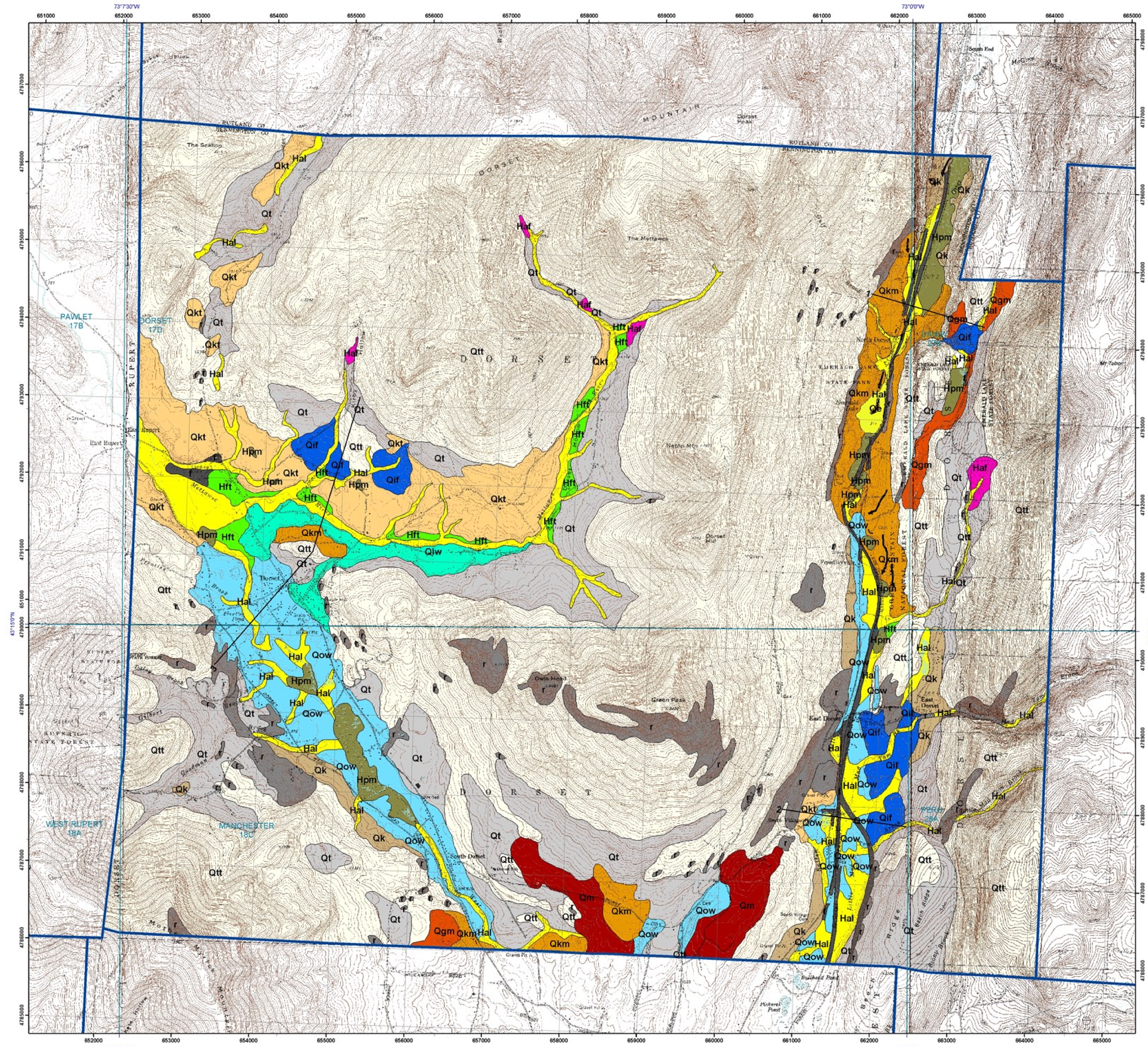

Base map from U.S. Geological Survey.
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Digitization and Cartography by Marjorie Gale
Date: February 2009

1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet

MN N

Magnetic declination
15.5 degrees west, 1968

SURFICIAL GEOLOGIC MAP OF THE TOWN OF DORSET, VERMONT

by
David De Simone
2009

Research supported by the Vermont Geological Survey, Dept. of Environmental Conservation, VT ANR.
This geologic map was funded in part by the USGS National Cooperative Mapping Program.
The views and conclusions contained in this document are those of the authors and should not be interpreted as necessarily representing the official policies, either expressed or implied, of the U.S. Government.
The map was funded in part by the Town of Dorset and by the Bennington County Regional Planning Commission.

Legend

DESCRIPTION OF MAP UNITS

RECENT

f	Fill; variable materials used as artificial fill along rail beds, road beds, embankments and low lying areas.
Hpm	Peat & Muck; organic sediment, mostly silt and clay in wetlands and swamps; low lying lands prone to flooding.
Hal	Alluvium; stream flood plains; fine sand, silt and gravel of river channel, bar, and bank areas; river bottom lands; variable permeability but usually intermediate to low; often wet sites and prone to flooding; can be good aquifer if sufficiently thick.
Haf	Alluvial Fan; tributary stream deposits; gravel, silt and sand, often poorly sorted; gently to moderately sloping lands located at the base of steep slopes and at stream junctions; variable permeability but usually intermediate to low; fair aquifer if sufficiently thick and permeable.
Hft	Fluvial Terrace; old flood plains; fine sand, silt, and gravel generally less than 5 meters thick; flat to gently sloping lands; variable permeability, usually intermediate; old stream terrace deposits above the flood plain; soils are often deep, well drained loams suitable for agriculture; water table may be sufficiently deep to allow for conventional septic systems; percolation rates may be locally variable and wet areas are not uncommon; banks above streams may be prone to failure; fair aquifer. Some terraces may be latest Pleistocene and related to lowering of glacial lake levels.

PLEISTOCENE

Qif	Inwash Fan; see Qiw description.
Qiw	Inwash; stratified fluvial sand, sand and gravel, or gravel deposited where uplands transition to lowlands and associated with other ice contact sediment or accumulated against an ice margin and having one ice contact side, typically the distal side; well drained and, if thick, a good aquifer.
Qow	Outwash; glacial melt water deposits of well sorted gravel and sand typically greater than 5 meters thick; gently sloping to flat lands which may be pitted due to melted ice blocks; intermediate to high permeability; high gravel-sand resource potential.
Qe	Esker; subglacial/englacial melt water stream deposits of moderately well sorted gravel and sand with boulders; prominent elongated and curving narrow ridges with steep sides and heights reaching 60+ feet; intermediate to high permeability; high gravel-sand resource potential; steep slopes may pose a slope stability problem.
Qk	Kame, undifferentiated hummocky terrain; glacial deposits from streams, slumps and deposition by ice; stratified and unstratified sand, gravel and boulders with variable silt; rolling, hilly lands to individual hills; intermediate to high permeability; high gravel-sand resource potential; fair to good aquifer limited by variable thickness and aerial extent.
Qkt	Kame terrace, sand with gravel; ice contact melt water and sediment flow deposits of stratified and unstratified gravel, sand, boulders and some silt; nearly flat lands; intermediate to high permeability; high gravel-sand resource potential; slopes at edges of these areas may pose a stability problem; variable sediment thickness typically exceeds 10 meters; percolation rates are generally satisfactory for conventional septic systems; aquifer recharge areas may be prone to contamination from infiltration.
Qkm	Kame Moraine, sand and gravel; ice contact melt water and sediment flow deposits of stratified and unstratified gravel and sand with silt and boulders; rolling, hilly ridged land with local flat areas; intermediate to high permeability; high gravel-sand resource potential; local steep slopes may pose a stability problem.
Qgm	Ground Moraine, hummocky till with sand and gravel; ice contact sediment flow, melt water and ice deposited sediments of variable texture ranging from stratified and well sorted gravel and sand to unstratified and poorly sorted silt, sand, gravel and boulders; thickness is variable and rock outcrops may portrude; low to high permeability; limited local slope stability problems; gently rolling hills and elongate smooth hills are possible.
Qm	Moraine, ridged till; ice contact ice deposited, sediment flow, and melt water materials of unstratified and stratified silt, sand, gravel and boulders; broad ridges and swales with rolling low hills; variable permeability; local slopes may pose a stability problem.
Qt	Till, thick or blanket; ice derived deposits of hardpan, silt, boulders, gravel and sand which are unsorted and unstratified and deposited beneath the glacier; may contain deformed stratified units that may be re-deposited diamictons from subaqueous or subglacial flows; thickness greater than 3 meters but rock outcrops may be common; surface boulders or erratics are common; smoothed and streamlined hills in the valley and gently undulating slopes on the lower mountain flanks to nearly flat plains dotted with erratics; low permeability; unstable slopes in excavations; may be prone to slope failures along stream banks.
Qtt	Till, thin or veneer; ice derived deposits of hardpan, silt, boulders, gravel and sand which are unsorted and unstratified and deposited beneath the glacier; thickness less than 3 meters with rock outcrops common; surface boulders or erratics are common; moderate to steep mountain slopes and summit areas; low permeability where thicker than 3'; moderately permeable where thin, weathered soils are less than 3' thick.

