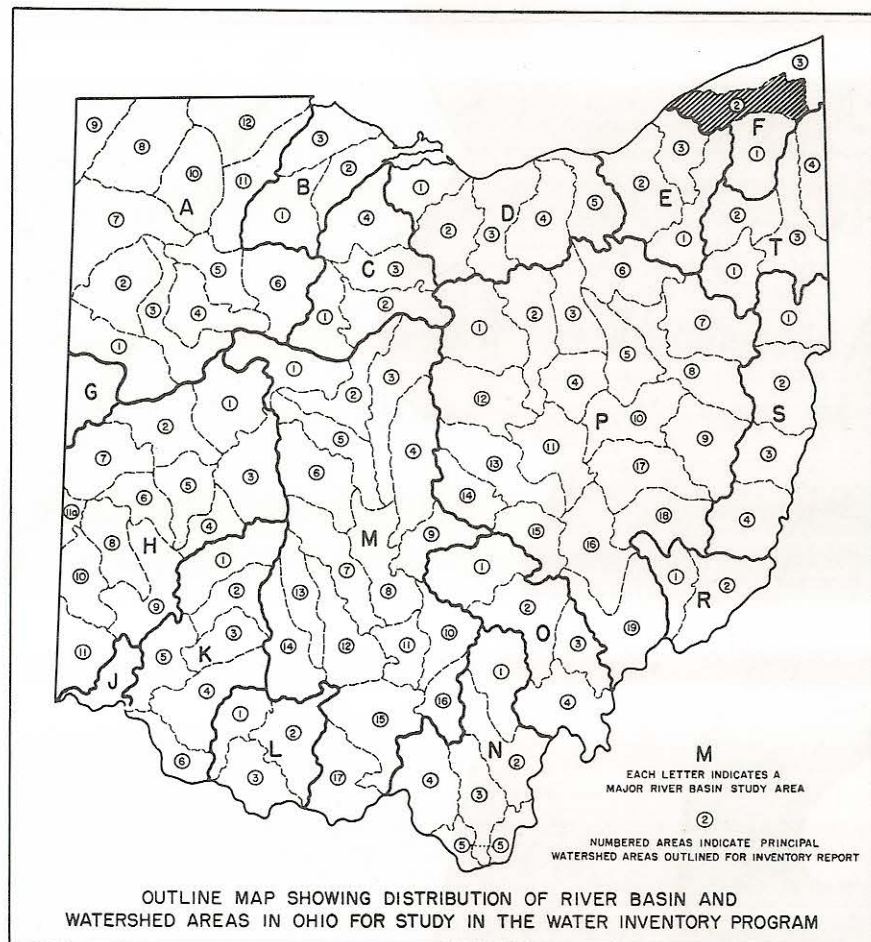


OHIO WATER PLAN INVENTORY
1960

GRAND RIVER BASIN
(Lower Portion)

UNDERGROUND WATER RESOURCES

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Ohio Division of Water



The occurrence of underground water depends upon the kinds of rock beneath the surface of the basin. The amount of water available to wells and the rate of movement of the water are controlled by the number, size, and arrangement of pore spaces, cracks, crevices, and solution channels present in the rocks. Differences in quantity and quality of ground water depend upon local geologic conditions. Records of over 2000 water wells in the lower part of the Grand River basin are on file at the Ohio Division of Water. The locations of selected wells are shown on this map.

The southward-dipping bedrock beneath the surface in this basin is composed primarily of shales interbedded with three water-bearing sandstones. The overlying glacial drift, ranging in thickness from a few feet to more than 270 feet, is composed primarily of clay with small amounts of sand and gravel and yields only small quantities of water to wells. The thickness and areal extent of the alluvial deposits in the flood plain underlying this part of the river are limited. The accompanying table shows the types of rocks which underlie the basin and their water-bearing characteristics.

Shales which underlie the entire basin and are at, or near, the surface in the valley of the Grand River are the only source of ground water in this valley. The amount of water which these rocks yield to wells, although generally small, may be increased where wells encounter coarser materials within the shale such as silt or sand or where they penetrate joints or bedding planes in the rocks which permit movement of larger quantities of water to the wells. Even under optimum conditions, however, yields from these rocks are small.

GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS
IN THE LOWER PORTION OF THE GRAND RIVER BASIN

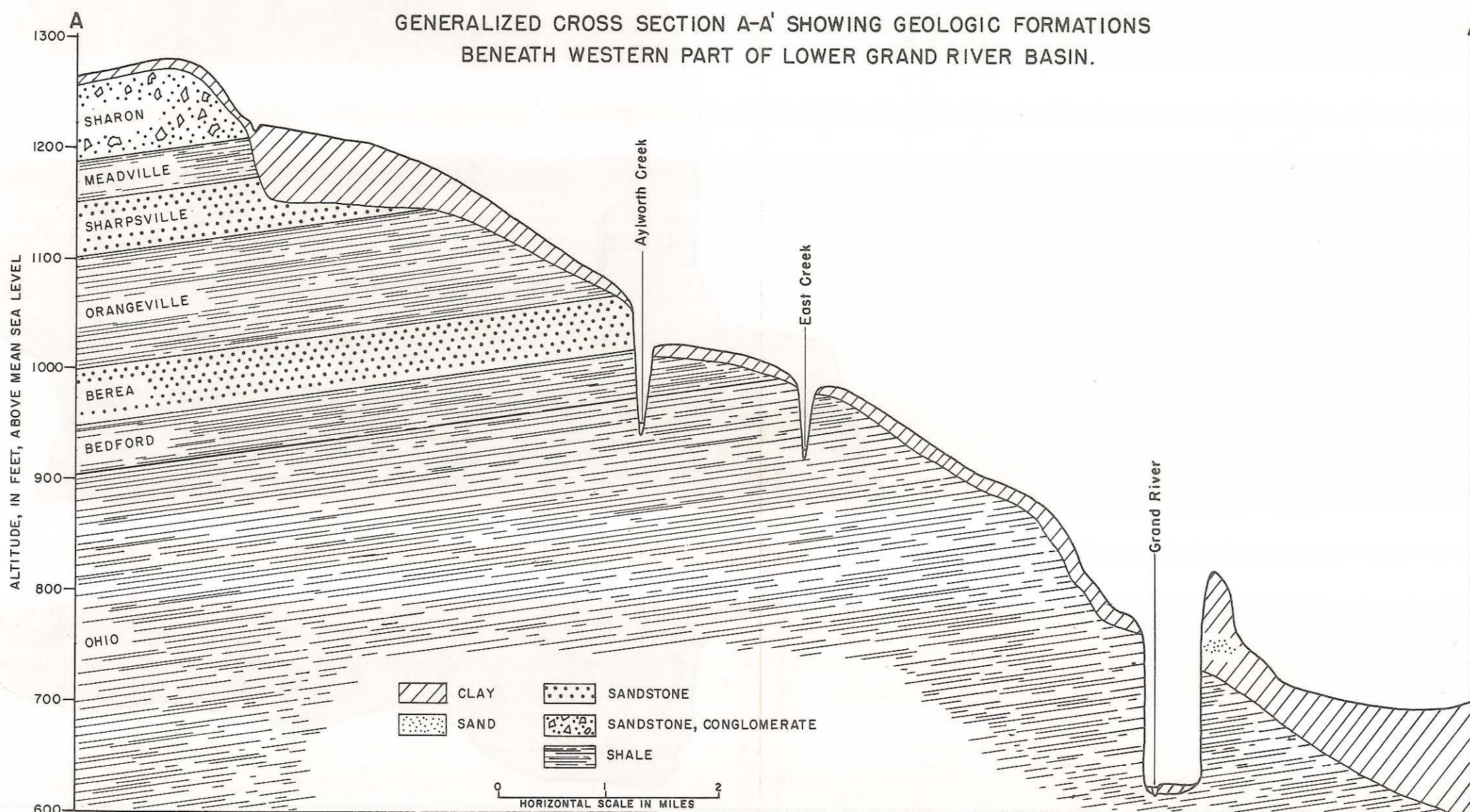
System or Series	Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent	Alluvium. Thin deposits of clay and silt containing thin lenses of sand and fine gravel.	Generally not water-bearing.
	Pleistocene	Unstratified, heterogeneous deposits of clay, silt, sand and gravel ranging in thickness from a few inches to more than 200 feet.	Yields of as much as 25 gpm obtainable from thin lenses of sand and gravel in the lower parts of the deep valleys in the bedrock surface.
Pennsylvanian	Sharon	Coarse gray-white to light red-tan quartzose sandstone or conglomerate.	Yields of 25 to 100 gpm available from thickest part of deposits along southwestern edge of basin.
	Meadville	Bluish-gray to ashen-gray shale alternating with thin sandstone beds.	Generally not water-bearing.
Mississippian	Sharpsville	Thin, hard, limy gray-brown to tan-gray, fine-grained sandstone alternating with shales.	Yields up to 15 gpm available from sandstones.
	Orangeville	Soft, fissile, dark blue to tan-gray shale.	Generally not water-bearing.
	Berea	Tan, light gray or white, medium to fine-grained quartz sandstone.	Yields up to 25 gpm available.
	Bedford	Soft, blue-gray shale with thin, calcareous sandstone lenses in places.	Generally not water-bearing; sandstone lenses may yield small amounts of water to wells.
Devonian	Ohio	Gray to black fissile shale.	Source of water in valley of Grand River. Yield generally less than 5 gpm.

