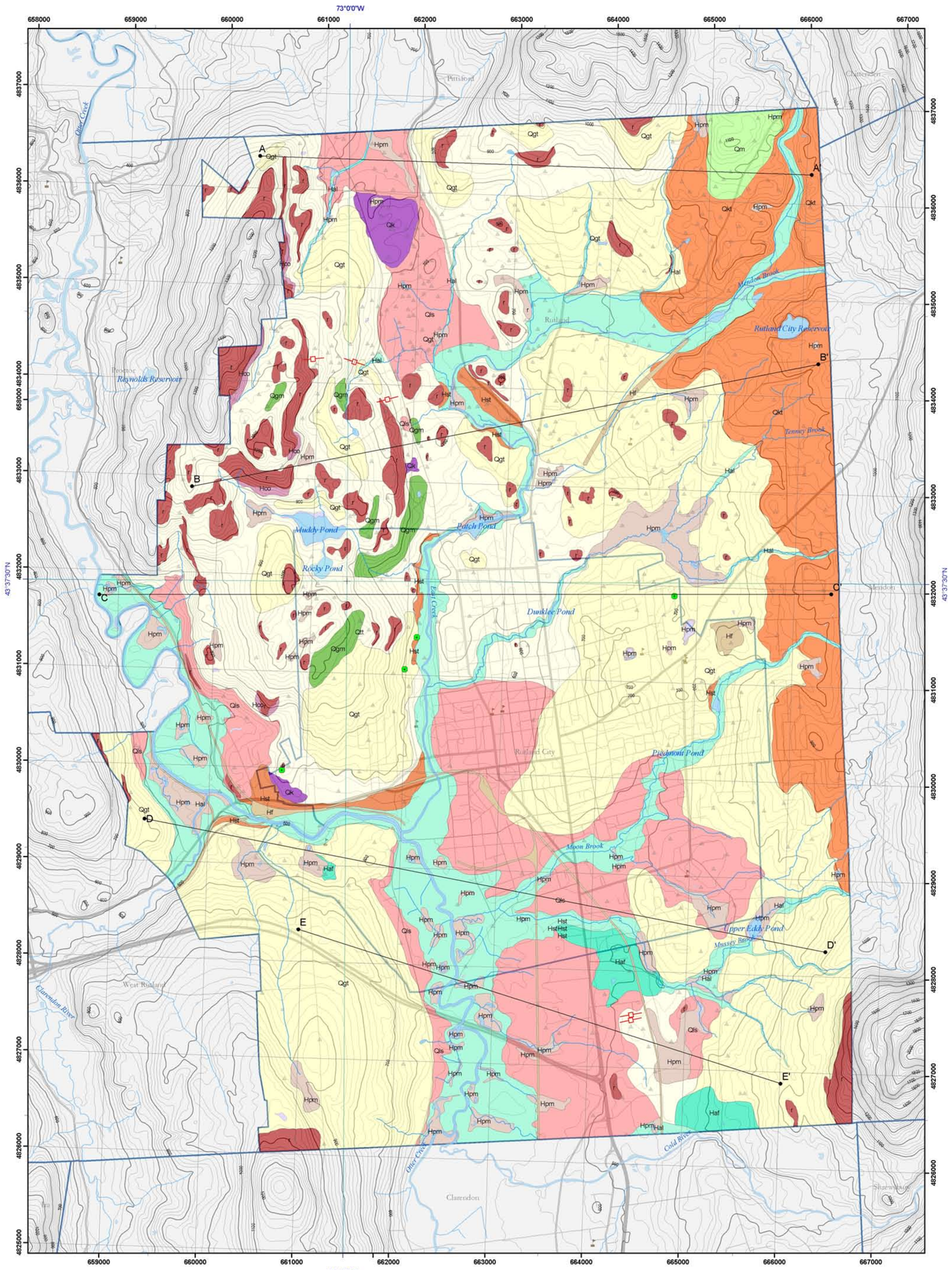

The 20ft contours (Statewide extent) were generated using the VT's "Hydrologically Corrected" Digital Elevation Model (VTHYDRODEM) available through vcgi.org. The Hydro digital elevation model was processed using Spatial Analyst's focal statistics tool to smooth the dataset. Coordinate System: Vermont State Plane, meters, NAD 83. Grid overlay on map is Universal Transverse Mercator, Zone 18N, NAD 27.
Digital Cartography by John Van Hoesen and Marjorie Gale
Date: September 2009

SCALE 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

OPEN FILE REPORT VG09-7-
SURFICIAL GEOLOGIC MAP OF RUTLAND, VERMONT

by
John Van Hoesen
2009

Legend

Description of Map Units

Holocene

Hf — Fill: unsorted, artificial material found along railways, power lines and town aqueduct routes.

Haf — Alluvial Fan: well-sorted, well-stratified, laterally extensive stream deposits composed of silty/clay/sand and pebbly sand in places. Common in moderately sloping topography along eastern margin of valley walls.

Hal — Alluvium: well-sorted, well-stratified, fluvial deposits adjacent to or in stream channels, sand/silt/pebbles/cobbles coarsening towards the uplands. Variable extent depending on location in field area – deposits can be limited to floodplain or cover locally extensive lowlands.

Hco — Colluvium: unconsolidated, unsorted pebbles/cobbles found exclusively in the western uplands at the base of steep, weathered cliffs.

Hpm — Wetland/Peat: well-sorted, well-stratified silt/clay deposits associated with concave topography lacking drainage. Predominantly occurs in low-lying valley, however some deposits occur in steeper uplands settings.

Hst — Fluvial Terraces: well-sorted, well-stratified and/silt/pebbles/cobbles that represent historical floodplain sediments dissected by modern streams.

Quaternary

Qm — Moraine: poorly-sorted, poorly-stratified ice-derived sediment composed of clay/sand/pebbles/boulders coating prominent north-south ridge.

Qgm — Ground Moraine: poorly-sorted, weakly-stratified medium to very coarse sandy till characterized by hummocky topography and deep orange oxidation. Primarily found in the uplands with rare occurrences in the valley bottom.

Qk — Kame: moderately-sorted, well-stratified and rounded to sub-rounded sand/silt/pebbles representing an ice contact deposit and exhibiting topographic reversal and irregular topography.

Qkt — Kame Terrace: moderately-sorted, well-stratified sand/silt/pebbles/cobbles representing an ice contact deposit, exhibiting steep marginal slopes, flat lying topography within irregularly shaped landforms.

Qls — Lacustrine Sediments: well-sorted, well-stratified silt/sand lake deposits that delineate flat lying topography in the valley bottom; thinner and less extensive in the northern part of town

Qtt — Thin Till: thin (3m), unsorted, poorly-stratified silty/clay till, characterized by frequent bedrock exposure, few cobbles/boulders of varying lithology, with rare rock walls and rock piles and deposits that mimic topography.

Qgt — Till: unsorted, poorly-stratified silty/clay till containing common pebbles/cobbles/boulders of varying lithology, predominantly found on gently sloping, often streamlined hills with common rock walls and rock piles.

Paleozoic

r — Rock outcrop

Description of Map Symbols

- Striations
- Erratics
- Field Sites
- Cross-section line
- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary

