Minnesota Department of Natural Resources
Groundwater Atlas Program
mndnr.gov/groundwatermapping

Hydrogeologic Cross Sections

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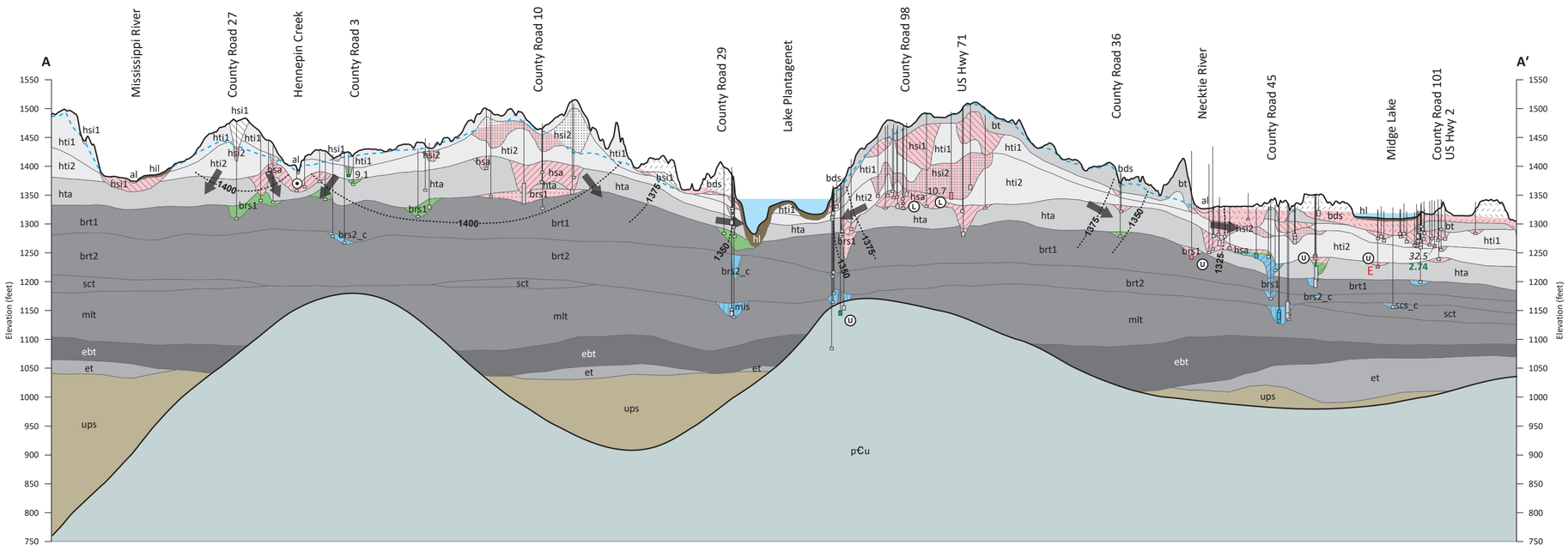
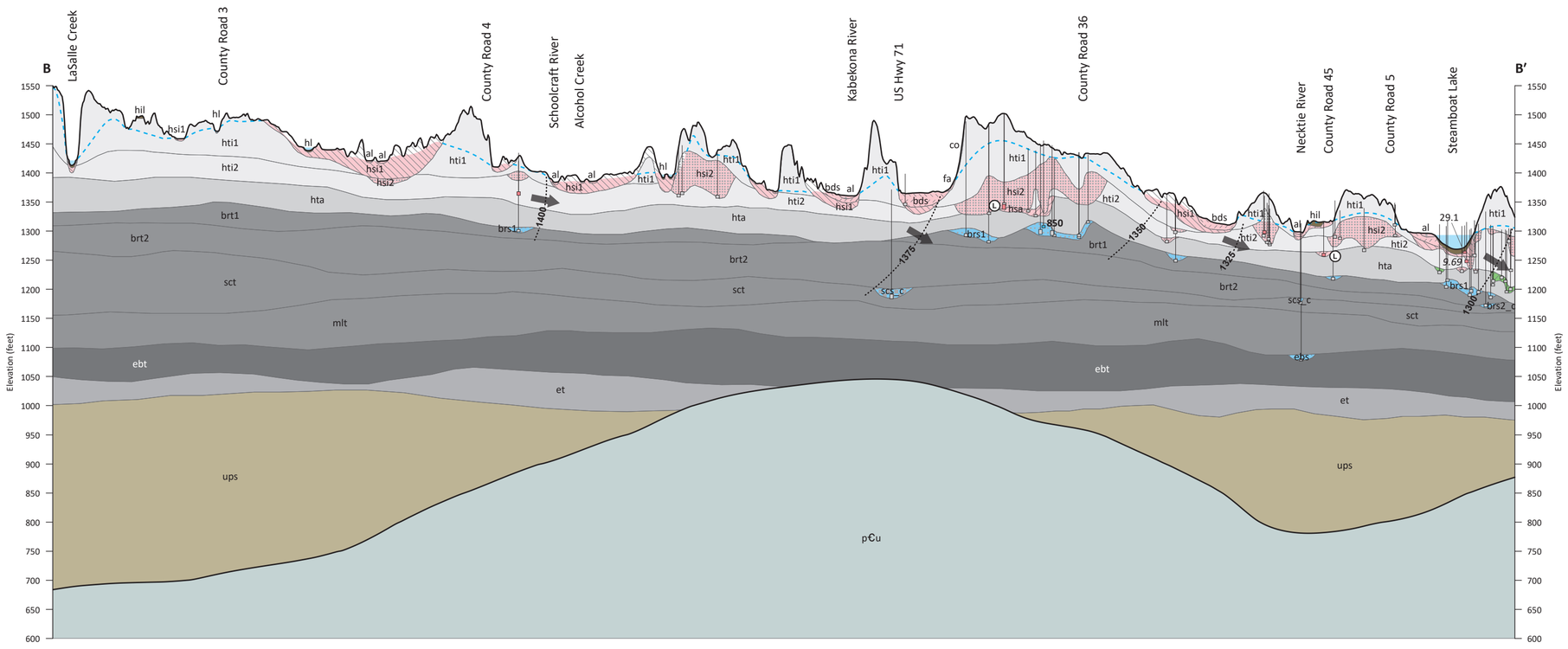
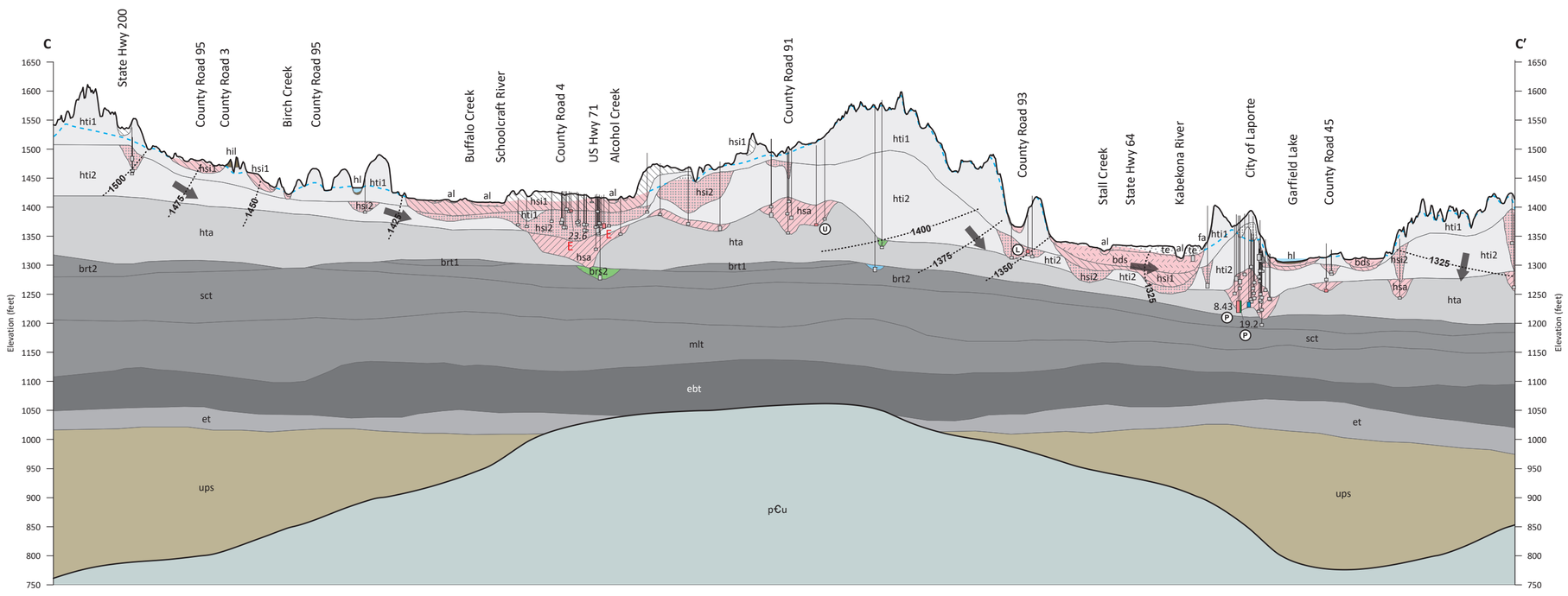
2024