Overlying these shales are alternating shales and sandstones with a total thickness of about 200 feet. The largest yields of water obtained from these rocks are derived from the lowest sandstone in this sequence of rocks. This tan, light gray, or white, medium to fine-grained sandstone averaging about 65 feet in thickness, yields up to 25 gallons per minute to wells. Above this sandstone, and separated from it by a blue to tan-gray shale which is generally not water-bearing, is a thin-bedded to massive sandstone, interbedded with shale, which yields up to 15 gpm to wells.

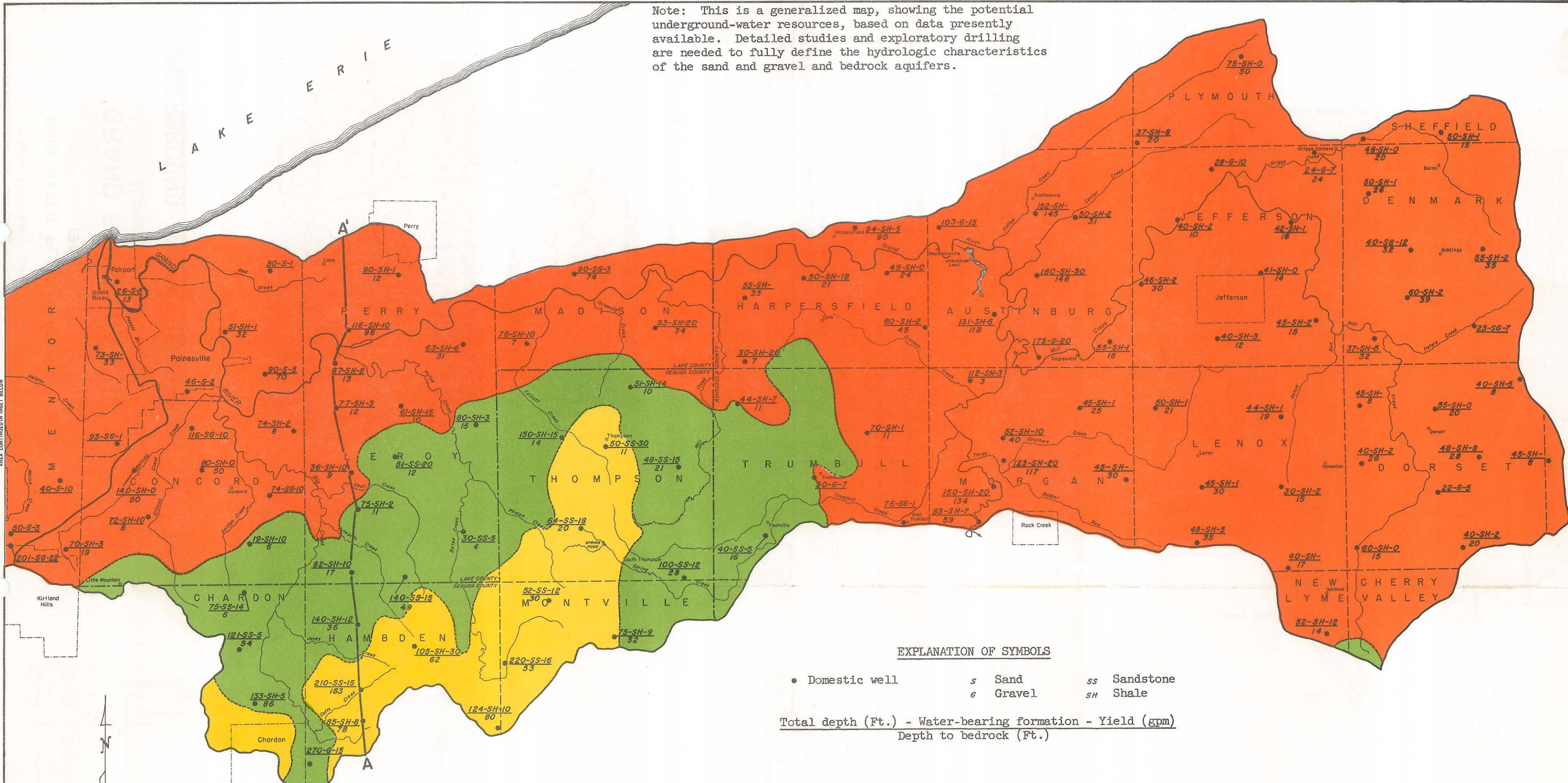
The coarse gray-white to light red-tan sandstone which caps the highest hills in Thompson, Montville, Hambden, and Chardon townships in Geauga County, although of limited areal extent in this basin, is the best water-bearing material. This sandstone yields 25 to 100 gpm to wells.