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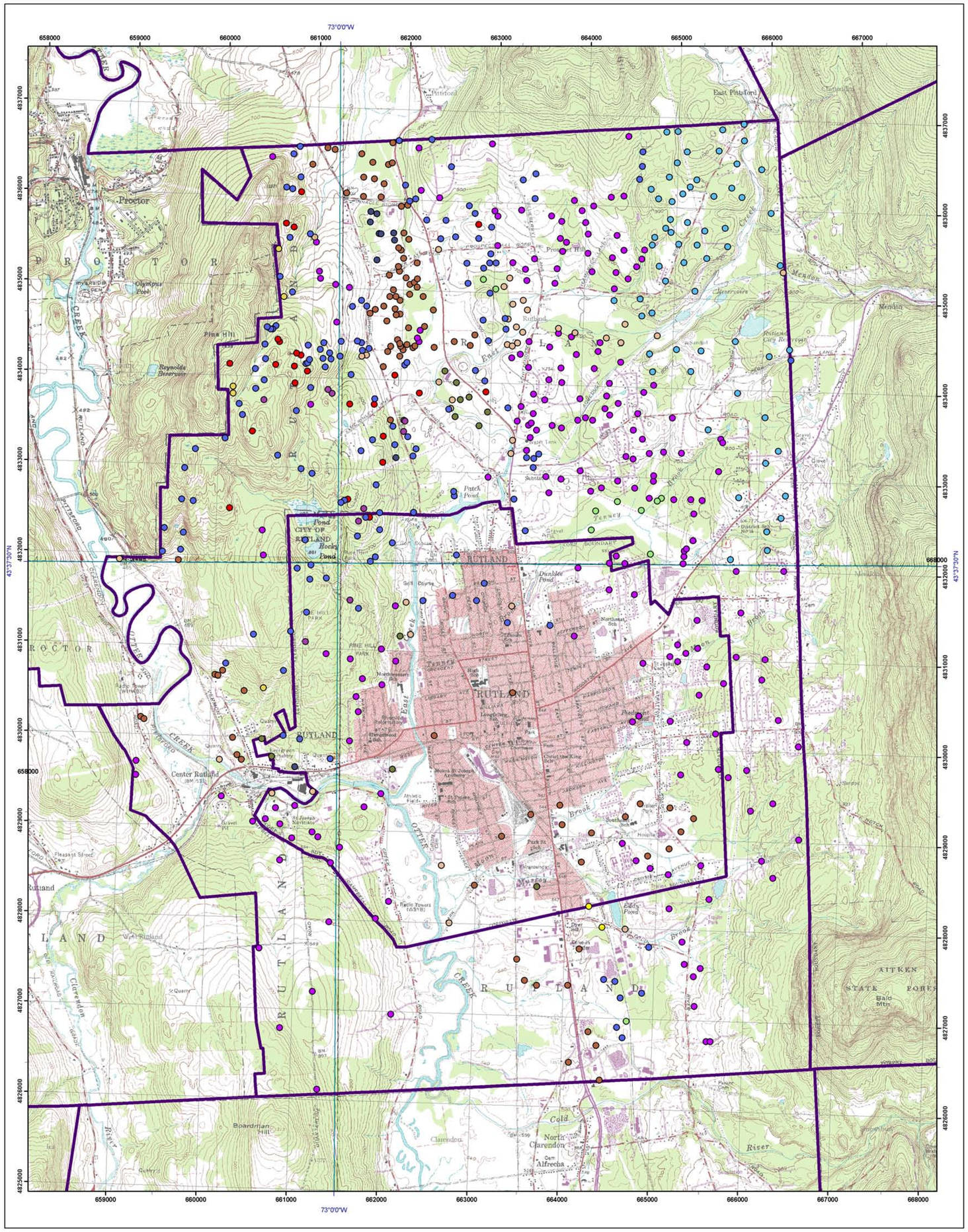
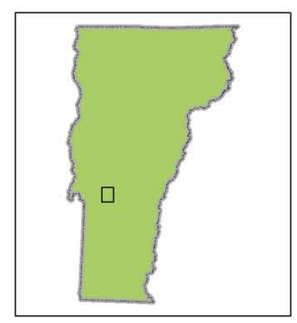


Legend

Field Station Sites and Lithology

- Haf - alluvial fan
- Hal - alluvium
- Hco - colluvium
- Hpm - peat and muck
- Hst - stream terrace
- Qgm - ground moraine
- Qls - lacustrine
- Qk - kame
- Qkt - kame terrace
- Qgt - glacial till
- Qtt - thin till
- r - rock

- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary



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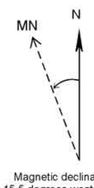
Date: January 2010

SCALE 1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet



Magnetic declination
15.5 degrees west, 1968

OPEN FILE REPORT VG09-7-
FIELD SITES AND LITHOLOGY, RUTLAND, VERMONT

by
John Van Hoesen
2009

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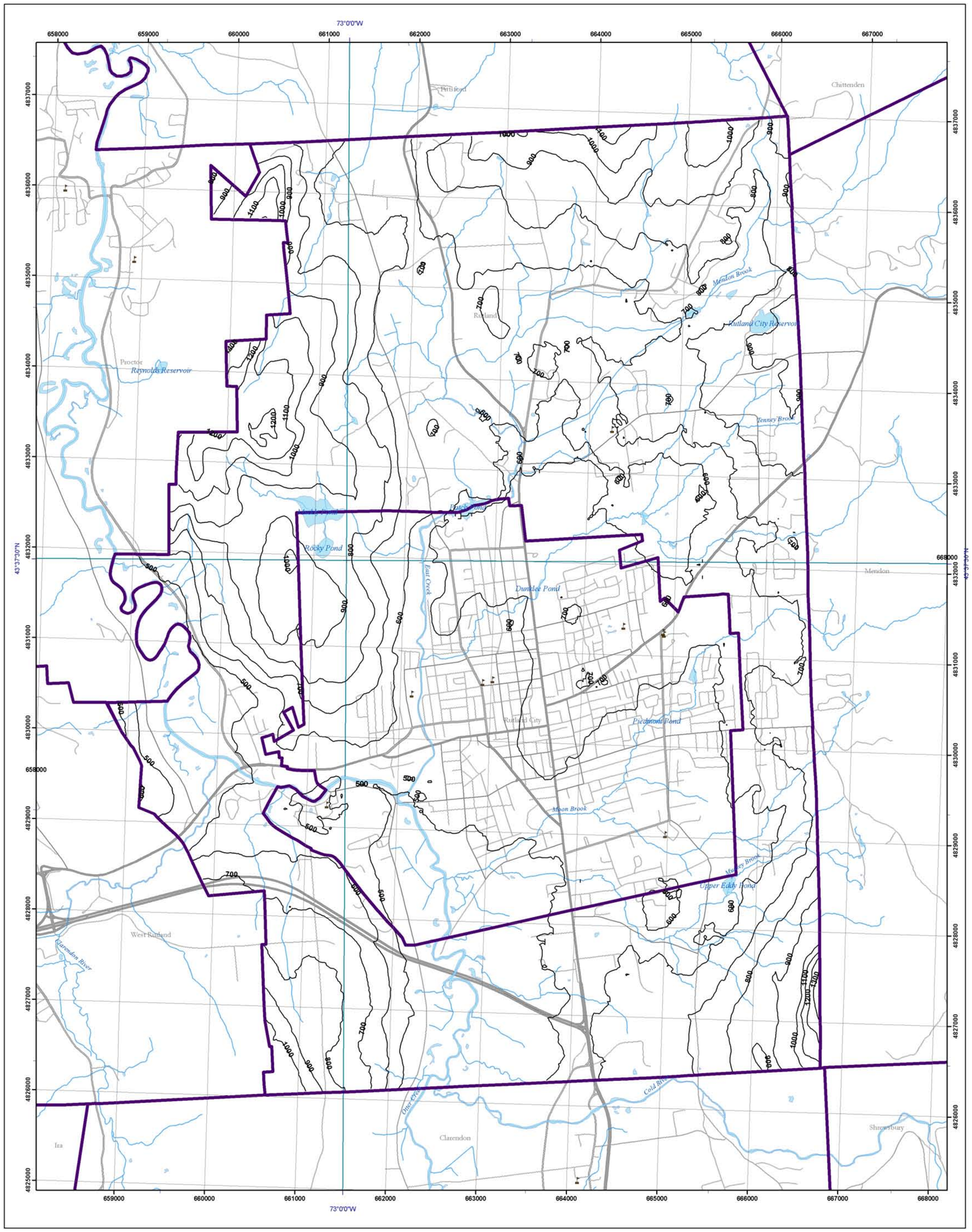
Vermont Geological Survey Open File Report VG09-7



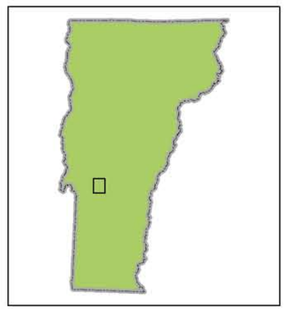
Legend

- Bedrock Contours (100 ft)
- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary

Explanation

This map was created using GPS locations of exposed bedrock and well location data, which contain a single measurement of overburden. The extent of overburden for the whole town was extrapolated from these data and used to create an isopach layer (see Rutland isopach map).

This layer was subtracted from a 30-meter digital elevation model of Rutland to produce this final map depicting bedrock topography.