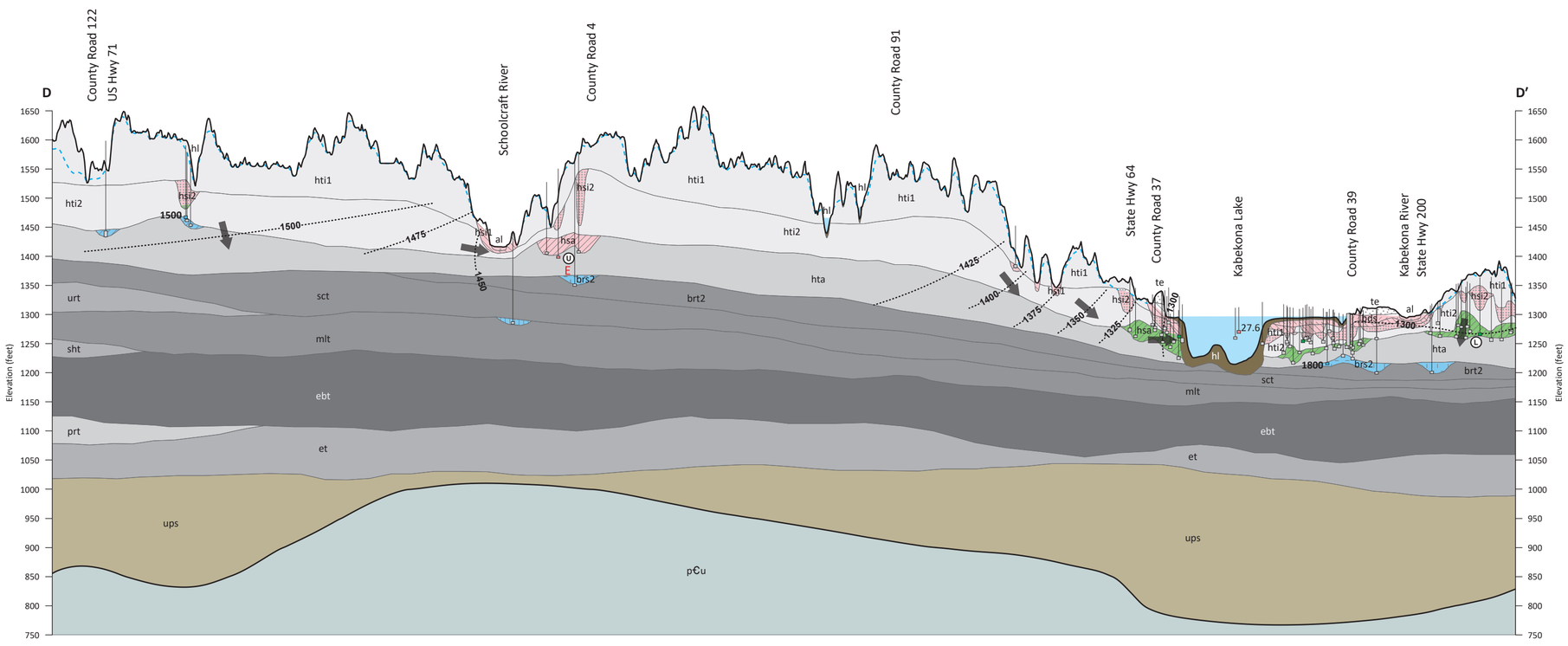
Groundwater Atlas of Hubbard County
Hydrogeologic Cross Sections, Plate 8
A–A′ through D–D′
County Atlas Series C-41, Part B

To accompany atlas Report, Plate 7, and Plate 9.









Cross Section Explanation

Aquifers and aquitards

Interpreted tritium age is indicated by background color.

Quaternary unconsolidated

See Figure 2 in the report for geologic unit correlation.

- hl
- co
- al
- fa
- te
- hil
- bds
- bt
- hsi1
- hti1
- hsi2
- hti2
- hsa
- hta
- brs1
- brt1
- brs2/brs2_c
- brt2
- scs_c
- sct
- urt
- mls
- mlt
- sht
- ebs
- ebt
- prt
- et
- ups

Bedrock

- p€u Precambrian

Quaternary aquitards

Grouped by texture ranging from highest to lowest sand content indicating relative hydraulic conductivity.