PALEOZOIC AND PRECAMBRIAN

r	Rock Outcrop; includes areas of predominantly outcrop with patches of till; outcrop areas serve to recharge bedrock units with groundwater; poor sites for septic systems; rock types are mainly marble, quartzite, schist and phyllite.
	VT Town Boundaries
	USGS 24K Quadrangle Boundaries
	Line of Cross-Section

Introduction

The Town of Dorset encompasses portions of the West Rupert, Manchester, Peru, Dorset and Danby 1:24000 topographic quadrangles.

Two major valleys separate three upland regions. Both major valleys are underlain predominantly by Cambro-Ordovician carbonate rocks, chiefly marble and dolomitic marble. There are some quartzite interbeds in the carbonate valley rocks.

The southwest corner of the Town rises moderately up the flanks of Mother Myrick Mountain whose 3,361 ft summit is just south of the Town boundary. Goodman, Gilbert and Daley Brooks drain the mountain flank and cut through Taconic Highland lithologies composed of schist, phyllite and carbonates above approximately 2,400 ft elevation. Below this elevation, the mountain flank is underlain by Cambro-Ordovician carbonate lithologies with a Taconian thrust fault separating the distinct lithologies.

The eastern edge of the Town rises steeply up the flank of the Green Mountains toward the summit of Mount Tabor and Bromley Mountain, both beyond the Town boundary. Elevation exceeds 2,400 ft and the steep slopes are underlain predominantly by the Cambrian Cheshire quartzite.

A large central upland region of the Town separates the Dorset and East Dorset valleys. This upland region is underlain by Taconian lithologies composed of phyllite and schist above a major Taconian thrust fault. Kirby Hollow, Dorset Hollow and several unnamed tributaries form the head waters of the Mettawee River.

Surficial Geology

The map shows the observed and inferred contacts between sediment types based upon the field data sites and interpretation of maps, aerial photographs and soils maps. The interpretation of the deglacial history is based on mapping in Dorset and previous mapping in nearby quadrangles (De Simone, 2004, 2001, 2005).

The Green Mountain, Dorset Mountain and Taconic Mountain ridge lines and flanks are underlain by a thin veneer of till with frequent outcrops. The carbonate rocks on the Taconic and Dorset mountain flanks tend to outcrop in a series of cliffs separated by steps. The Green Mountain flanks are underlain chiefly by quartzite with less frequent outcrop and subtle ledges. Thick till occurs along the lower flanks of the mountains. The topography typically reveals the contact between thick and thin till as a small but distinctive break in slope. The thick till- thin till contact also generally coincides with the trace of the major Taconian thrust fault along the Taconic and Dorset mountain flanks.

Ice contact and glaciofluvial sediment predominate in the valleys. Two small areas of moraine and kame moraine at the southern margin of town represent still stands or minor surge margins of the Dorset and East Dorset valley glaciers. These sediments occur in the vicinity of Morse Hill Road. Ice contact stratified sands and gravels occur along the lower valley flanks in both the Dorset and East Dorset valleys. Mettawee Hollow contains a series of stepped kame terraces along the northern valley bottom that are composed of glaciofluvial sand with gravel. Thick ice marginal deposits occur just north of Dorset Village and at North Dorset. Both of these sites represent still stands of the respective retreating valley glaciers. The head of outwash at Dorset is beautifully kettled and links to a lateral margin kame terrace. The North Dorset ice margin is a site of excessively thick ice contact sedimentation with esker deposits and a notable former stagnation zone that heads at Emerald Lake, a large kettle depression with several other large kettles to the south of the lake. Much of the Dorset and East Dorset valley bottoms consist of outwash sands and gravels forming a prominent sandur or valley train of outwash. Mettawee Hollow contains a similar valley train of sands and gravels that descends along the southern margin of the hollow and merges with the Dorset valley outwash. This deposit represents inwash and the distal portion of this inwash was deposited against or beneath the Dorset valley glacier.

Deglacial History

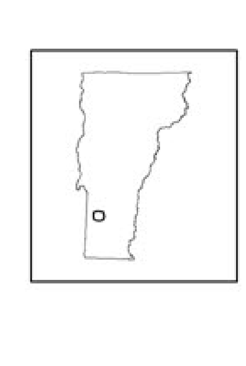
The moraine and kame moraine deposits in the Morse Hill Road area define the first ice marginal positions recognized. These were previously identified during mapping in Manchester and named the South Dorset Ice Margin. The exposed sediment south in Manchester of the Dorset glacier moraine consists of interbedded diamicton and stratified fluvial sediment. The deformation in the diamicton is consistent with sediment flow origins but also may be the result of a minor surge of the Dorset glacier during its retreat. A similar ridge was mapped as moraine and would have been deposited by the East Dorset glacier and is inferred to be contemporaneous. This latter ridge is not exposed. Melt water from these ice margins deposited outwash through Manchester Center south of the town.

The Dorset and East Dorset glaciers retreated to the Dorset and North Dorset ice positions, respectively. The extensive ice marginal deposits described above accumulated during this relatively long still stand. This is named the Dorset Ice Margin. Sedimentation associated with this still stand defined the present drainage divides in both the Dorset and East Dorset valleys. As the Dorset glacier maintained this ice position, retreat and down wasting of ice in Mettawee Hollow resulted in a series of stepped kame terraces. Each kame terrace likely records a local and small ice marginal lake in the upper Mettawee Hollow. These unnamed minor lakes apparently drained back under the Dorset ice rather than spilling over the divide between the valleys. The lakes were likely very short-lived and no surface fine grained lacustrine sediments were observed. Final retreat of the Mettawee Hollow ice allowed the inwash sandur to be deposited against the Dorset valley glacier. Mapping supports De Simone's (2004) conclusion that there was no Glacial Lake Batten in the Batten Kill valley extending south through Manchester toward Arlington. Rather, the sediments consist of typical outwash deposited in a subaerial environment.

Retreat of both the Dorset and East Dorset glaciers resulted in the establishment of ice marginal lakes in their respective valleys. Glacial Lake Emerald (De Simone 2005) was named because ponded waters in the Otter Creek drainage basin flowed across the spillway at the Emerald Lake divide. Retreat of the Dorset glacier allowed Mettawee basin waters to pond in front of the ice. This established a Glacial Lake Dorset with a spillway through the broad drainage divide to the Batten Kill basin. The previously deposited outwash was dissected and an inset outwash or valley train was deposited through Manchester. This can be seen as a lower outwash surface through Manchester Center to Manchester. The modern streams in the drainage divide are underfit. It is not believed that the use of this spillway was for a long time or that a large flow existed. Therefore, it is believed that a lower outlet for Lake Dorset and the establishment of a new glacial lake in the Mettawee basin occurred fairly quickly.

The Luzerne Readvance Question

Connally's (2002) depiction of the Luzerne readvance in eastern New York takes the limit of the readvance as far south as Mt. Equinox. There was evidence for a minor surge of ice associated with the South Dorset Ice Margin as discussed above and in De Simone (2004). However, the evidence is not of the type associated with a larger surge or ice readvance as envisioned by Connally. Indeed, the deformation in the moraine may be solely the result of sediment flow in a typical ice marginal setting. The occurrence of extensive deformed till in other places such as northern Vermont where the Bridport surge of the Hudson-Champlain Lobe occurred is taken as the necessary proof of a readvance. No such proof exists in the Vermont Valley precisely where Connally's depiction of the Luzerne readvance would place the readvance limit. Therefore, it is concluded here that the Luzerne readvance did not occur as most recently envisioned by Connally.