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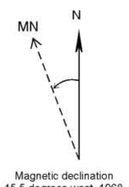
Digital Cartography by John Van Hoesen and Marjorie Gale
Date: January 2010

SCALE 1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet

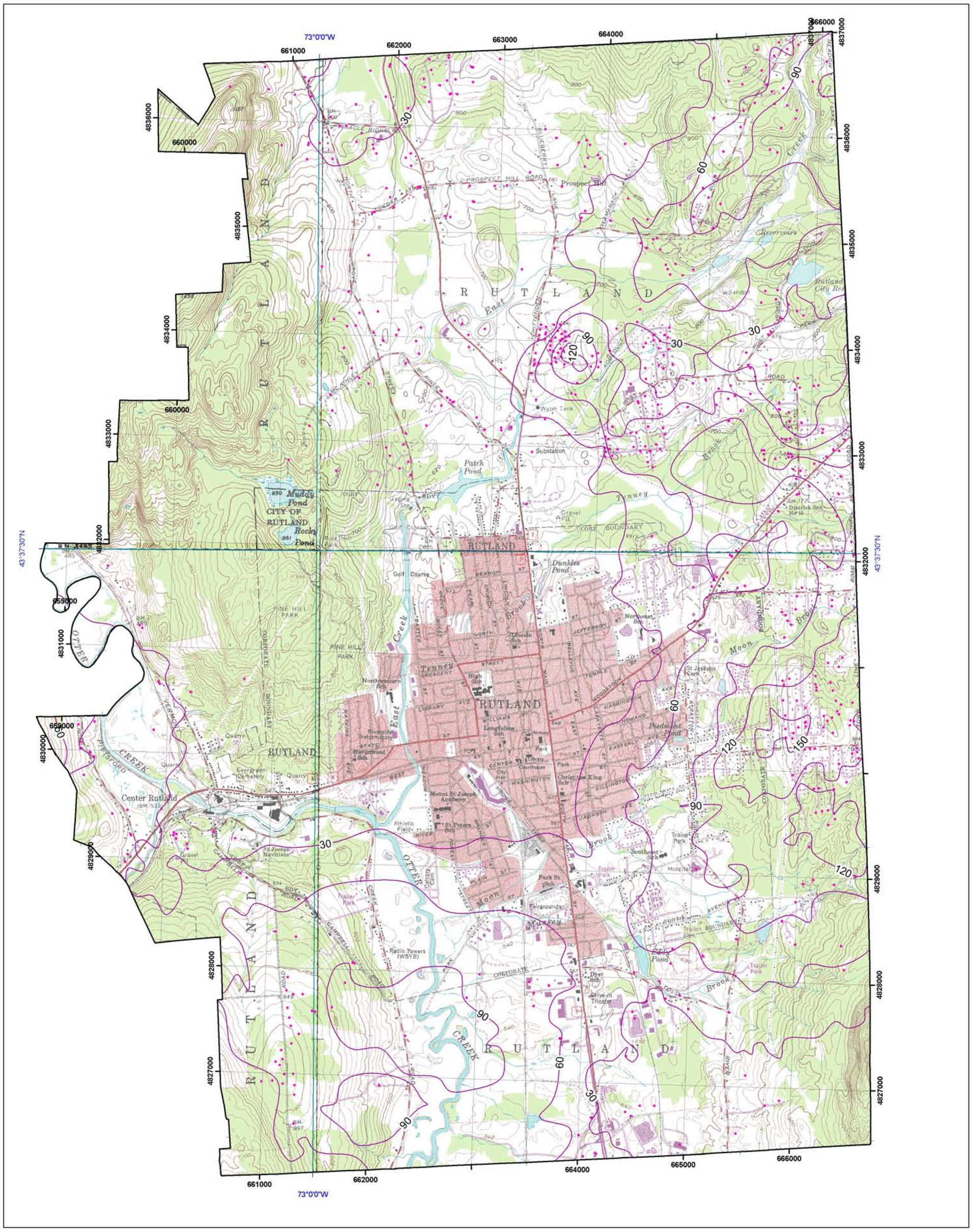


Magnetic declination
15.5 degrees west, 1968

OPEN FILE REPORT VG09-7-
BEDROCK TOPOGRAPHY, RUTLAND, VERMONT

by
John Van Hoesen
2009

VERMONT GEOLOGICAL SURVEY, Division of Geology and Mineral Resources, VT DEC, Waterbury, VT



Legend

- Depth to bedrock, contour interval 30 feet
- Located water well log
- USGS Quadrangle Boundary

USGS 7.5 minute quadrangle basemap.
Coordinate System: Vermont State Plane, meters, NAD 83.
Grid overlay on map is Universal Transverse Mercator, Zone 18N, NAD 83.
Digital Cartography by John Van Hoesen and Marjorie Gale
Date: September 2009

SCALE 1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 3 Kilometers

Contour Interval 20 Feet

MN N

Magnetic declination
15.5 degrees west, 1968

OPEN FILE REPORT - DEPTH TO BEDROCK, RUTLAND, VERMONT

by
John Van Hoesen
2009

Location Map

Published by:
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Recharge Potential to Shallow Aquifers, Rutland, Vermont

Legend

Recharge Potential

- I - Highest
- II - High
- III - Moderate
- IV - Low
- V - Lowest
- Shallow Aquifer

Explanation

Type I = thick deposits of ice contact sediment; primarily kame and kame terrace.

Type II = thinner ice contact deposits, fluvial terraces, and alluvium mantling the valley floor.

Type III = deposits of ground moraine, sporadic ice contact deposits on the valley walls, and alluvial fans.

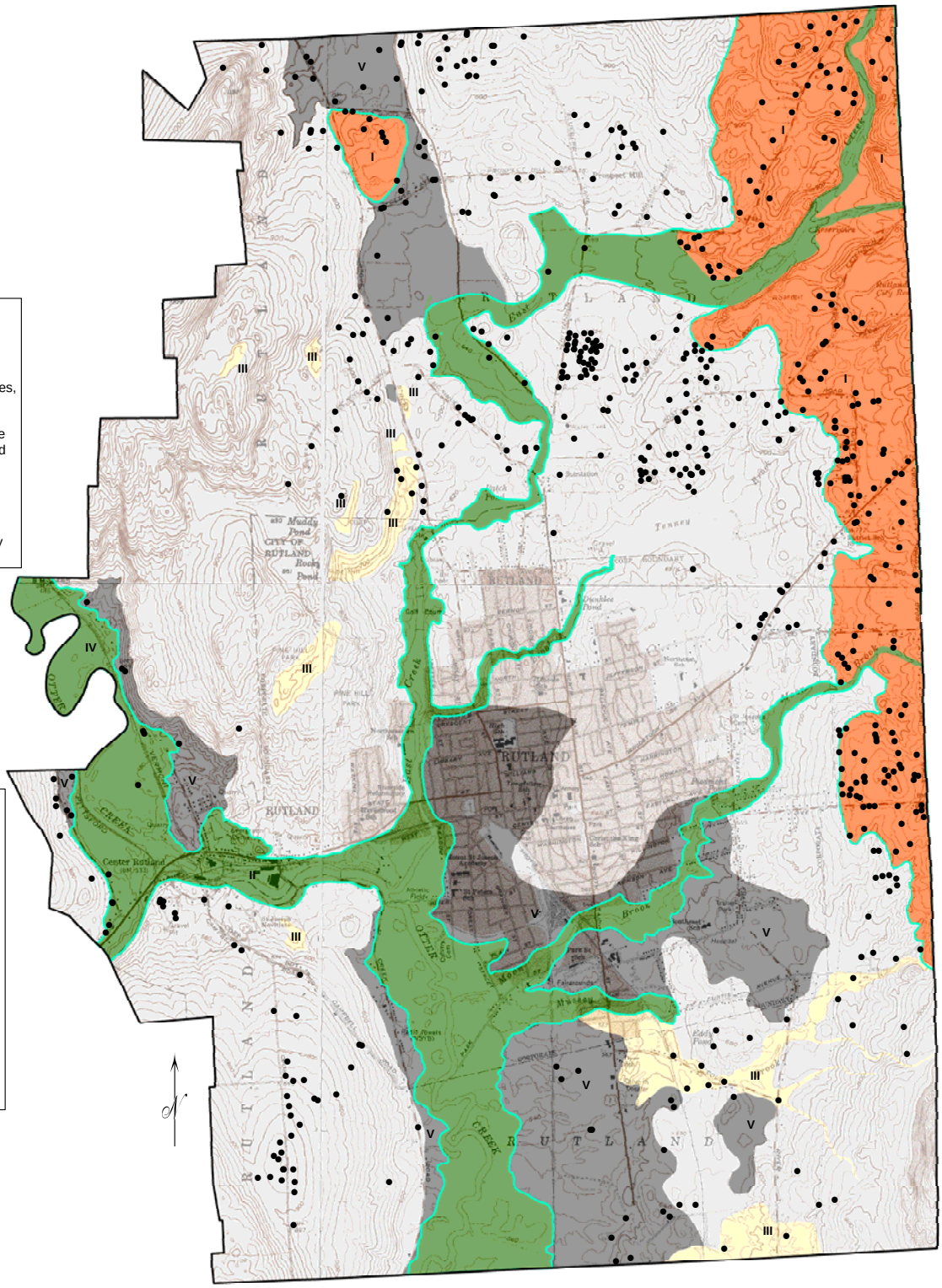
Type IV = areas dominated by wetlands and surface waters.

