravel or other unconsolidated materials in areas of artificial cut-and-fill reworked through human activity. Areas include gravel pit excavations, road/railroad embankments, and dams.

Hw — **Wetland deposits (Holocene)** — Loam and partially decomposed organic material (peat), clay, silt, and sand in poorly drained areas. Large boulders are found in some wetlands underlain by or surrounded by till. May occur on floodplains and stream terraces. The deposits are generally 1 to 10 feet (up to 3 meters) thick but may be as much as 30 feet (9 meters) thick.

Ha — **Alluvium (Holocene)** — Sand, silt, and gravel deposited within channels and along the floodplains of active streams/rivers, including minor wetland and windblown sand deposits. Alluvium along the Connecticut and Ashuelot rivers consists mainly of fine sand and silt. Deposits are up to 40 feet (12 meters) thick.

Qsty — **Stream terrace alluvium (late Pleistocene to Holocene)** — Sand, gravel, and silt deposited on the floodplains of late-glacial and post-glacial streams and rivers. In the town of Hinsdale, these terraces were deposited by the late-glacial and post-glacial Ashuelot River and its tributaries that cut through lake bottom and deltaic deposits of former glacial Lake Hitchcock. Terraces are discontinuously veneered with up to 40 feet (12 meters) of stream terrace alluvium and may include wetlands.

Qsto — **Older stream terrace alluvium (late Pleistocene to early Holocene)** — Sand, silt, and gravel graded to 330 feet (100 meters) elevation, the highest alluvial terrace deposited on the banks of the late-glacial and post-glacial Ashuelot and Connecticut Rivers as they cut down through glacial lake sediments. This unit was probably graded to the Lily Pond bedrock barrier near Turner Falls in the Greenfield, Massachusetts, quadrangle. These stream sediments are 1 to 20 feet (up to 6 meters) thick and form an alluvial veneer over lacustrine and deltaic sediments.

Qrt — **Stream terrace alluvium of the Connecticut River (late Pleistocene to early Holocene)** — Sand, gravel, and silt deposited on floodplains of the early Holocene to Late Pleistocene Connecticut River, as it cut down through lake bottom and deltaic deposits of former Glacial Lake Hitchcock. Most terrace deposits disconformably overlie varved clay/silt and grade to the Lily Pond bedrock barrier near Turner Falls in the Greenfield, Massachusetts, quadrangle or to a higher base level. Terraces are discontinuously veneered with up to 40 feet (12 meters) of stream terrace alluvium and may include wetlands.

Qf — **Alluvial fan deposits (late Pleistocene to early Holocene)** — Sand and pebble gravel deposited at the mouth of valleys tributary to the Connecticut River including minor amounts of alluvium and stream terrace deposits along associated streams. Map-scale alluvial fans in the Northfield quadrangle (Massachusetts) were formed by reworking and redepositing deltaic lacustrine sediments of glacial Lake Hitchcock. The deposits are generally less than 30 feet (9 meters) thick, and thin downslope from the apex.

Pe — **Eolian sand (late Pleistocene)** — Very fine to medium sand with minor amounts of interbedded silt and coarse sand. The uniform coarseness of the sand and the absence of pebbles and stones identifies the material as windblown. Occurs as sand dunes that overlie Lake Hitchcock river terraces. Discontinuous eolian deposits are commonly found overlying many late-Pleistocene deposits but are too small to map. The deposits are as much as 30 feet (9 meters) thick.

Plfh — **Glaciolacustrine and glaciofluvial deposits of glacial Lake Hitchcock (Pleistocene)** — Mainly outwash and deltaic sand, gravel, silt, and clay deposited into the lake occupying Connecticut River valley. The deposits include ice-contact deltas, shore and nearshore sediment, outwash and minor bottom-set beds of glacial lake Hitchcock, whose level was controlled by a glacial drift dam at Rocky Hill, Connecticut, and a spillway at New Britain, Connecticut. One of the largest deltas was deposited at the mouth of the Ashuelot River as it drained into Lake Hitchcock at around 400-450 feet elevation. Subsequent river erosion during the Holocene has carved terraces into these deposits, leaving them overlain by veneers of alluvium. The deposits are up to 150 feet (45 meters) thick.