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Department of Environmental Conservation
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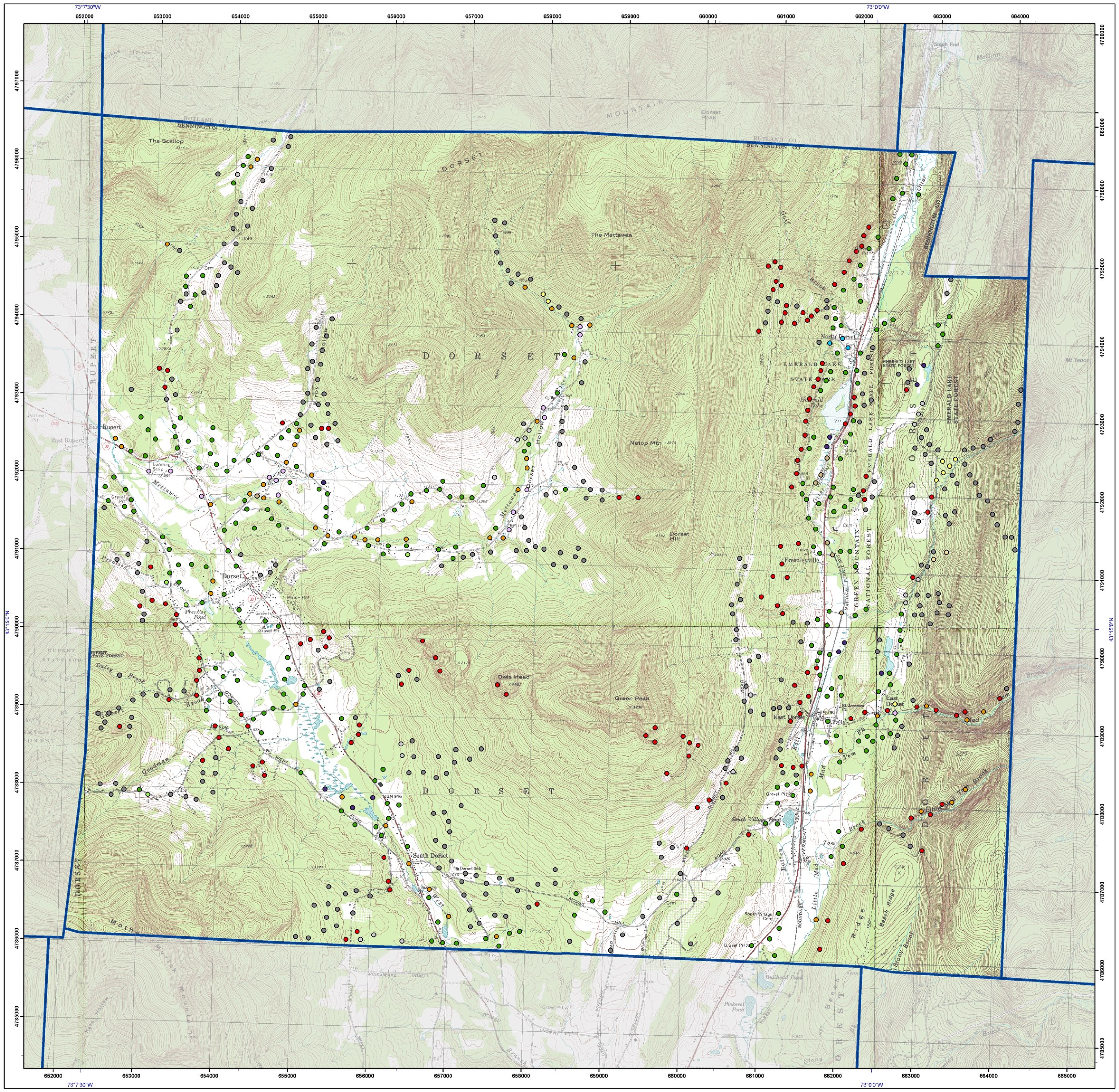
Vermont Geological Survey Open File Report VG09- 3
Field Stations, Dorset, VT



Legend

Field Station Site and Lithology

- f - fill, artificial material of variable texture
- pm - organic rich sediment, peat and muck of wetlands
- al - alluvium, may be sandy, silty, gravelly
- af - alluvial fan sediment of gravel, silt and sand
- ft - fluvial terrace sediment of gravel with sand and/or silt
- co - colluvium, may be gravelly, bouldery
- s - sand
- g - gravel
- sg - sand and gravel
- ts - till with sandy matrix; ablation till
- t - till, compact with silt - clay but may also include minor sand in matrix
- r - rock

Town Boundary

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0 0.5 1 2 3 Miles
0 0.5 1 2 3 Kilometers
Contour Interval 20 Feet

MN N

Magnetic declination
15.5 degrees west, 1968

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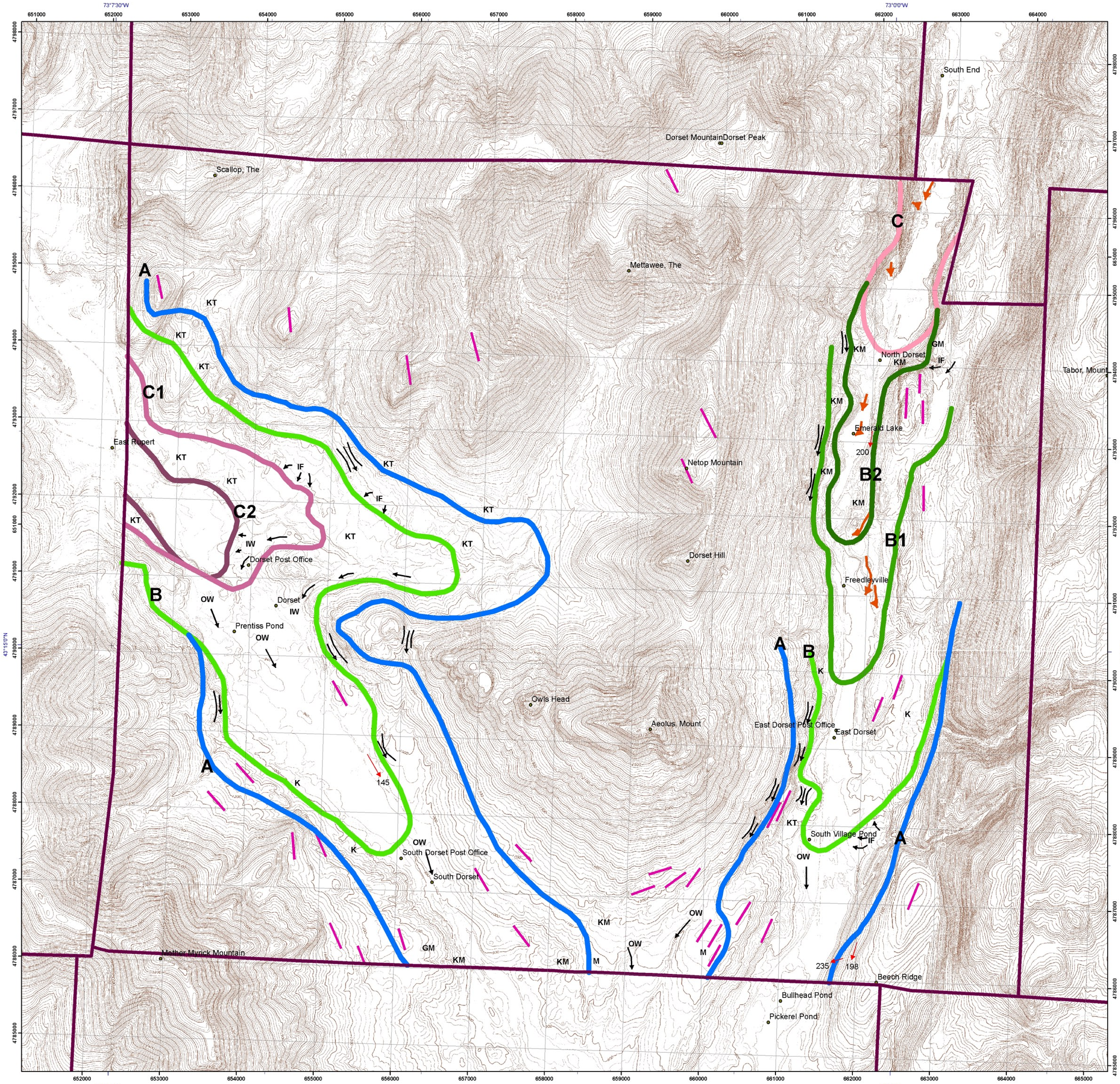
Digitization and Cartography by Marjorie Gale
Date: February 2009

FIELD STATIONS, DORSET, VERMONT

by
David De Simone
2009

VERMONT GEOLOGICAL SURVEY



Legend

Ice Margins

A — South Dorset ice margin

C

C1 — Dorset ice margin

C2

B, B1, B2 — Positions B, B1 and B2 represent intermediate "steps" in the retreat of the ice from the South Dorset to the Dorset ice margins. Position B in the Dorset valley represents a step in the retreat which resulted in a lower set of kame terraces in Mettawee Hollow. Positions B, B1 and B2 in the East Dorset valley represent steps in the retreat which enabled the esker, kame moraine and kame terrace sediments mapped to accumulate in a sequential fashion.

Flow Direction Indicators

- Streamline molded forms - rock drumlin, drumlin, roche mountenee and whalebacks
- Esker - subglacial/englacial melt water stream deposits of moderately well sorted gravel and sand with boulders
- Striation
- Spillway or flow direction

GM	Ground Moraine - hummocky till with sand and gravel
IF	Inwash fan - stratified fluvial sand, sand and gravel, or gravel
IW	Inwash - stratified fluvial sand, sand and gravel, or gravel
K	Kame, undifferentiated hummocky terrain; glacial deposits from streams, slumps and deposition by ice
KM	Kame Moraine, sand and gravel; ice contact melt water and sediment flow deposits
KT	Kame Terrace - sand with gravel; ice contact melt water and sediment flow deposits
OW	Outwash - glacial melt water deposits of well sorted gravel and sand
M	Moraine, ridged till - ice contact ice deposited, sediment flow and melt water materials

Town Boundary

Deglacial History

A sequence of 2 ice margins can be recognized through the town which records brief still stands of the retreating valley ice from the area. Most geologists believe the ice retreated quite rapidly from Vermont and adjacent parts of New York and New England. Where dates from organic materials are available, these data confirm the ice retreated at rates in the Champlain Lowland approaching 0.4-0.5km/yr (De Simone et al, 2008, Franzi et al, 2007). If similar rates of retreat held true for the ice in the Dorset valleys, then ice retreat may have been accomplished in as little as 15-20 years. The 2 recognized ice margins are: 1. South Dorset ice margin (position A) and 2. Dorset ice margin (position C and C1-C2). Positions B, B1 and B2 represent intermediate "steps" in the retreat of the ice from the South Dorset to the Dorset ice margins. Position B in the Dorset valley represents a step in the retreat which resulted in a lower set of kame terraces in Mettawee Hollow. Positions B, B1 and B2 in the East Dorset valley represent steps in the retreat which enabled the esker, kame moraine and kame terrace sediments mapped to accumulate in a sequential fashion.