Type V = areas covered by glacial till and silty/clay lacustrine sediment.

Explanation

Regions of unconsolidated sediment with high porosity and permeability, typically some mixture of sands and gravels, were identified as areas capable of supporting an unconfined shallow aquifer. These aquifers experience recharge through infiltration following precipitation events, melting snow, and losing streams reaches.

These areas were ranked based on their potential for infiltration after looking at well log data, surficial geology and geomorphic position. Those areas with the thickest and most permeable deposits were given the highest ranking (e.g. – extensive ice contact sediments) and those areas covered by thinner less permeable deposits were given a lower ranking (e.g. – thin till and clay-rich lacustrine sediments).

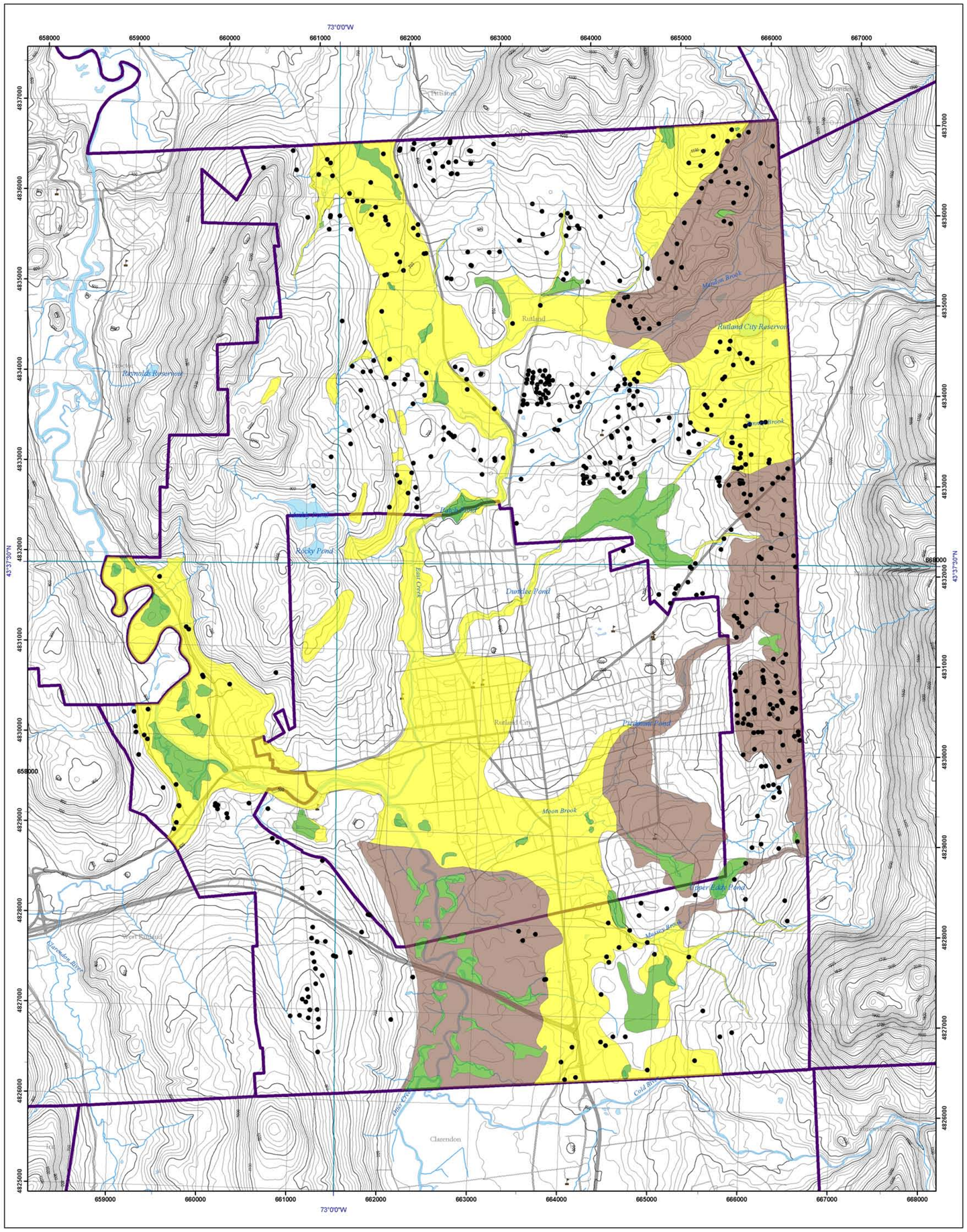


Map Scale = 1:24,000

0 0.15 0.3 0.6 0.9 1.2 Miles

0 0.5 1 Kilometers

Vermont Geological Survey Open File Report VG09-7



Legend

- Well Locations
- A: potential locations of shallow overburden aquifers.
- B: areas covered by >60 feet of permeable overburden that have the potential to contain a high yielding well.
- D: represents potential locations where the water table intersects the surface. Typically wetlands, ponds, and streams.
- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary

This map was created using water well data, surficial geology, and the isopach map. The map depicts areas with the potential to support shallow aquifers. However, the efficacy of recharge through surface runoff and infiltration is dependent on many variables, There are likely stream reaches that provide additional recharge capacity, but identifying graining and losing reaches was beyond the scope of this study.

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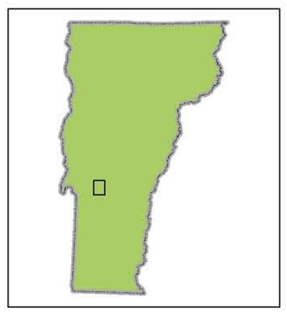