The unstratified, heterogeneous deposits, composed predominantly of clay, with small amounts of silt, sand, and gravel, which overlie the bedrock throughout this basin generally yield only small quantities of water to wells. These deposits range in thickness from a few feet to more than 270 feet. Available well logs indicate a northward-trending valley in the bedrock surface in Morgan and Austinburg townships. The materials filling this valley, composed primarily of clay, with only small amounts of sand and gravel, are too fine to yield more than small amounts of water to wells.

FILE INDEX
F-2



Note: This is a generalized map, showing the potential underground-water resources, based on data presently available. Detailed studies and exploratory drilling are needed to fully define the hydrologic characteristics of the sand and gravel and bedrock aquifers.

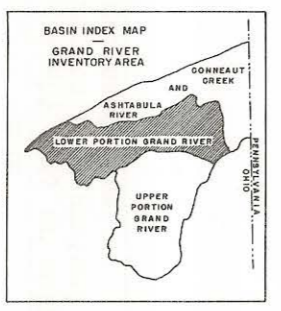
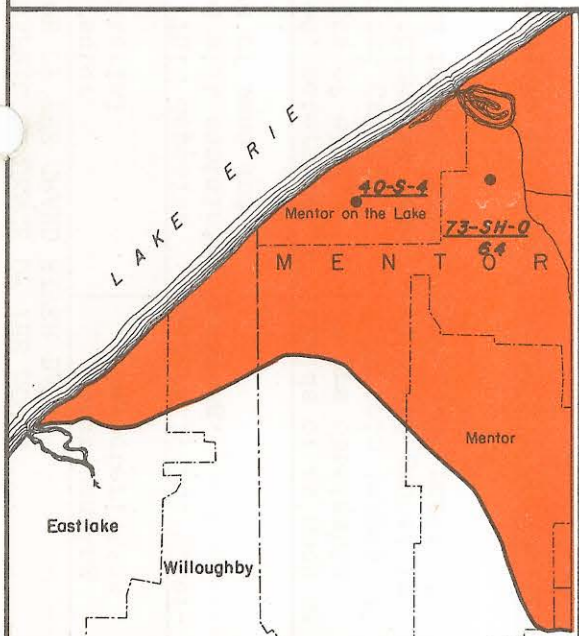


EXPLANATION OF SYMBOLS

- Domestic well
 - s Sand
 - g Gravel
 - ss Sandstone
 - sh Shale
- Total depth (Ft.) - Water-bearing formation - Yield (gpm)
 Depth to bedrock (Ft.)

LEGEND

- AREAS IN WHICH YIELDS OF 25 OR MORE GALLONS PER MINUTE CAN BE DEVELOPED
 - Yields of 25 or more gpm from sandstone capping the hills in the southwestern part of the basin. Larger amounts of water may be pumped for short periods.
- AREAS IN WHICH YIELDS OF 5 TO 25 GALLONS PER MINUTE CAN BE DEVELOPED
 - Yields of 5 to 25 gpm from sandstone, up to 200 feet thick, which is overlain by thin, alternating shales and sandstones. Thinner sandstones yield up to 15 gpm.
- AREAS IN WHICH YIELDS OF LESS THAN 5 GALLONS PER MINUTE CAN BE DEVELOPED
 - Yields of less than 5 gpm from joints and cracks in gray to black shale.



MAP OF THE LOWER PORTION OF THE GRAND RIVER BASIN SHOWING AVAILABILITY OF UNDERGROUND WATER

PUBLISHED BY - STATE OF OHIO, DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER

SCALE IN MILES