The moraine and kame moraine deposits in the Morse Hill Road area define the first ice marginal positions recognized on the Deglacial History map. These were previously identified during mapping in Manchester and named the South Dorset Ice Margin. The exposed sediment south in Manchester of the Dorset glacier moraine consists of interbedded diamicton and stratified fluvial sediment. The deformation in the diamicton is consistent with sediment flow origins but also may be the result of a minor surge of the Dorset glacier during its retreat. A similar ridge was mapped as moraine and was deposited by the East Dorset glacier and is inferred to be contemporaneous. This latter ridge is not exposed. Melt water from these ice margins deposited outwash through Manchester Center.

The Dorset and East Dorset glaciers retreated to the Dorset and North Dorset ice positions, respectively. The extensive ice marginal deposits described above accumulated during this relatively long still stand. This is named the Dorset Ice Margin. Sedimentation associated with this still stand defined the present drainage divides in both the Dorset and East Dorset valleys. As the Dorset glacier maintained this ice position, retreat and down wasting of ice in Mettawee Hollow resulted in a series of stepped kame terraces. Each kame terrace likely records a local and small ice marginal lake in Mettawee Hollow. These unnamed minor lakes apparently drained back under the Dorset ice rather than spilling over the divide between the valleys. The lakes were likely very short-lived and no surficial fine grained lacustrine sediments were observed. However, well logs record fine grained sediments that represent deposition into these small, local lakes. Final melting of the Mettawee Hollow ice allowed inwash and an inwash fan of gravel and sand to be deposited against the Dorset valley glacier in the east part of Dorset village. This Mettawee Hollow ponded water drained through the pass at approximately 1000ft elevation where the lower portion of Dorset Hollow Road is today.

In the East Dorset valley, thick gravel and sand was deposited through the North Dorset area, especially from a melt water and/or meteoric water source along the west margin of the glacier. This is where the overburden thickness approaches 300ft and where well logs indicate the sediment is predominantly permeable. While mapped as part of the kame moraine, the surface of the deposit just west of North Dorset has a fan type appearance that might have resulted from a meteoric contribution to the top of the ice contact melt water sediment toward the end of deposition. Alternatively, the sediment could have been derived from melt water originating higher on the glacier surface to the north and flowing into the Gulf Brook drainage basin and back against the ice as a late stage fan deposit atop the thick ice contact sediment. Regardless, the final result is an area of the thickest gravel and sand sediment accumulation in the town.

1:24,000

0 0.5 1 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet

MN N

Magnetic declination
15.5 degrees west, 1968

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Grid overlay on map is Universal Transverse Mercator, Zone 18N, NAD 27.

Digitization and Cartography by Marjorie Gale
Date: March 2009

DEGLACIAL HISTORY, DORSET, VERMONT

by
David De Simone
2009

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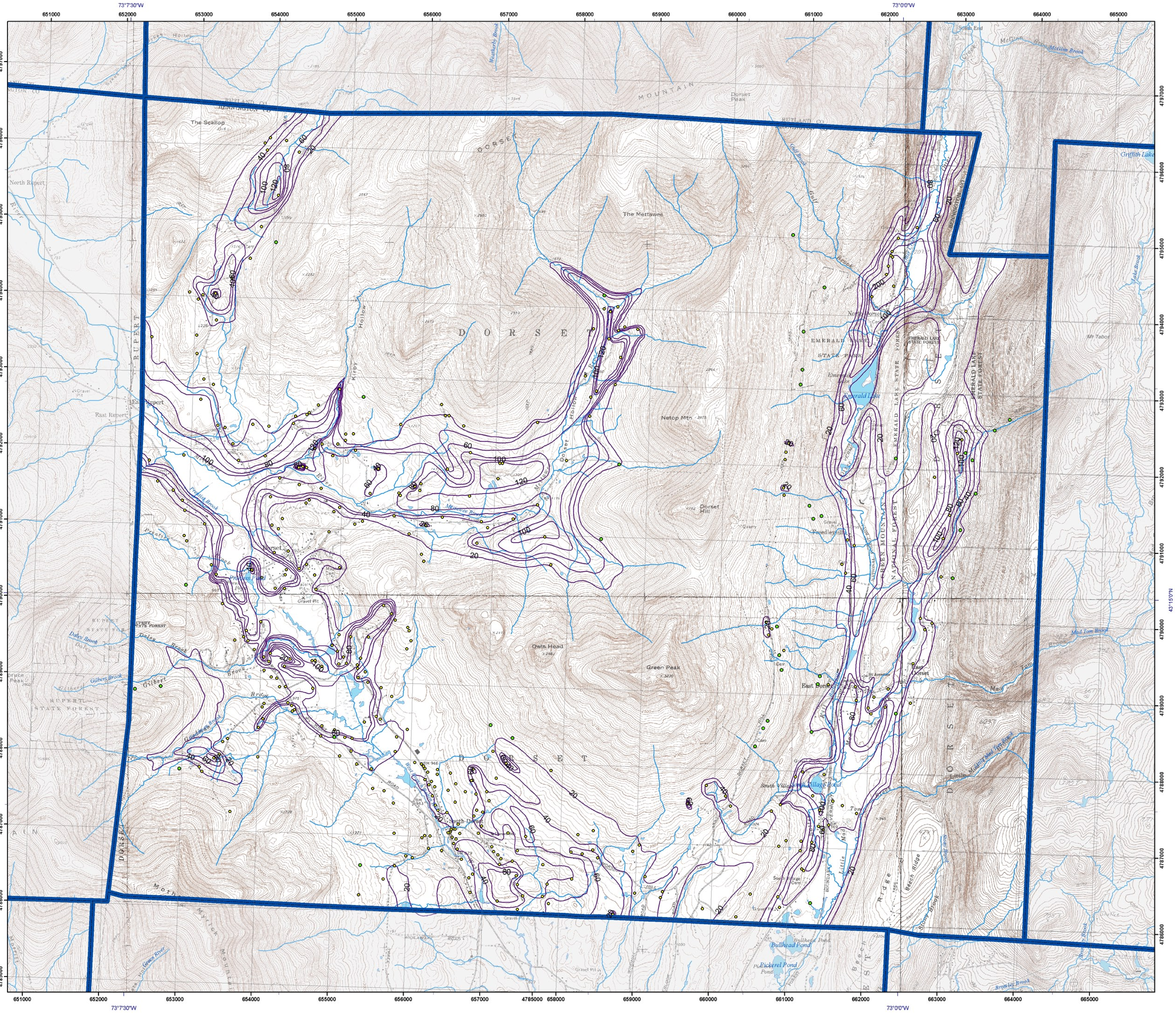
VERMONT GEOLOGICAL SURVEY

Vermont Geological Survey Open File Report VG09- 3
Depth to Bedrock, Dorset, VT



Legend

- Depth to bedrock contour; contour interval 20' except in N. Dorset where a 100' interval is used
- Located Water Wells - well located by GPS or E911 address
- Spring or seep
- Surface water
- Town Boundary

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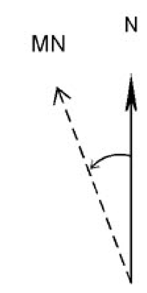

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Scale: 0 0.5 1 2 3 Miles
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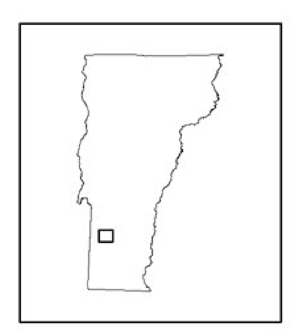
DEPTH TO BEDROCK, DORSET, VERMONT