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Date: January 2010

SCALE 1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet

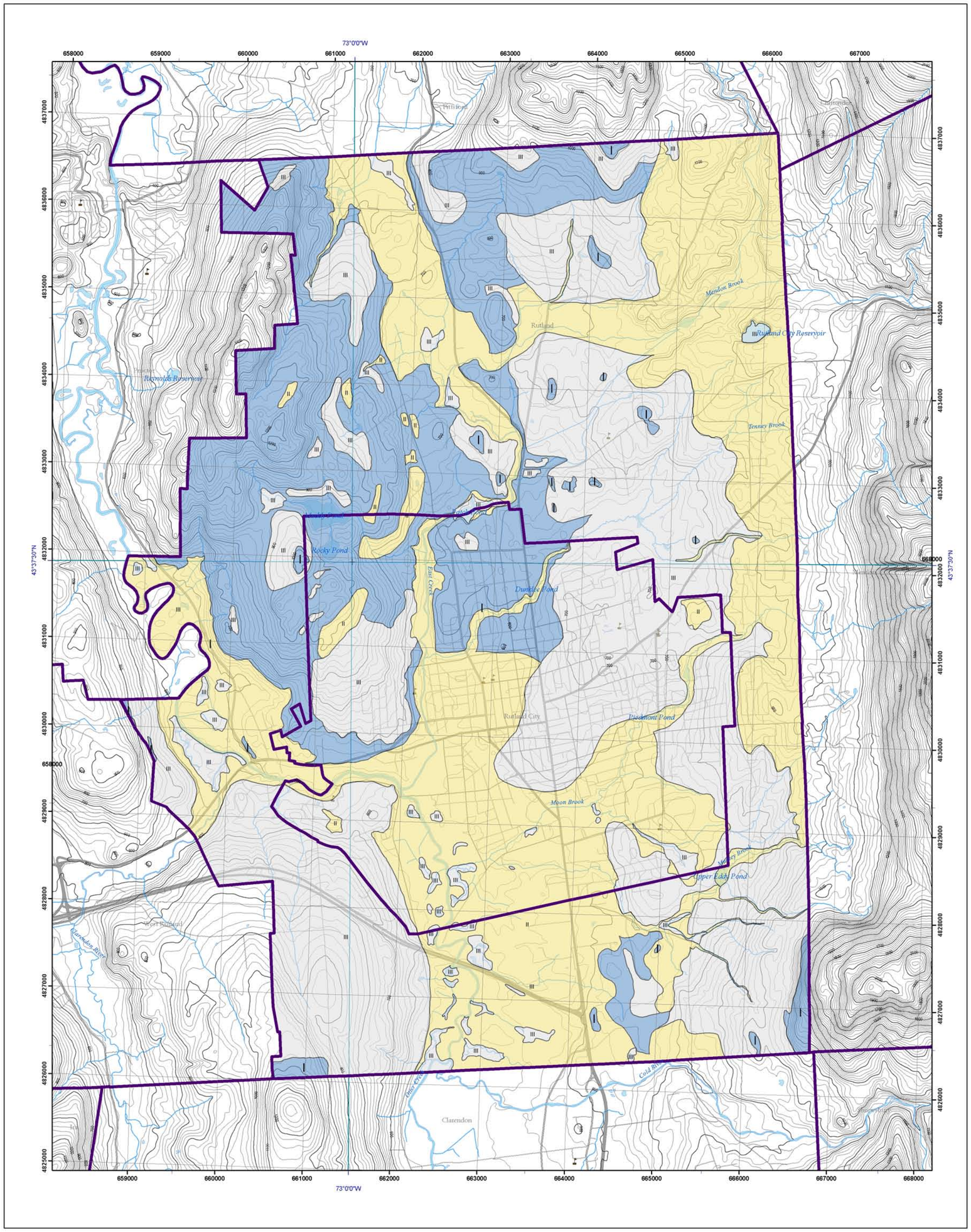
MN N

Magnetic declination 15.5 degrees west, 1968

VERMONT
AGENCY OF NATURAL RESOURCES
Vermont Geological Survey

OPEN FILE REPORT VG09-7-
DISCHARGE AREAS AND POTENTIAL SHALLOW AQUIFERS, RUTLAND, VERMONT

by
John Van Hoesen
2009



Legend

- I - High Recharge: Primarily located in highlands dominated by thin till and frequent bedrock outcropping.
- II - Moderate Recharge: Characterized by unconsolidated sediment derived from fluvial and glaciofluvial processes; primarily located within and along valleys walls.
- III - Low Recharge: Characterized by impermeable thick, compacted till, and wetlands.
- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary

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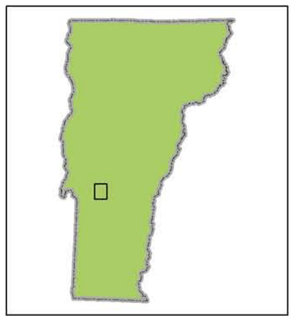

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0 0.5 1 2 Miles

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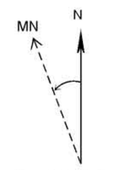

Magnetic declination
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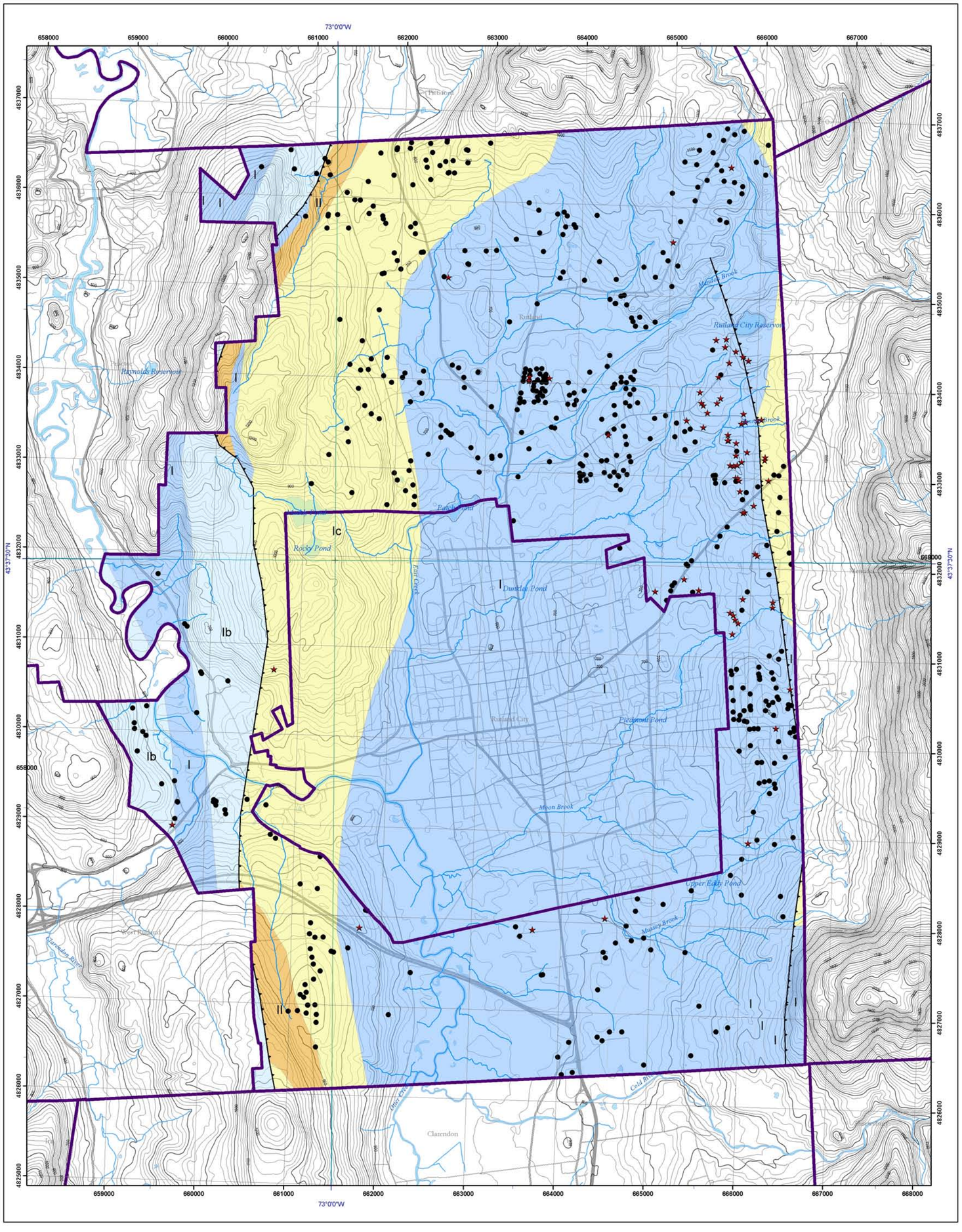
OPEN FILE REPORT VG09-7-
RECHARGE POTENTIAL TO BEDROCK AQUIFER, RUTLAND, VERMONT

by
John Van Hoesen
2009

VERMONT GEOLOGICAL SURVEY, Division of Geology and Mineral Resources, VT DEC, Waterbury, VT

Vermont Geological Survey Open File Report VG09-7



Legend

- Bedrock Well (n = 483)
- Gravel Well (n = 69)
- Faults

I - Champlain Valley Sequence: n=343): include exposures of carbonates, quartzite, and conglomerates within the Shelburne, Danby,Winooski, Monkton, Dunham, and Dalton Fms.
mean yield = 22gpm, mean depth = 303'
median yield = 10gpm, median depth = 265'

Ib - Champlain Valley Sequence: (n=21): exposures of slate and phyllite within the Hortonville Formation.
mean yield = 14gpm, mean depth = 338'
median yield = 5gpm, median depth = 303'

Ic - Champlain Valley Sequence: (n=113): exposures of Cheshire Quartzite
mean yield = 15gpm, mean depth = 231'
median yield = 10gpm, median depth = 222'

II- Green Mountain Sequence: (n=6): biotite gneiss of the Mt Holly Complex
mean yield = 29gpm, mean depth = 367'
median yield = 17gpm, median depth = 370'

- Water
- Roads
- Buildings
- USGS 7.5 minute Quadrangle Boundary
- Town Boundary

This map depicts the spatial distribution of distinguishable lithologic units within the town boundary. Units were extracted from data digitized by Nicholson et al. (2006) based on the 1961 Centennial Geologic Map.

