OHIO DEPARTMENT OF NATURAL RESOURCES, DIVISION OF WATER
1562 W. First Ave., Columbus 12, Ohio

OHIO WATER PLAN INVENTORY
1962

A PART OF THE
WALHONDING RIVER BASIN

UNDERGROUND WATER RESOURCES

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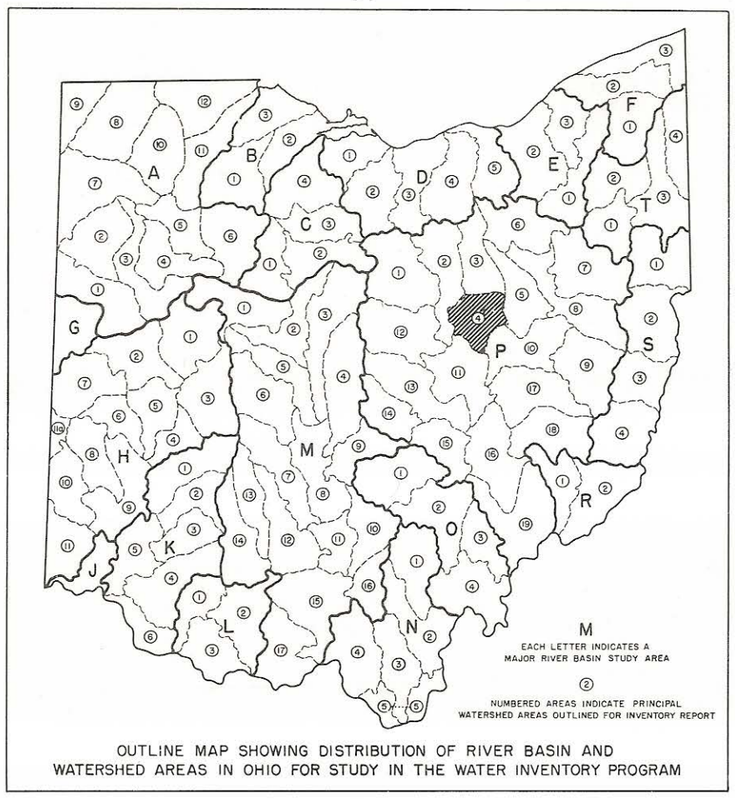


OUTLINE MAP SHOWING DISTRIBUTION OF RIVER BASIN AND WATERSHED AREAS IN OHIO FOR STUDY IN THE WATER INVENTORY PROGRAM

The occurrence and rate of movement of water beneath the surface of the earth depend upon the kinds of rocks in which the water occurs and the size, shape, number, and arrangement of openings within the rocks. The numerous openings in rocks may be small like those in clay and shale, or large like those in sand and gravel. The rate of movement of water through deposits such as sand and gravel or some coarse-grained sandstones that contain large openings is greater than it is through deposits such as silt and clay, or through most consolidated rocks which contain small openings. The amount of water which may be pumped from a rock depends upon the capacity of the rock to store and transmit water.

The rocks underlying the surface of the Walhonding River Basin are essentially consolidated deposits of sandstone and shale, and unconsolidated deposits of gravel, sand, silt, and clay. The consolidated deposits are overlain by generally thin deposits of fine-grained materials composed primarily of clay with only small amounts of sand and gravel. The unconsolidated surficial deposits in the northern part of the basin, which lies at the southern edge of the glaciated area, are somewhat thicker than those in the southern part of the basin. Available well logs show that these deposits in the northern part of the basin are generally 15 to 60 feet thick and occasionally are as much as 170 feet thick. The unconsolidated deposits overlying the bedrock in the upland areas in the southern part of the basin are from five to 35 feet thick and occasionally are more than 90 feet thick. The thickest unconsolidated deposits in the upland areas, generally, are the few elongate patches of end moraine in the two northern tiers of townships in the basin. These deposits, like the other unconsolidated deposits in the upland areas, are usually too fine-grained to yield large quantities of water to wells.