by
David De Simone and Marjorie Gale
2009



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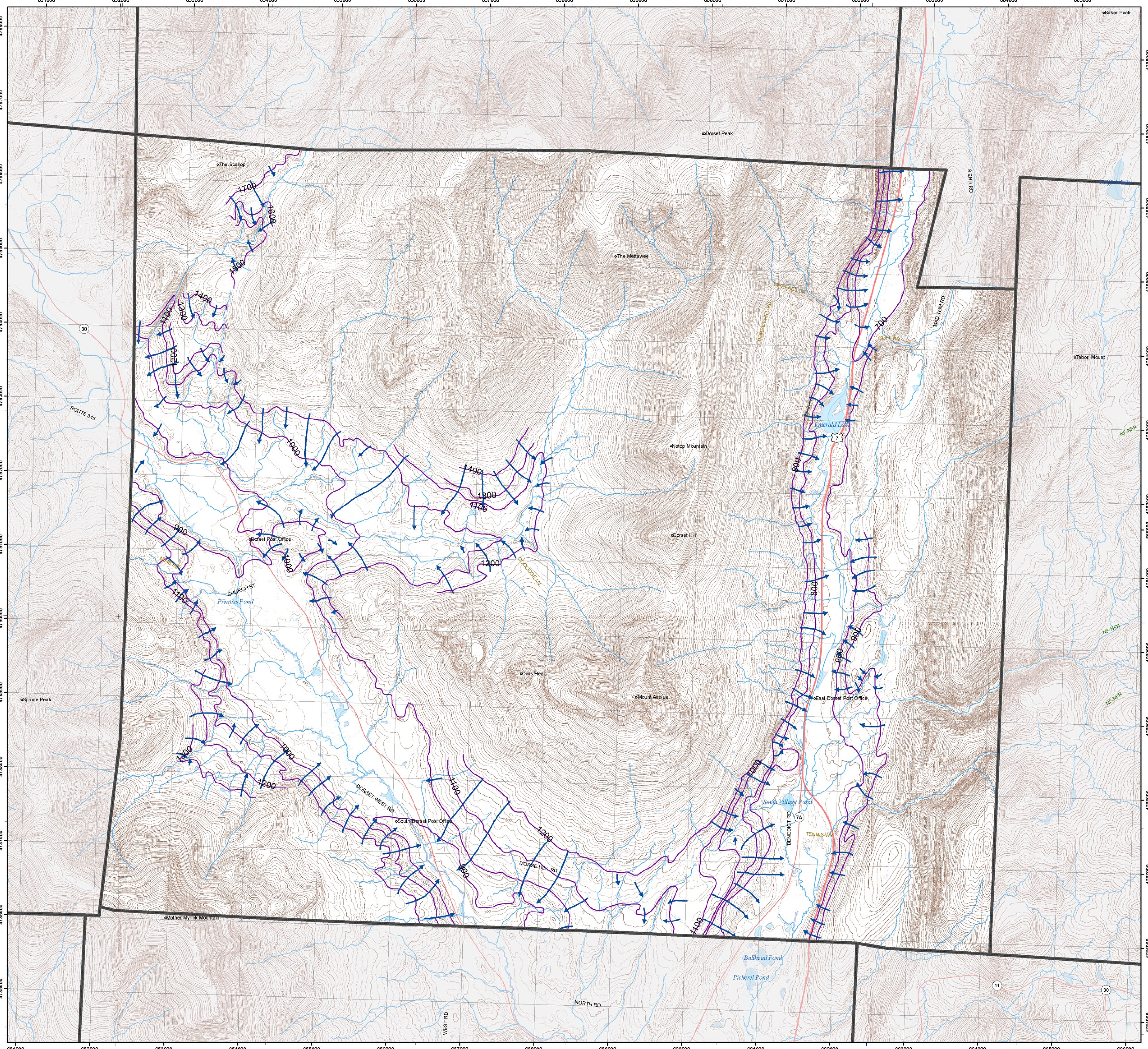

Legend

- Potentiometric surface contours; contour interval 100 feet
- Groundwater flow lines
- Rivers and streams
- Town Boundary

Explanation

The static level of water in a well is a useful parameter as it is a factor in determining the amount of water that is stored in the well bore, and thus, available to be pumped into a house or other structure using the water. The elevation of the static water level in bedrock wells reported in the well log data was determined. These data were contoured using a 100ft contour interval only in the valley portions of the town where there were a sufficient number of wells. The contoured map shows the typical pattern of static levels that mimic the underlying topography. The reported static level for a well may be unreliable if the measurement was made before a well had completely recovered from pumping; such isolated low values of static level were discounted in the construction of the map.

Groundwater flows down the hydraulic gradient from a high potentiometric level to a low potentiometric level. Flow lines are drawn at right angles to the potentiometric contours. The groundwater flow lines reveal the inferred directions or pathways of recharge from higher regions in an aquifer to regions of discharge in lower portions of an aquifer.

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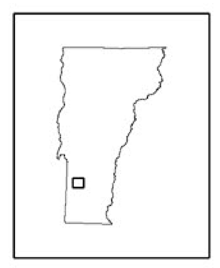

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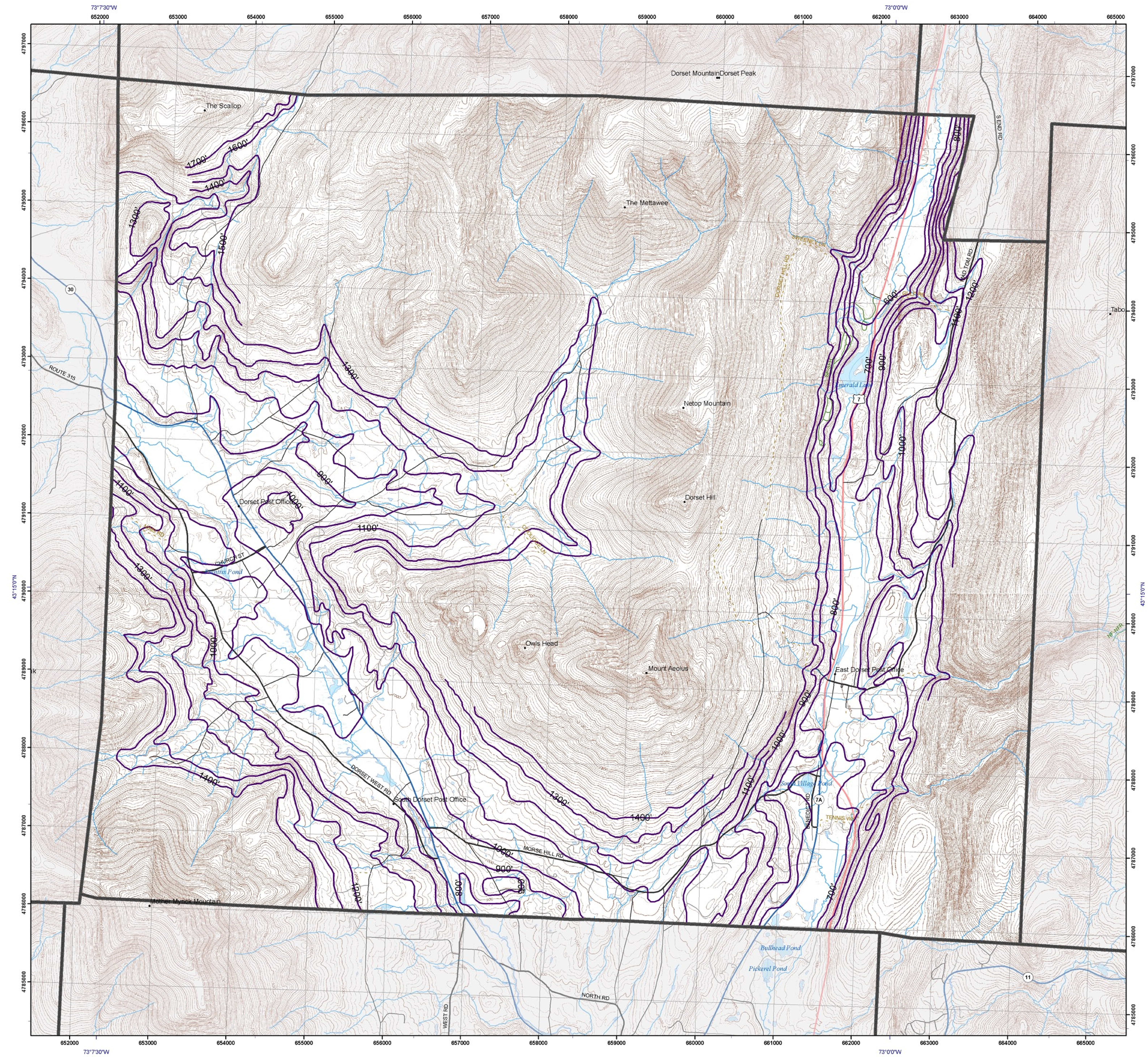
POTENTIOMETRIC SURFACE AND INFERRED GROUNDWATER FLOW LINES, DORSET, VERMONT

by
David De Simone and Marjorie Gale
2009

VERMONT GEOLOGICAL SURVEY

Vermont Geological Survey Open File Report VG09- 3
Bedrock Topography, Dorset, VT



Legend

Bedrock elevation; contour interval 100 feet

Rivers and streams

Town Boundary

Explanation

The map reveals pathways of the major preglacial valleys that coursed through town. The map was generated by subtracting the contoured overburden thicknesses from the surface elevations to determine the elevation of bedrock. These same elevation data exist as points in the well logs where the depth to bedrock was subtracted from the estimated elevation of the well head as interpreted from the topographic map.

The practical value of the bedrock topography map is that it can be used to discern the areas of thickest overburden but also to trace or track the deepest portion of the buried bedrock valleys through town. This may be valuable as the bottoms of the buried bedrock valleys may be sites where permeable overburden from the most recent or even from older glaciations may be preserved. Such permeable overburden, if present, would represent a potential aquifer resource.