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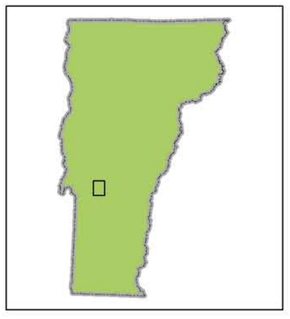

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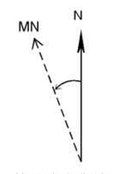
SCALE 1:24,000
0 0.5 1 2 Miles
0 0.5 1 2 Kilometers
Contour Interval 20 Feet



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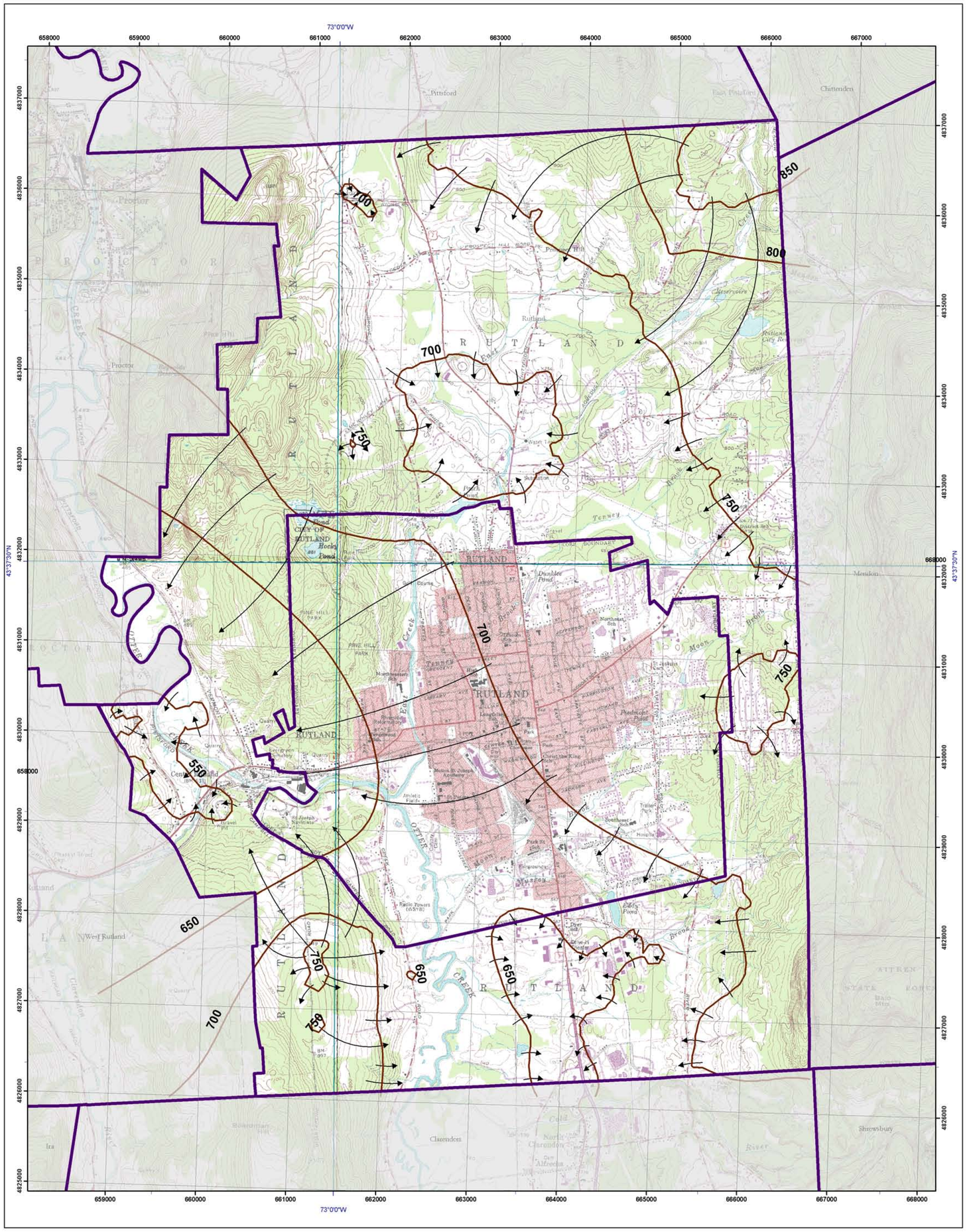
HYDROGEOLOGIC UNITS, RUTLAND, VERMONT

by
John Van Hoesen
2009

VERMONT GEOLOGICAL SURVEY, Division of Geology and Mineral Resources, VT DEC, Waterbury, VT



Legend

→ Generalized Direction of Groundwater Flow

Potentiometric Contours (50')

Explanation

This map depicts 50 foot contours extracted from the underlying potentiometric surface. Both of these data layers rely on the static level of water within wells drilled throughout Rutland Town. The contours are widely spaced and some level of uncertainty exists in the inferred flow direction in some areas of the map. However, the general trend of flowing east to west and northeast to southwest is readily apparent.

Groundwater flow lines are indicators of potential flow down hydraulic gradient within an aquifer. Therefore, it is important to note that water levels do not represent the actual height of the water table.

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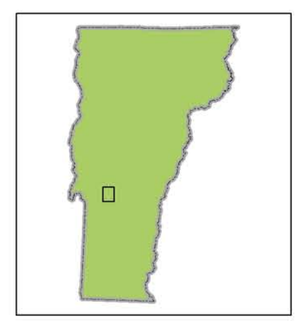

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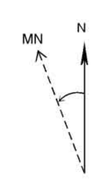
SCALE 1:24,000