Plh — **Glaciolacustrine deposits of glacial Lake Hitchcock (Pleistocene)** — Mainly bottom-set clay, silt, sand, and minor gravel deposited in deep water settings in glacial Lake Hitchcock. Varved clay is common and is interbedded with sand and silt with minor amounts of massive silt and fine gravel. A thin cover of alluvium overlies lake-bottom deposits along several modern and relict river terraces. The deposits are up to 100 feet (30 meters) thick.

Plfa — **Glaciolacustrine and glaciofluvial deposits of glacial Lake Ashuelot (Pleistocene)** — Sand, gravel, silt, and clay deposited into former glacial Lake Ashuelot. Some materials were deposited at the ice margin into the glacial lake, and some were deposited into ponded water bodies between the ice margin and a spillway. These materials formed ice-contact, shore, and nearshore deposits. The level of the glacial lake was controlled by a spillway at 470 feet elevation on the southern banks of the modern Ashuelot River in Winchester near the border with Hinsdale. Most of these deposits disconformably overlie varved clay and are as much as 60 feet (18 meters) thick.

Plda — **Glaciolacustrine deltas of glacial Lake Ashuelot (Pleistocene)** — Sand, pebble gravel, and minor silt and clay. The deposits were formed in contact with and downgradient of glacial ice as glaciolacustrine, deltaic, and kame deposits. Deltas were deposited into glacial Lake Ashuelot at the mouths of river valleys where they join the wider Ashuelot River valley. The deposits grade to local spillways up to 540 feet elevation as well as the main Ashuelot spillway of 470 feet. These deposits are up to 150 feet (45 meters) thick.

Pla — **Glaciolacustrine deposits of glacial Lake Ashuelot (Pleistocene)** — Mainly lake-bottom clay, silt, fine to coarse sand, and minor pebble gravel deposited into deeper water settings of glacial Lake Ashuelot. The unit is overlain in places by dominantly deltaic sand, pebble gravel deposits, and a subordinate wind-blown sand. This unit includes lake-bottom varved clay and nearshore deposits of glacial Lake Ashuelot. The level of glacial Lake Ashuelot was controlled by a spillway at 470 feet elevation just south of the current course of the Ashuelot River in Winchester near the border with Hinsdale. The deposits are up to 130 feet (40 meters) thick.

Plfao — **Glaciolacustrine and glaciofluvial deposits of the high stages of glacial Lake Ashuelot (Pleistocene)** — Medium to coarse sand and pebble to boulder gravel with minor silt and clay deposited in contact with and beyond adjacent ice as ice-contact, deltaic, and lacustrine sediments graded to at least three local spillways between 705 and 525 feet. The deposits are up to 100 feet (30 meters) thick.

Plfc — **Glaciolacustrine and glaciofluvial deposits of glacial Lake Contoocook (Pleistocene)** — Sand, gravel, silt, and clay deposited in contact with or beyond adjacent ice, representing different stages of a glacial lake within the Contoocook River valley. The unit includes ice-contact deposits, such as kames and outwash, as well as glaciolacustrine deposits, such as deltaic and lake-bottom sediments. These sediments were graded to at least four spillway elevations between 1050 and 960 feet. The deposits are up to 75 feet (23 meters) thick.

Pls — **Glaciolacustrine deposits of glacial Lake Sip (Pleistocene)** — Fine to coarse sand, silt, and clay deposited into former glacial Lake Sip in the town of Fitzwilliam.

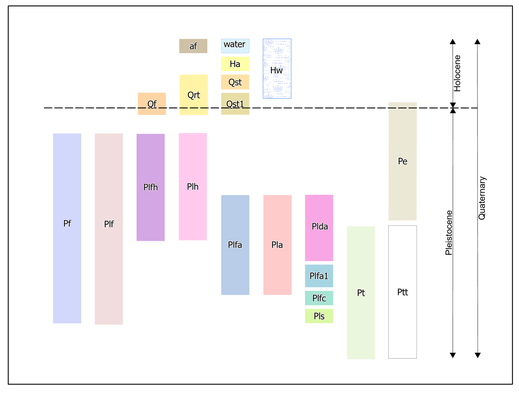
Pf — **Glaciofluvial deposits, undifferentiated (Pleistocene)** — Fine to coarse sand, pebble to boulder gravel, and minor silt and clay deposited in contact with ice or distal to the ice margin as outwash. Deposits are commonly stratified and include ice-contact deposits such as eskers, ice-channel filling, and kames, as well as minor amounts of flow till. The deposits are graded to various local ice, till, or bedrock spillways and glacial drift. The deposits are as much as 100 feet (30 meters) thick.