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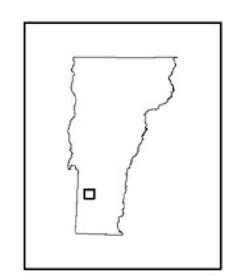

Published by:
Vermont Geological Survey
Laurence Becker, State Geologist
Department of Environmental Conservation
Agency of Natural Resources
103 South Main St., Logue Cottage
Waterbury, VT 05671-2420
http://www.anr.state.vt.us/dec/geo/vgs.htm

1:24,000

0 0.5 1 2 3 Miles

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Contour Interval 20 Feet

MN N

Magnetic declination
15.5 degrees west, 1968

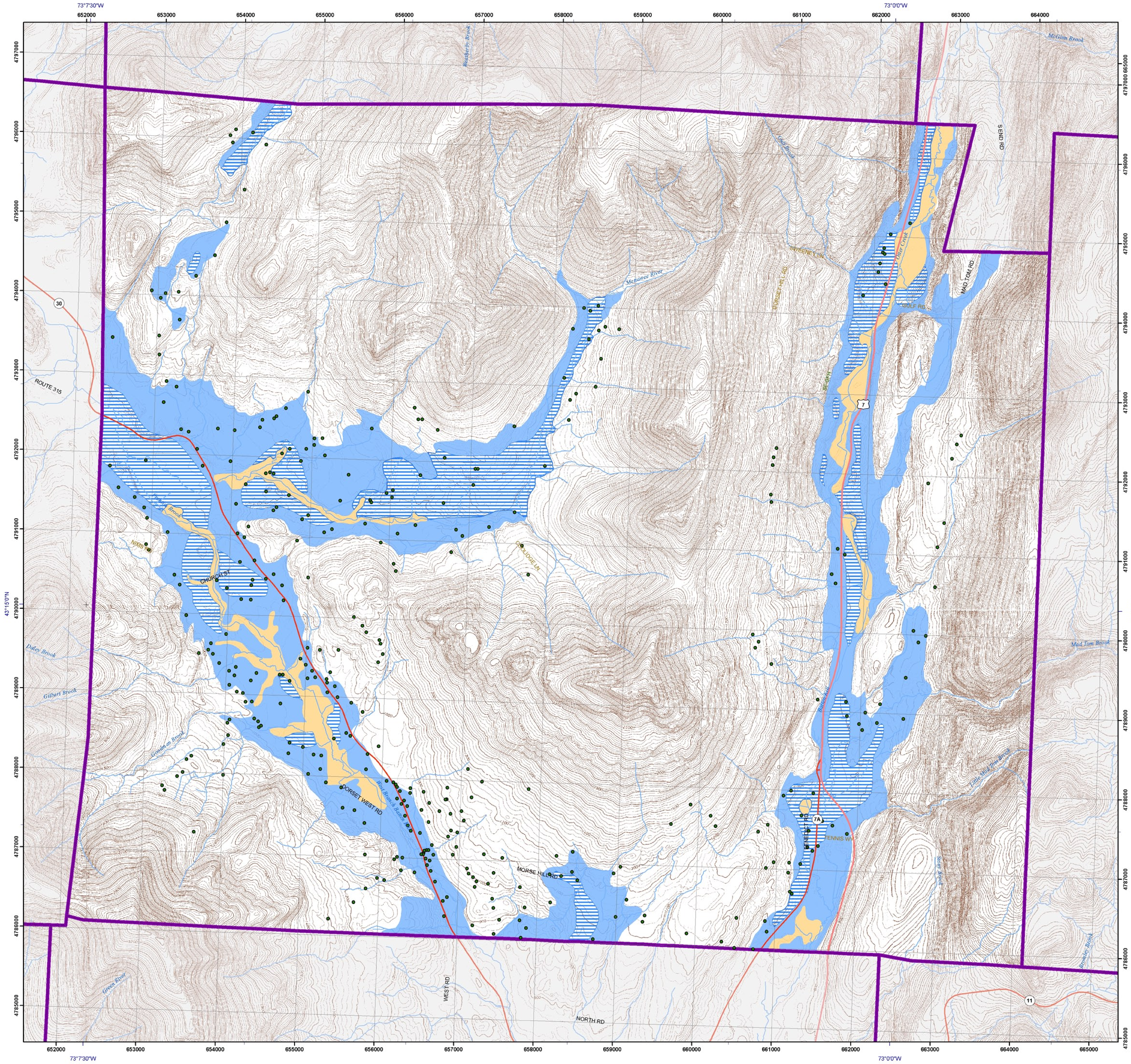
Base map from U.S. Geological Survey.
Quadrangle names printed in blue.
Coordinate System: Vermont State Plane, meters, NAD 83.
Geographic coordinates shown at topo corners are in NAD 83.
Grid overlay on map is Universal Transverse Mercator, Zone 18N, NAD 27.
Editing, digitization and cartography: M. Gale
Date: March 2009

BEDROCK TOPOGRAPHY, DORSET, VERMONT

by
David De Simone
2009

VERMONT GEOLOGICAL SURVEY

Vermont Geological Survey Open File Report VG09- 3
Shallow Aquifers, Dorset, VT



Legend

- Possible extent of viable shallow or unconfined overburden aquifers
- Areas of thickest permeable overburden (≥60ft) within the outline of the possible overburden aquifers. This indicates regions where there is the highest potential for a high yielding overburden well.
- Wetlands, ponds and stream aquifer discharge areas. These are topographically low surface portions of the overburden aquifer where the water table intersects the ground surface.
- Rivers and streams
- Water Well
- Town Boundary

Explanation

The map is based on an analysis of the surficial geology, water well logs and overburden thickness.

Recharge to the overburden aquifers apparently occurs by direct infiltration of precipitation through permeable deposits of gravel and sand.

However, the interaction between surface streams and the overburden aquifer can be more complex and may provide an additional source of recharge, indirect recharge, to the overburden aquifer. The higher flanks of the valleys with thin till and/or exposed rock may contribute to surface stream runoff in a significant way. When these streams spill out of the mountains and onto the valley floor, there may be a reach of the stream that crosses the permeable surficial deposits. Recharge by leakage of water through the beds of the streams is, thus, possible. Any given reach of a stream may be a place where water leaks from the streambed into the subsurface to recharge the shallow aquifer below.

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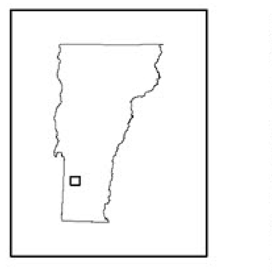

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Contour Interval 20 Feet

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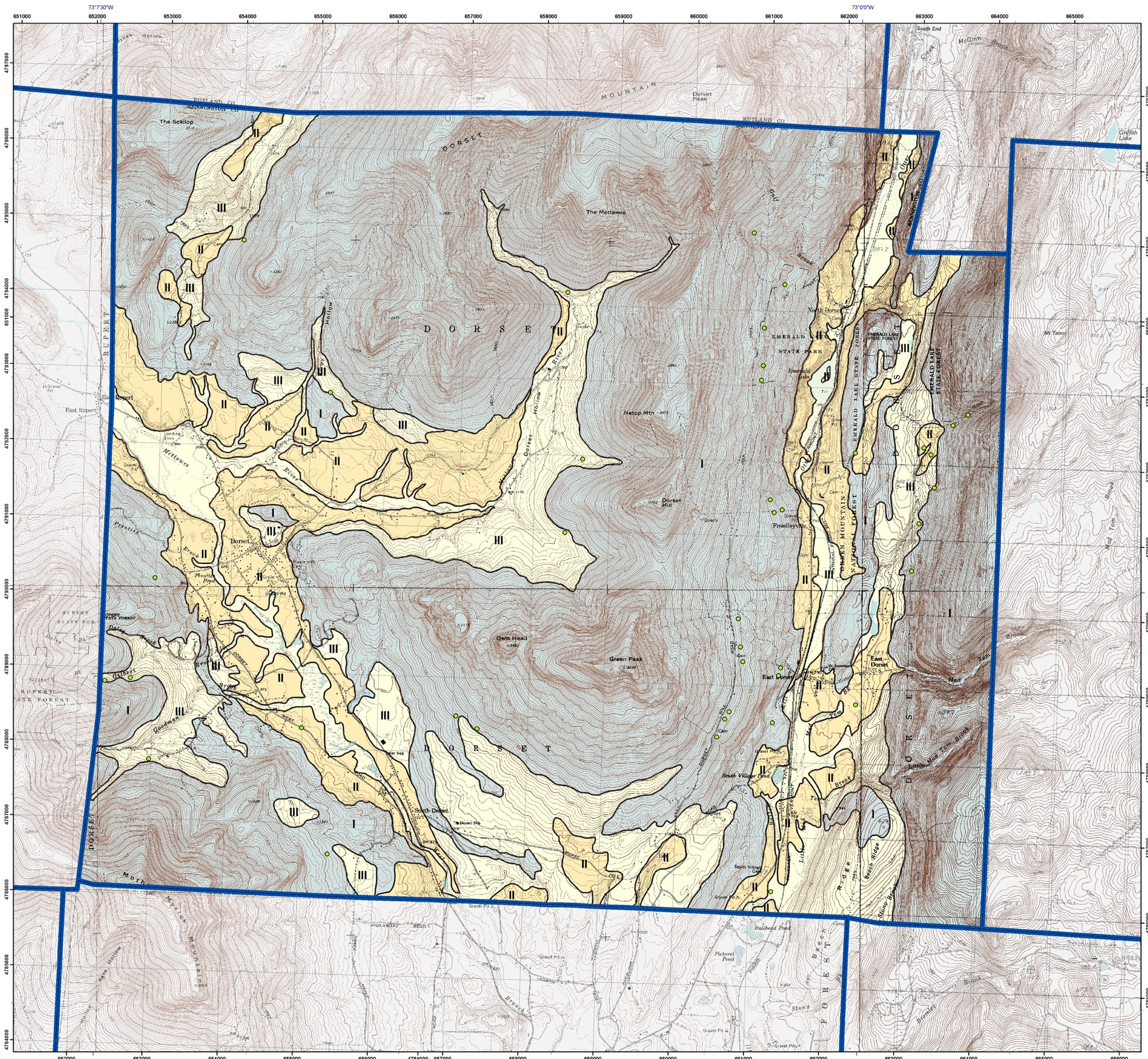
Digitization and Cartography by Marjorie Gale
Date: February 2009