Unconsolidated deposits in the valleys of Killbuck Creek and Walhonding River, and of the streams tributary to them, are variable in thickness, in areal extent, and in water-bearing characteristics. Killbuck Creek, throughout the 32 miles of its course from Holmesville to its junction with the Walhonding River, and the Walhonding River from the mouth of Killbuck Creek to its mouth, flow on a flood plain which averages about one-half mile in width. The unconsolidated materials which have been deposited in this valley to depths of 160 feet or more comprise gravel, sand, and clay. The gravel and sand occurring adjacent to the streams make it possible, through infiltration from the streams, to pump large quantities of water through large, properly designed and constructed wells. Available data show that large quantities of water are pumped from deposits of sand and gravel at the larger municipalities; similar quantities of water also are available throughout other segments of the flood plain. Estimates of yields of large proposed underground-water supplies in this valley, as well as in any other area, must be based upon adequate test drilling to determine the location, thickness, and extent of water-bearing materials and adequate test pumping to determine the amount of water available.

The Walhonding River, from the point where it flows into this basin from the west to the point, 24 miles farther east, where it joins Killbuck Creek, meanders across a flood plain which averages one half mile in width. The unconsolidated deposits beneath this flood plain, which are about 180 feet thick, include a large percentage of coarse, water-bearing materials. The few available data on wells in this valley indicate that wells can be constructed through which amounts of water exceeding 100 gallons per minute may be pumped. Here, as elsewhere, location of wells must be determined by a program of test drilling and test pumping.

GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS IN THE WALHONDING RIVER BASIN

System or Series		Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent		Alluvium, composed primarily of clay and silt, with few thin lenses of sand and gravel, deposited on flood plains of principal rivers.	Yields generally small.
Quaternary	Pleistocene		Thick deposits of sand and gravel interbedded with thin layers of till in buried valleys.	Yields of 1000 gpm or more may be developed.
Quaternary	Pleistocene		Thin to thick morainal deposits of till, in northern part of basin, containing thin lenses of sand and gravel.	Yields generally less than 15 gpm; most wells are finished in underlying sandstone and yield less than 20 gpm.
Quaternary	Pleistocene		Till in northern part of basin, consisting predominantly of clay with few thin lenses or beds of sand and gravel of limited area extent.	Yields generally less than 5 gpm; most wells are finished in underlying sandstone and yield less than 15 gpm.
Quaternary	Pleistocene		Thin lenses or beds of sand and gravel interbedded with thick layers of till in buried valleys in northern part of basin.	Yields generally less than 10 gpm.
Pennsylvanian		Conemaugh	Few thin, isolated remnants of sandstone and sandy shale.	No water.
Pennsylvanian		Allegheny	Variable sequence of shale and sandstone.	Limited areal extent and thickness preclude use as source of water supply.
Pennsylvanian		Pottsville	Thin sandstone and shale, with some coal, clay, and small amounts of coarse sand.	Limited areal extent and thickness preclude use as source of water supply, except for occasional wells of small yield in southeast part of basin.
Mississippian		Logan	Fine-grained sandstones with interbedded shales.	Yields range from 5 to 25 gpm.
Mississippian		Cuyahoga	Alternating sandstone and shale.	Sandstones generally yield up to 25 gpm; thicker sandstones may yield up to 250 gpm in favorable locations.

Several other stream valleys, including those of Black, Wolf, and Doughty creeks and Big Run, contain unconsolidated deposits with variable thicknesses and water-bearing characteristics. The few available logs of wells show that the unconsolidated materials within these valleys contain predominantly fine-grained materials, including sand and clay. These materials probably yield less than 10 gallons per minute to wells. The fact that most of the wells in these valleys have been drilled into the underlying sandstone indicates that only small quantities of water are available in the unconsolidated valley fill deposits.