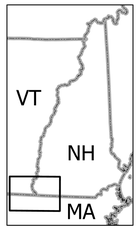
Plf — **Glaciolacustrine and glaciofluvial deposits, undifferentiated (Pleistocene)** — Fine to coarse sand, pebble to boulder gravel, and minor silt and clay. Sand is interbedded with thin silt and clay beds, and discontinuous beds of cobble and pebble gravels. The unit includes ice-contact deposits such as eskers, kames, and outwash, as well as glaciolacustrine deposits such as deltaic and lake-bottom sediments. The deposits are up to 115 feet (35 meters) thick.

Pt — **Till (Pleistocene)** — Loose to very compact, unstratified to weakly stratified, unconsolidated mixture of clay, silt, sand, and pebble to boulder gravel (diamicton). Compact, clay-bearing till is interpreted as subglacial till, deposited at the base of glacial ice. Sand-rich, weakly stratified till may have originated as flow till on top of or adjacent to the ice sheet or experienced some degree of reworking by meltwater or remobilization by gravity-induced mass wasting. Drumlins, streamlined hills of till shaped by moving ice, are present. Thickness varies but may be locally up to 200 feet (61 meters) thick.

Ptt — **Thin till (Pleistocene) and bedrock** — Till deposits in areas where bedrock outcrops are common and/or the till thickness is inferred to be generally less than 10-15 feet (3-4.5 meters) thick.

CORRELATION OF MAP UNITS





Scale 1:100,000

0 4,000 8,000 16,000 24,000 32,000
Feet

0 1.25 2.5 5 7.5 10
Miles

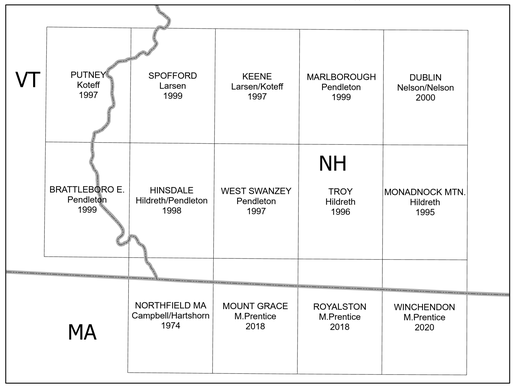
0 2.5 5 10 15 20
Kilometers

TRUE NORTH AND MAGNETIC NORTH
DECLINATION AT CENTER OF MAP, 2022
13.72° W

EXPLANATION OF MAP SYMBOLS

- State Boundary
- Railroad
- Major Roads
- Town Border
- Stream/River
- Contact—Certain within 25 meters
- Glacially streamlined hill, drumlin, or flute—Showing bearing and direction of flow
- Glacial Lake Ashuelot, high stage
- Glacial Lake Ashuelot, middle stage
- Glacial Lake Ashuelot, lower stage
- Glacial Lake Contoocook maximum
- Glacial Lake Hitchcock maximum
- Till ridge
- Glacial striation—Showing measured bearing and direction of flow. Dot indicates location of observation point
- A-472 — Glacial lake spillway—Showing elevation of major spillways in feet above sea level. Arrow shows direction of flow. PP-1020': Pool Pond, glacial Lake Contoocook; FH-705': Franconia Mountains-Hewes Hill, glacial Lake Ashuelot, high stage; RH-690': Rabbit Hollow Road, glacial lake Ashuelot, high stage; IB-525': Indian Brook, glacial Lake Ashuelot, middle stage; A-472' - Ashuelot, lower stage.

Source 1:24,000-Scale Maps



Topographic basemap developed from 10 meter LiDAR data, National Hydrography Dataset, and NHDOT, MassDOT, and VTrans roads data.

Projection: North American Datum 1983 New Hampshire State Plane Feet.

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New Hampshire State Geologist: Shane Csiki, Ph.D.

Surficial Geologic Map Open-File Series GEO-012-100000-SMOF

Maps and companion documents can be found at https://www.des.nh.gov/land/geology

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