DISCHARGE AREAS AND POSSIBLE SHALLOW AQUIFERS, DORSET, VERMONT

by
David De Simone
2009

VERMONT GEOLOGICAL SURVEY



Legend

RechargeType

I: HIGH
These are the high elevation areas, summit ridge lines and steep mountain flanks where the thin till veneer and rock outcrops enable some recharge into the underlying fractures and foliation of the rock.
Thin till areas in mountain regions offer little impedance to downward infiltration due to the weathered and relatively permeable shallow soils over bedrock.

II: MODERATE
These are the areas of ice contact, outwash and inwash sediments dominated by gravel and sand (KM, KT, K, >>>, OW, IW, IF on the surficial map). Areas of permeable surface sediment may be partly or wholly in contact with bedrock and this facilitates recharge of the bedrock aquifer.

III: LOW
Areas of impermeable thick till do not easily allow water to penetrate any deeper than the base of the soil profile. These occur along the lower mountain flanks in areas where there are no permeable surficial deposits and where thick till blankets lower valley ridges. Wetlands, typically places of ground water discharge to the surface, do not serve to recharge the underlying rock aquifer.

Town Boundary

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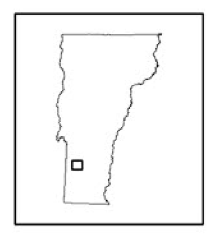

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Contour Interval 20 Feet

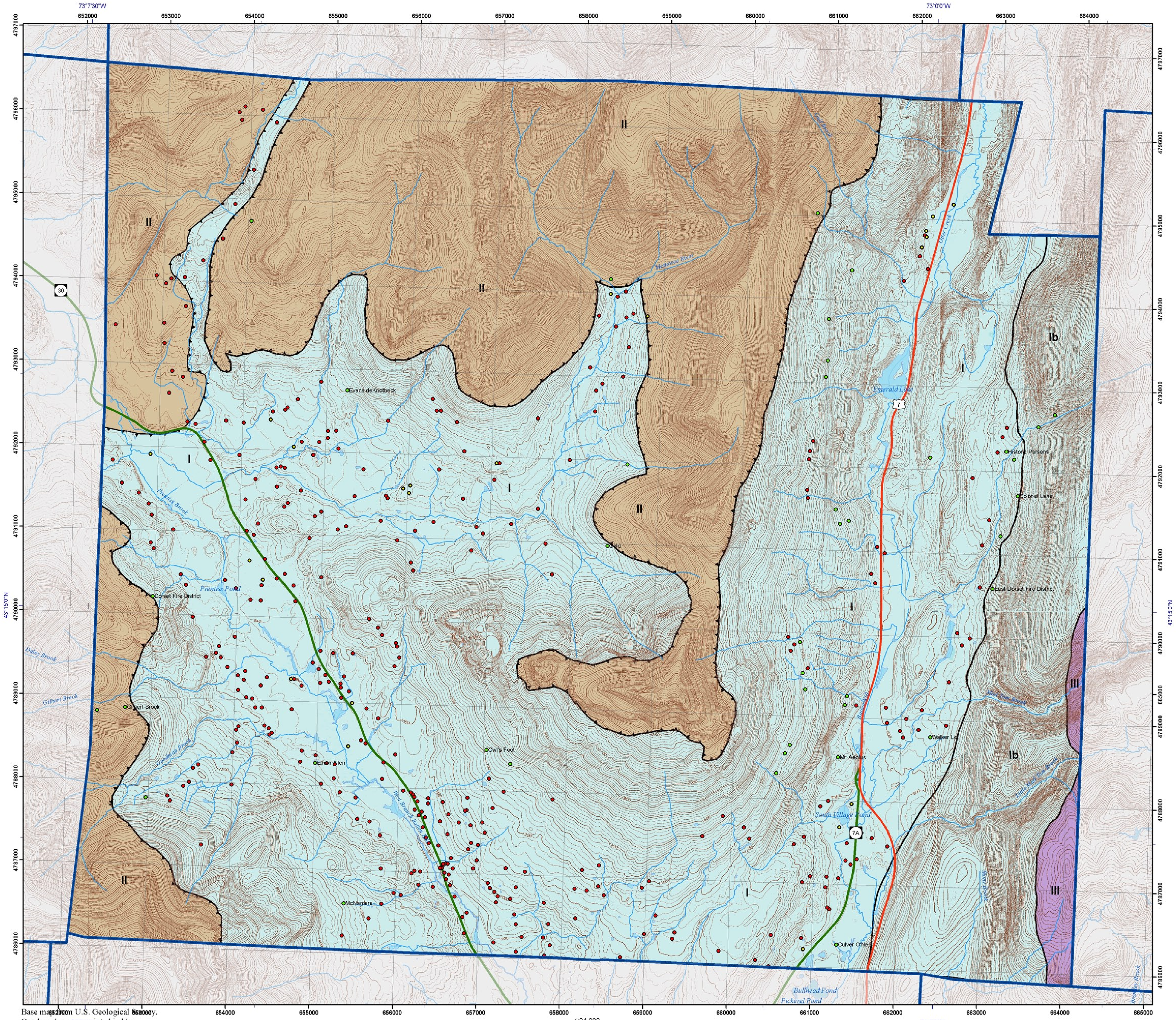
MN N
Magnetic declination
15.5 degrees west, 1968

RECHARGE POTENTIAL TO BEDROCK AQUIFER, DORSET, VERMONT

by
David De Simone
2009

VERMONT GEOLOGICAL SURVEY

Vermont Geological Survey Open File Report VG09- 3
Hydrogeologic Units, Dorset, VT



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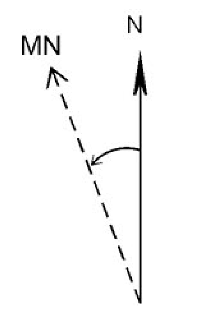
Contour Interval 20 Feet



Magnetic declination
15.5 degrees west, 1968

Legend

Bedrock Lithology and Well Yield

I & Ib — Champlain Valley Sequence
I - Carbonates (with some quartzites and conglomerates) of the Bascom, Shelburne, Clarendon Springs, Winooski, Dunham, Danby, Monkton, and Dalton Fms.;
Ib - mainly Cheshire quartzite
*290 wells - Mean yield: 21 gpm, Mean depth: 309'
Median yield: 10 gpm, Median depth: 280'

II — Taconic Sequence
Slate, phyllite, and carbonate of the St. Catherine and Brezee Formations.
*24 wells - Mean yield: 10 gpm, Mean depth: 424'
Median yield: 3 gpm, Median depth: 400'

III — Green Mountain Sequence
Gneiss of the My. Holly Fm.
*No wells

Fault - teeth on upper plate
Located bedrock wells
Located gravel wells
Springs and seeps

Town Boundary

Major Roads
Interstate Highway
US Highway
Vermont State Highway
Class 1 Town Highway

Explanation

The map portrays the distribution of major lithologic units in the town. Formation contacts are from Vermont Geological Survey Bulletin 30, Vermont Geological Survey Bulletin 18, and USGS digital data of the 1961 Cenntennial Geologic Map of Vermont, scale 1:250,000. Geology has been slightly modified based on field outcrops.

References:

Shumaker, R.C. and Thompson, J.B., Jr., 1967, Bedrock Geology of the Pawlet Quadrangle, Vermont: Vermont Geological Survey Bulletin 30, scale 1:62,500.

Hewitt, P.C., 1961, The Geology of the Equinox Quadrangle and Vicinity, Vermont: Vermont Geological Survey Bulletin 18, scale 1:62,500.