Geologic unit code	Percent sand
hti1, hti2, co	>60%
hta, bt, prt	>50% and ≤60%
et, sht, urt	>40% and ≤50%
sct, mlt, brt1, brt2	>30% and ≤40%
ebt	≤30%

Tritium age

Darker color in small vertical rectangle (well screen symbol) indicates tritium age of water sampled in well. Lighter color indicates interpreted age of water in aquifer.

- Modern: water entered the ground after 1953.
- Mixed: water is a mixture of modern and premodern waters.
- Mostly premodern*: water likely entered the ground before 1953 but may contain a small amount of modern water.
- Premodern: water entered the ground before 1953.
- Well not sampled for tritium.

*These samples are referred to as "premodern" in the report. Both "mostly premodern" and "premodern" are shown on plates and figures for consistency with the dataset.

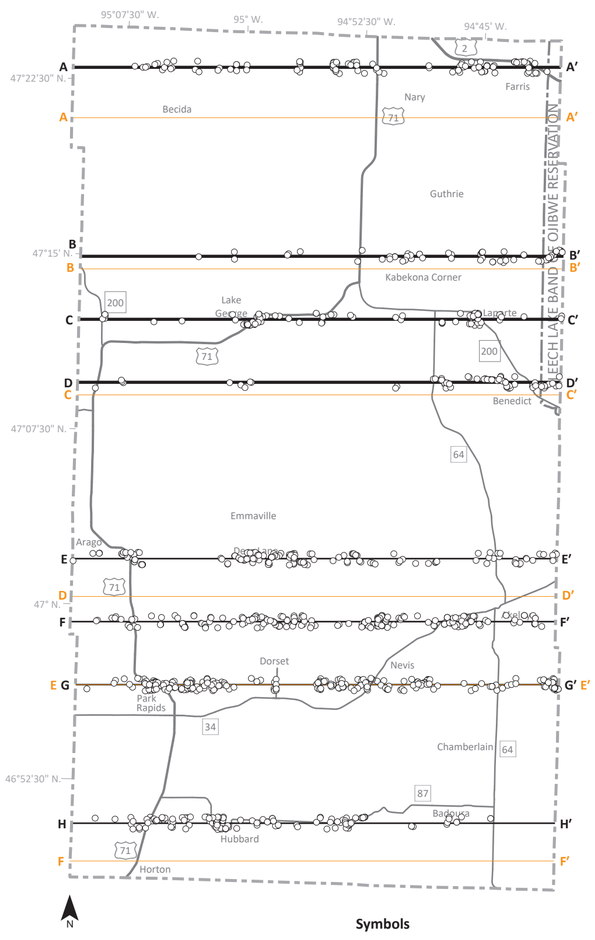
Symbols and labels

- 10.7 Chloride: if shown, concentration is ≥5 ppm. (*naturally elevated, ˢsource unknown; italicized labels indicate source was adjusted)
- 2.74 Nitrate: if shown, concentration is >1 ppm.
- 850 Carbon-14 (^{14}C): estimated groundwater residence time in years
- E Groundwater sample with evaporative signature
- General groundwater flow direction
- ····1400···· Approximate equipotential contour; contour interval 25 feet
- Geologic contact
- Land or bedrock surface
- Water table
- Lake

Groundwater conditions

- (L) Lateral flow: aquifer may have received lateral recharge from upgradient areas of higher pollution sensitivity.
- (P) Pumping: high-volume pumping may have enhanced recharge rates and changed local groundwater flow.
- (U) Unknown: neither the pollution sensitivity model nor groundwater conditions explained the presence of mixed or modern tritium-age water.
- Groundwater movement out of cross section.

SCALE 1:100 000
VERTICAL EXAGGERATION X 50
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 8 9 KILOMETERS



SCALE 1:350 000
1 0 1 2 3 4 5 MILES
1 0 1 2 3 4 5 6 7 KILOMETERS

Symbols

- Well used to generate cross section
- A—A′ Part B line of cross section shown on this plate
- E—E′ Part B line of cross section shown on Plate 9
- A—A′ Part A line of cross section

This map was compiled and generated in a geographic information system. Digital data products are available from the DNR Groundwater Atlas Program page (mndnr.gov/groundwatermapping).

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Base modified from Minnesota Geological Survey, Geologic Atlas of Hubbard County, Part A, 2018.

Universal Transverse Mercator projection, Zone 15N, North American Datum of 1983. North American Vertical Datum of 1988.

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