0 0.5 1 2 Miles

0 0.5 1 2 Kilometers

Contour Interval 20 Feet



Magnetic declination
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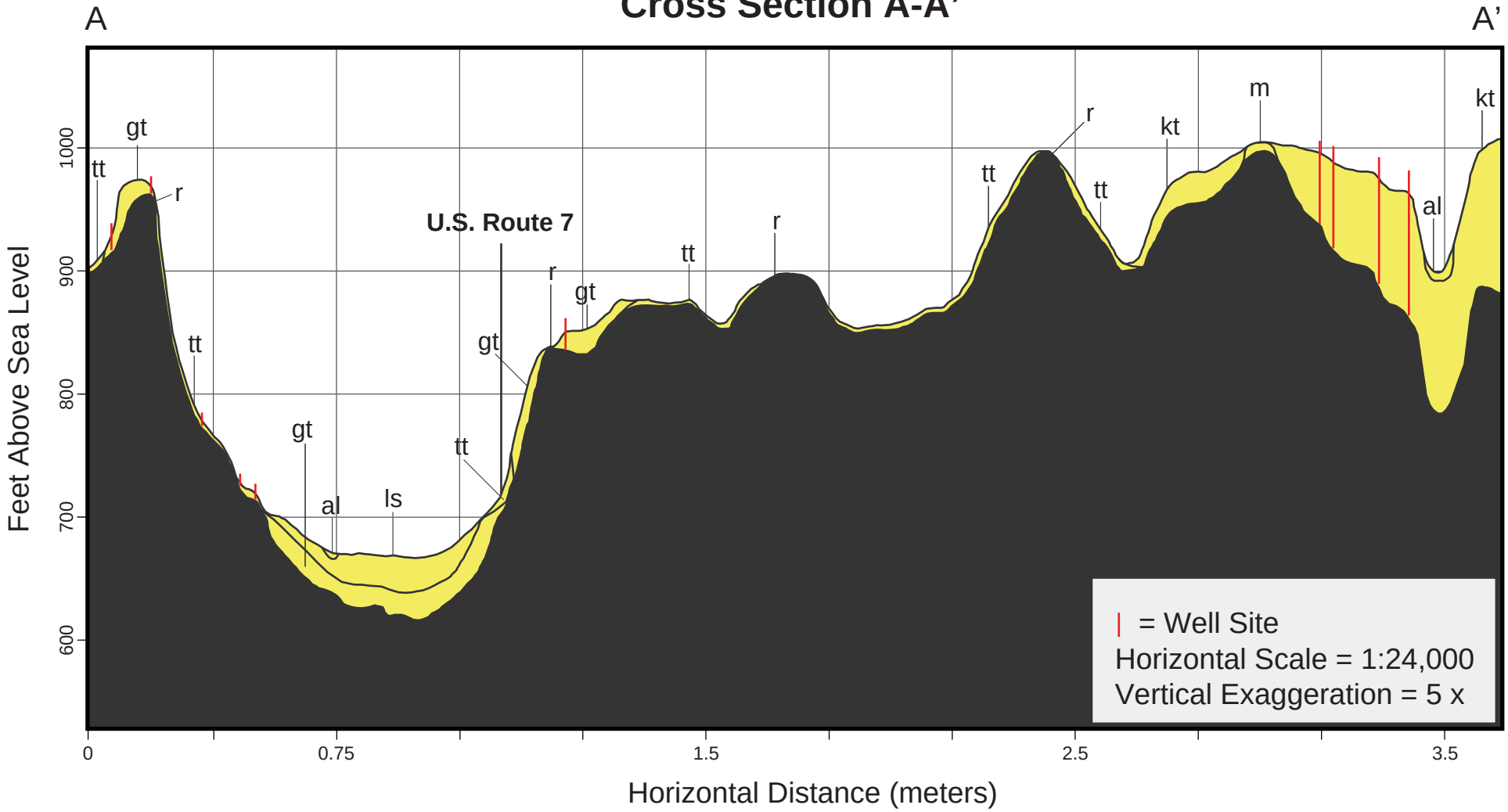
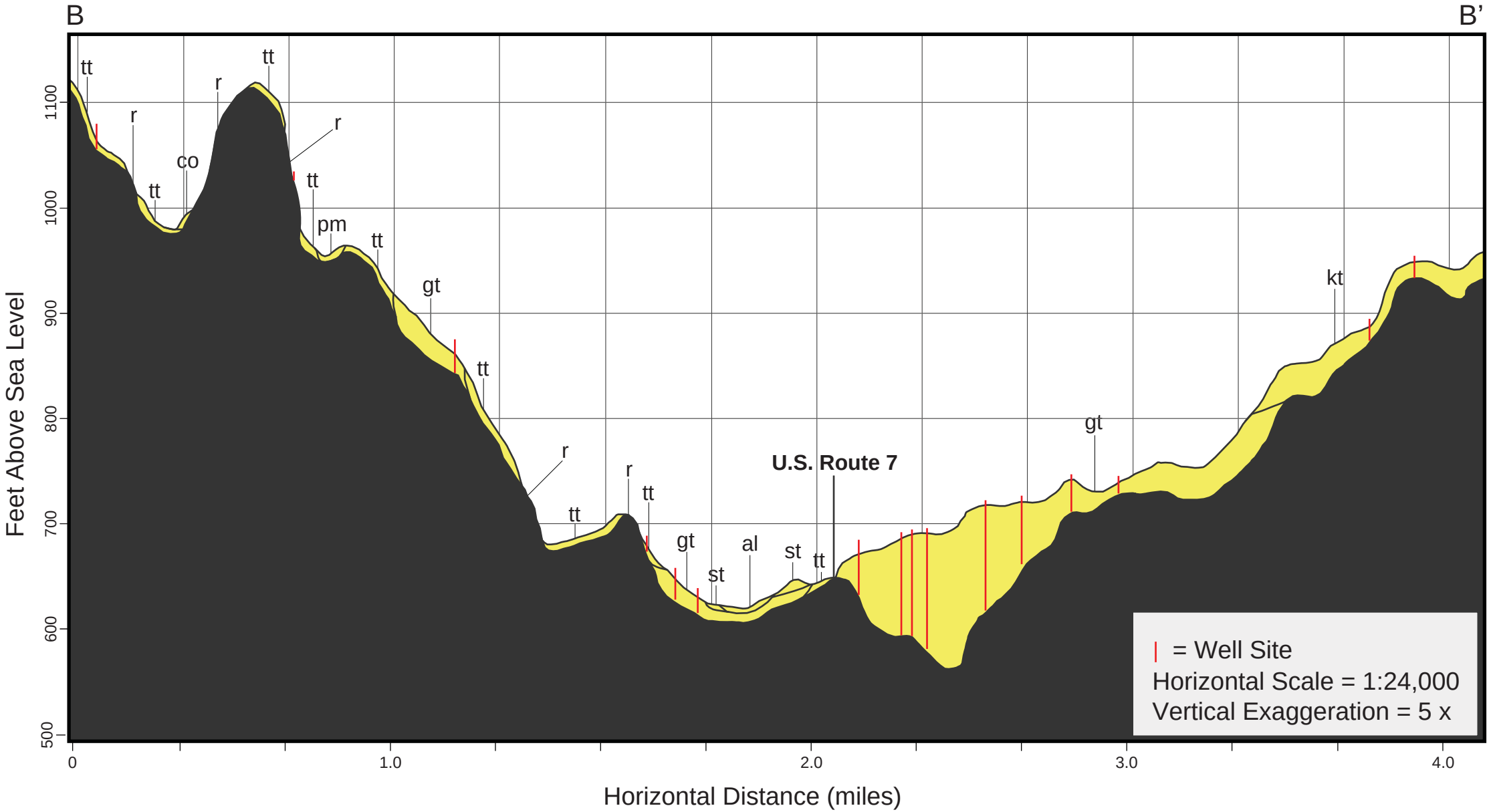
OPEN FILE REPORT VG09-7-
POTENTIOMETRIC SURFACE AND FLOW LINES, RUTLAND, VERMONT

by
John Van Hoesen
2009

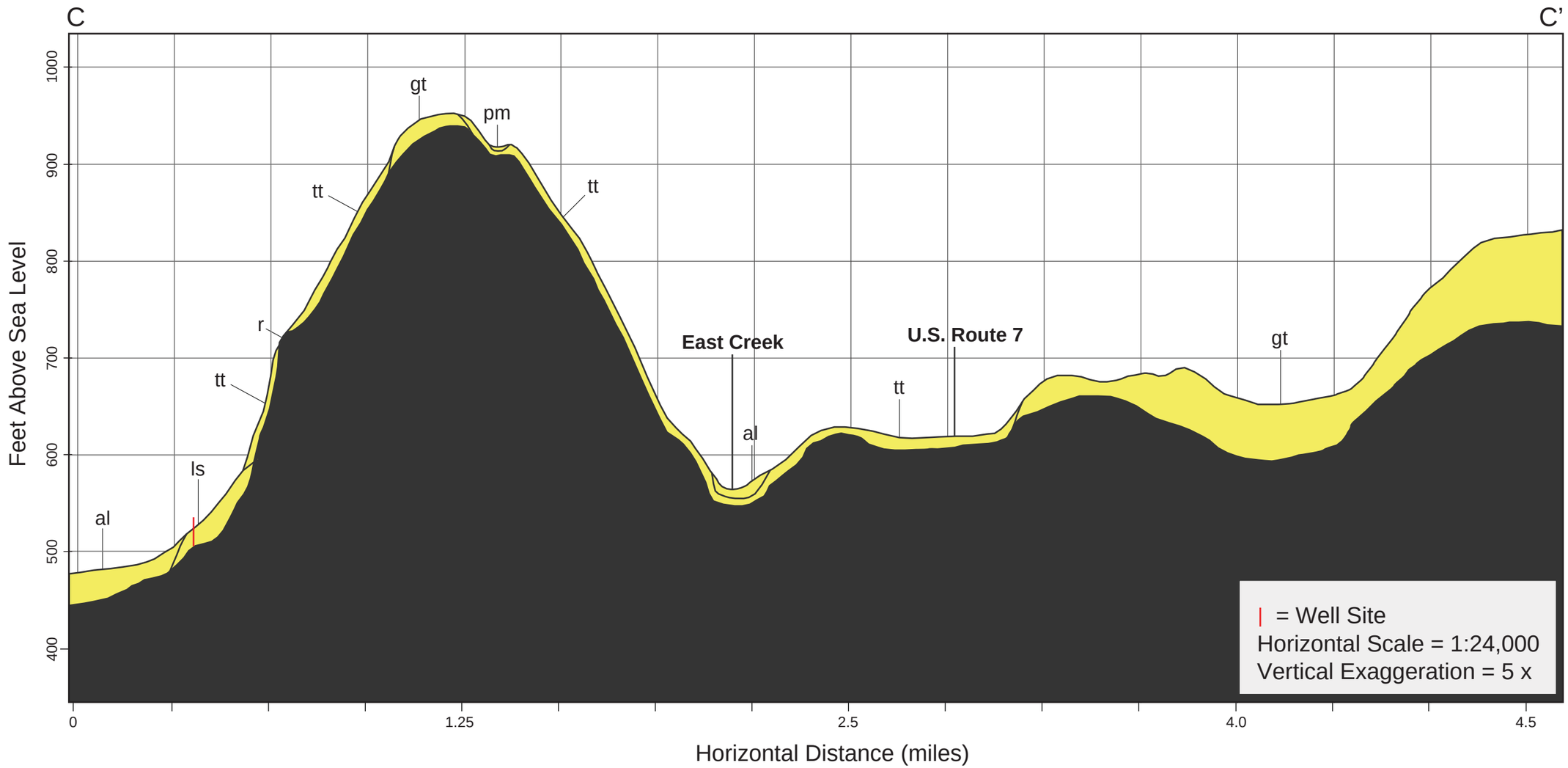
Surficial Geology of Rutland Town, Vermont
Cross Section A-A'