USGS Open-File Report 2006-1272: Preliminary Integrated Geologic Map Databases for the United States: Connecticut, Maine, Massachusetts, New Hampshire, Rhode island and Vermont
http://pubs.usgs.gov/of/2006/1272/

Champlain Valley Sequence -
The vast majority of Dorset wells, 290, tap into carbonate and quartzite of the Champlain Valley Sequence. The carbonate units are aerially extensive and cover the majority of the valley bottom and much of the valley slopes in town. Exposures of carbonate bedrock reveal that dissolution has resulted in high secondary porosity and permeability.
Karst terrain is exposed in a few locations and is inferred to be buried beneath the extensive cover of glacial deposits. The eastern margin of town where the flanks of the Green Mountains are underlain by quartzite or interbedded quartzite and conglomerate are sites where there are no well data. However, the quartzite produces relatively good well yields, as shown by work in Wallingford, Manchester and Arlington. In Dorset, the quartzite has springs and seeps issuing from the Green Mountains flanks.

Taconic Sequence -
The Taconic Sequence lithologies can be found in the mountains west of Dorset along the border with New York and in the Dorset Mountains in the central portion of town. The higher Taconic Mountains elevations are underlain by fine grained phyllite or similar rock. Mean well yields are relatively low (10 gpm). However, this rock does contribute recharge through its numerous fractures and foliation to the underlying rock units. The high elevations in these areas are underlain largely by a very thin veneer of till. The summit ridges and steep mountain flanks contain a veneer that may be only a foot or so thick. This thin till has weathered and become relatively permeable over time and the underlying rock readily weathers. The soils on areas of thin till with frequent rock outcrops allows water to infiltrate the shallow soil profile and some of this water can penetrate the weathered fractures and foliation in the phyllite and carbonate rocks found at the high Taconic elevations. Therefore, these areas represent good recharge zones.

Green Mountains -
The higher Green Mountains elevations are not unlike the Taconic Mountains in being thinly veneered with till and this till has weathered and allows water to infiltrate into the subsurface. The hard, dense lithologies of the higher Green Mountains east of the town boundary do allow water to infiltrate the fractures in the rock through the weathered till veneer. This likely contributes some of the recharge to the East Dorset Fire District springs, for example.

HYDROGEOLOGIC UNITS, DORSET, VERMONT

by
David De Simone and Marjorie Gale
2009

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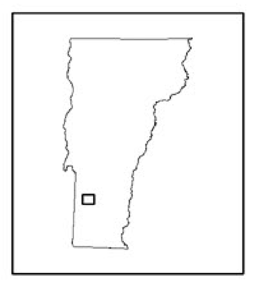

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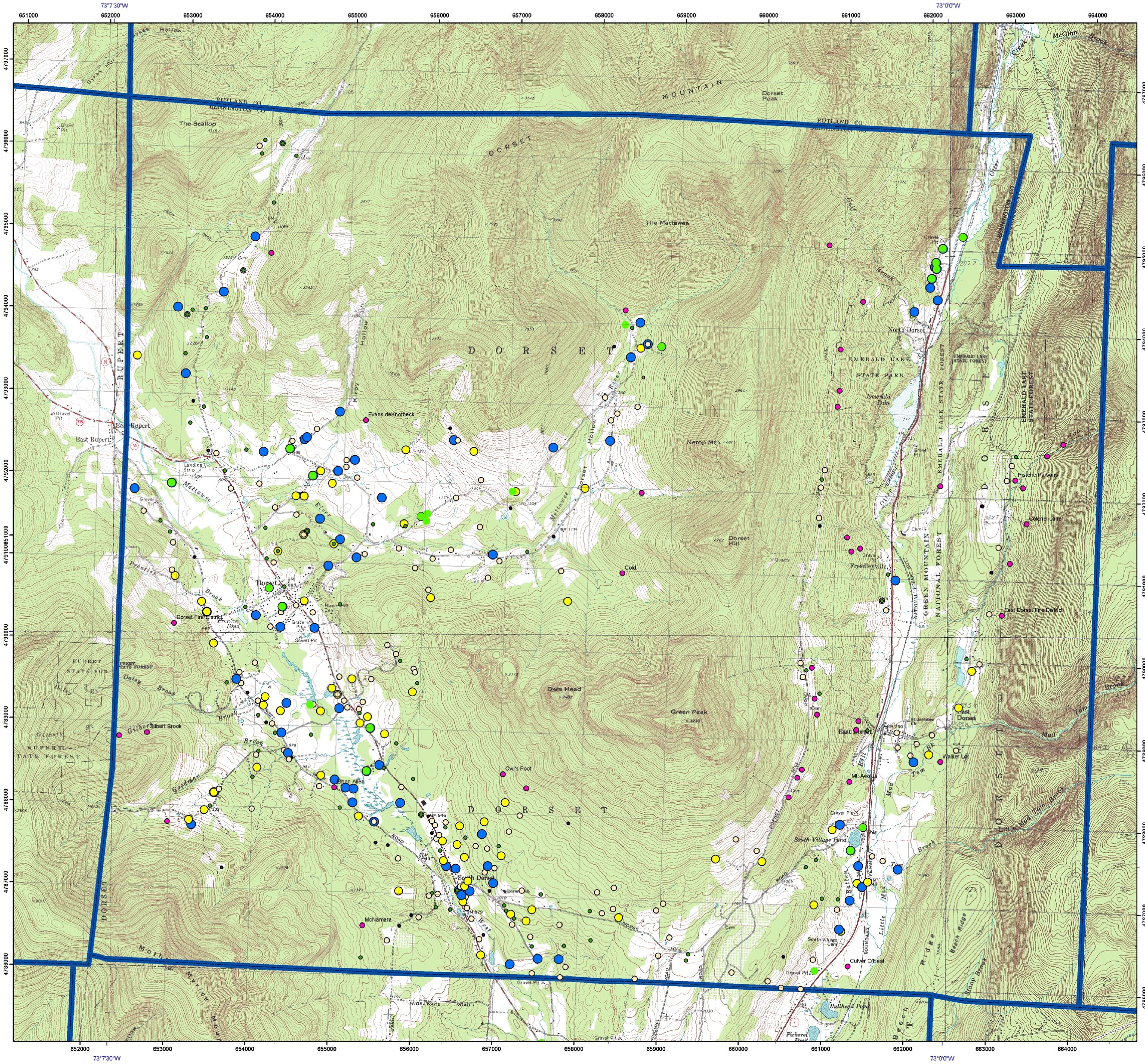
VERMONT GEOLOGICAL SURVEY

Vermont Geological Survey Open File Report VG09-3
Water Well Location Map



Legend

- Springs and seeps
- Gravel wells (located)

Bedrock wells (located) and reported yield (gpm)

- 0 - 1 gpm
- 1.1 - 5 gpm
- 5.1 - 20 gpm
- 20.1 - 40 gpm
- 40.1 - 250 gpm
- Town Boundary

EXPLANATION

Dorset well log data from VTDEC Water Supply Division were examined in order to assess the water source to the well, the nature of the overburden and to identify any errors in the dataset. Overburden wells were distinguished from bedrock wells. The data were amended for erroneous depth to bedrock input in the original dataset. Additional data were generated by determining the well elevation, water table elevation and bedrock elevation, all in feet above sea level. The elevation data were used to create the derivative maps. A total of 335 well records, matched to E911 addresses, were studied. Wells not linked to an E911 address were not used in this study.

21 overburden wells were identified from the 335 total wells in the dataset. The average yield of the 21 overburden wells is 43 GPM. The reported yield varied from 15 GPM to 100 GPM. The average overburden well depth is 111 ft with a range of 50 - 265 ft. 2 wells with reported depths and yields of 0 were not included in these calculations.

The vast majority of Dorset bedrock wells, 290, tap into rocks of the Champlain Valley sequence (CVS). The units are aerially extensive and cover the majority of the valley bottom and much of the valley slopes. The average yield of the 290 wells is 21 GPM with a range from 0 -250 GPM. The median yield is 10 GPM. The average CVS rock well is 309 ft deep and the range is 40 - 900 ft. The median depth is 280'.

24 bedrock wells were drilled into a fine grained metamorphic rock of the Taconic sequence. The rock is variously called phyllite, slate, schist or shale in the drillers logs. The average yield of the 24 Taconic sequence wells is 10 GPM with a range of 0-50 GPM. The median yield is 3 GPM. Wells in Taconic sequence tend to be deep with an average depth of 423 ft and a depth range of 140-800ft. The median depth is 400'.

Ochre is a weathered material resting atop bedrock and there are scattered places where the advancing glacier apparently did not remove all of the old weathered material and there is ochre preserved beneath till. Only 4 wells were identified to have a water source in the ochre. These wells have an average yield of 11.3GPM. The average depth drilled is 177 ft. and the depth range is 85-400 ft.

No located wells tapped gneiss or granite bedrock typical of the Green Mountains summit region. However, on a statewide basis, wells in the quartzite of the Mt. Holly formation have a mean yield of 13 GPM and a mean depth 320 ft.

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Digital Cartography by Marjorie Gale
Date: Feb. 2009

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Contour Interval 20 Feet

MN N

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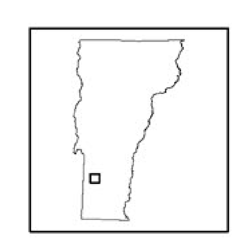

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WATER WELL LOCATION MAP, DORSET, VERMONT

The Water Well Location Project is a joint project of the Vermont Geological Survey, the DEC Water Supply Division and ANR GIS

VERMONT GEOLOGICAL SURVEY