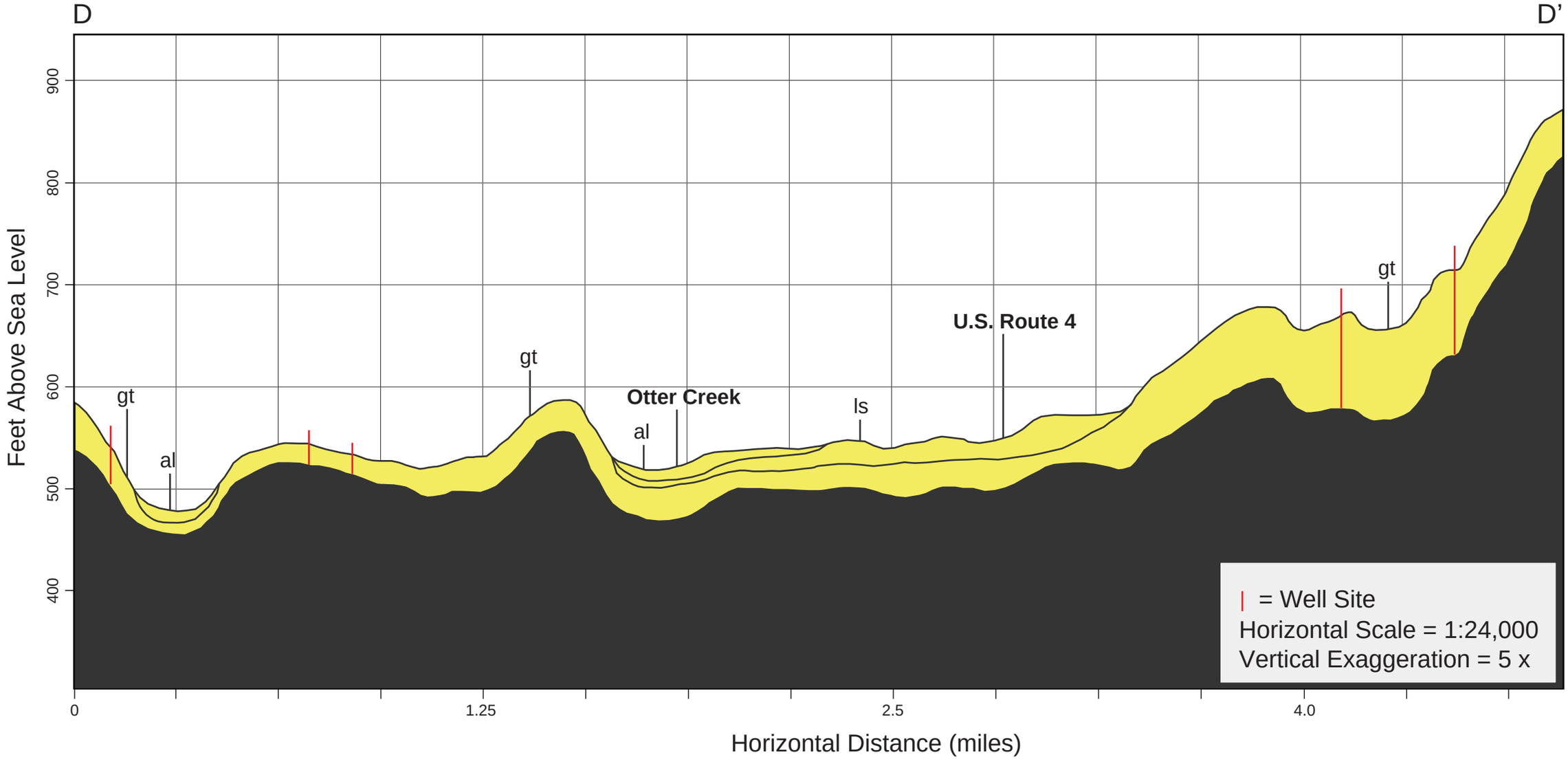
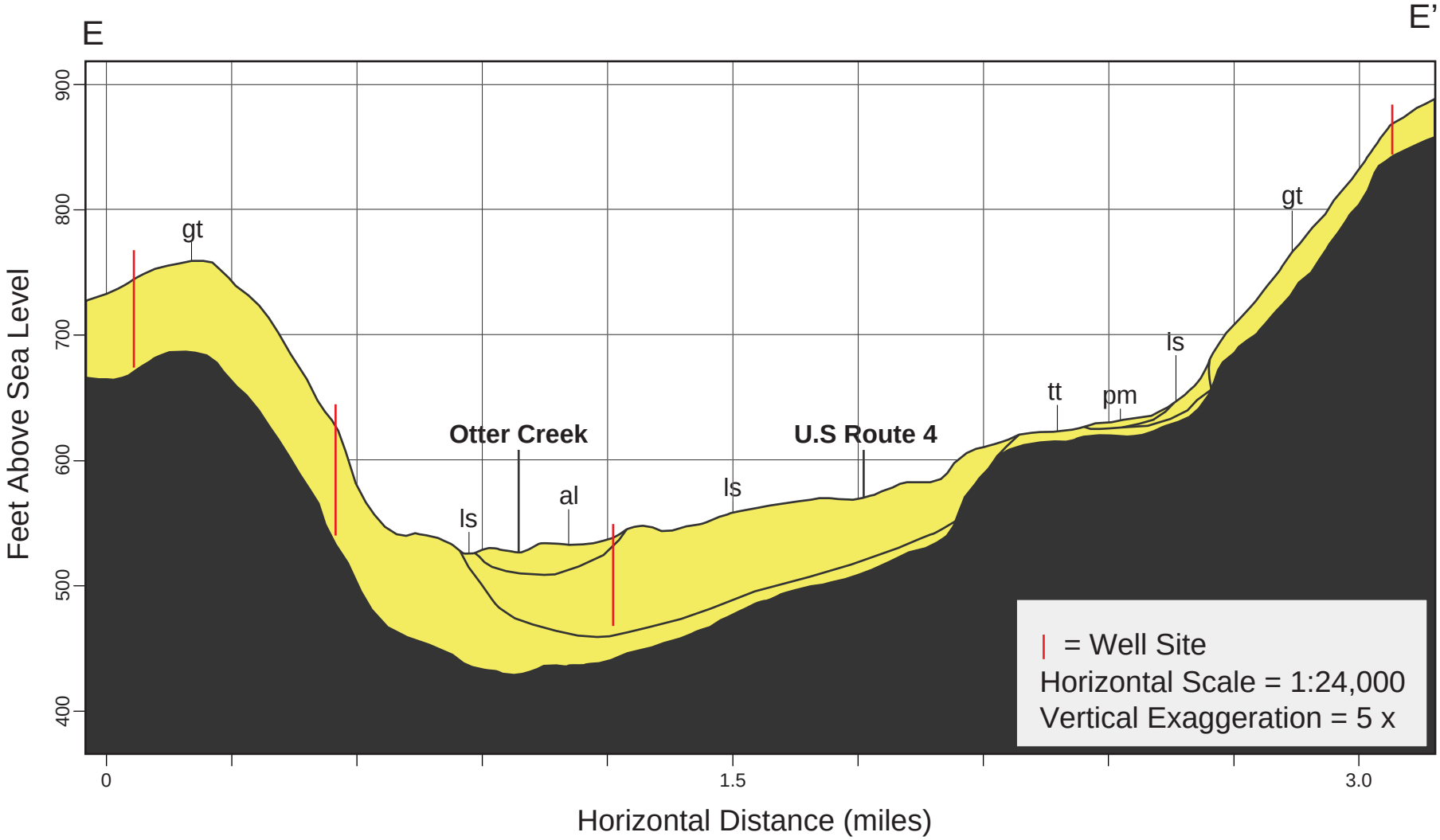
Surficial Geology of Rutland Town, Vermont
Cross Section B-B'



Surficial Geology of Rutland Town, Vermont
Cross Section C-C’



Surficial Geology of Rutland Town, Vermont
Cross Section D-D’



Surficial Geology of Rutland Town, Vermont
Cross Section E-E'