The consolidated rocks which occur at or near the surface in the Walhonding River Basin include deposits of sandstone and shale, with coal, limestone and iron ore which, although present in only relatively small amounts, are economically valuable. The bedrock formation of the basin which yields the largest quantities of water to wells in the western and northern parts of the basin is the sandstone known locally as the "Big Injun," which yields five to 15 gpm (gallons per minute) to wells. This rock changes within a short distance from a permeable sandstone beneath Millersburg to a relatively impermeable shale in northwestern Holmes County. These variations in the type of rock result in variations in the amount of water the rocks yield to wells. The shallow wells in the upland areas throughout most of the basin and the deeper wells in the eastern part of the basin are finished in the younger thin sandstones and shales. These rocks yield from less than five to more than 20 gpm, depending upon the thickness and areal extent of the water-bearing rock. The bedrock in the southernmost part of the basin yields little or no water to wells.

The unconsolidated deposits in the upland areas, whether in the northern or southern part of the basin, generally yield only small quantities of water to wells, since these deposits are relatively thin and are composed of materials through which water passes very slowly.

QUALITY OF UNDERGROUND WATER

Well number	C-1	C-2	C-3	C-4	C-5	C-6
Depth (Ft.)	90	458	81	58	135	90
Water-bearing formation	Sand and gravel	Sandstone	Sandstone	Gravel	Gravel	Sand and gravel
	Parts per million					
Iron (Fe)	0.32	0.15	0.1	0.5	2.1	0.15
Chloride (Cl)	14.	0.	4.	27.	8.	9.
Dissolved solids	270.	236.	88.	319.	186.	304.
Total hardness	228.	160.	27.	216.	146.	250.
pH	7.5	7.5	7.1	7.6	7.7	7.4

The results of chemical analysis of six samples of water from this basin are shown in the accompanying table. This tabulation shows that the chemical quality of water from both sand and gravel and sandstone deposits is similar to the water from these sources in adjacent basins. The analysis of the water from well C-3, a municipal well at Glenmont, indicates that this water is appreciably softer and contains a far smaller concentration of dissolved solids than the water from most sandstone wells. The other analyses, however, indicate that the water from wells finished in both sand and gravel and sandstone aquifers should be softened before being used for most purposes. The analyses also indicate that water from a sand and gravel formation may contain a high enough concentration of iron to warrant removal before the water can be used. Information in adjacent basins indicates that objectionably high iron content also may be present in water derived from sandstone.

EXPLANATION OF SYMBOLS

- • Domestic well
- ◎ Industrial well
- ◎ Municipal well

- SH Shale
- SS Sandstone
- S Sand
- G Gravel

C/2 Chemical analysis in text.

Total depth (Ft.) - Water-bearing formation - Yield (gpm)
Depth to bedrock (Ft.)

This is a generalized map, showing the potential underground-water resources, based on data presently available. Detailed studies and exploratory drilling are necessary to precisely evaluate the water-bearing characteristics of the glacial and bedrock aquifers.

AREAS IN WHICH YIELDS OF 1000 GALLONS PER MINUTE OR MORE CAN BE DEVELOPED

Thick deposits of permeable sand and gravel filling buried valleys beneath major perennial streams. Large yields sustained through stream infiltration.

AREAS IN WHICH YIELDS OF 100 TO 500 GALLONS PER MINUTE CAN BE DEVELOPED

Thick, permeable sand and gravel deposits within buried valleys.

AREAS IN WHICH YIELDS OF 5 TO 25 GALLONS PER MINUTE CAN BE DEVELOPED

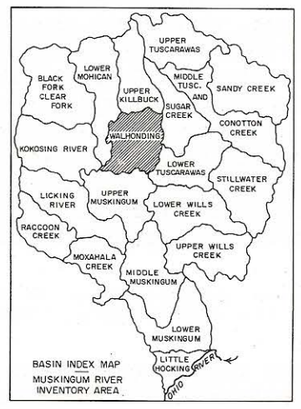
Sandstone aquifer of variable thickness, with interbedded shale, beneath thin to thick unconsolidated deposits which are generally fine-grained. The unconsolidated deposits are not an important source of water, although they may furnish sufficient water for domestic use.

Thin to thick glacial moraine deposits consisting of thin lenses of sand and gravel interbedded with thick layers of clayey till. Moraine and till overlie thin to thick sandstones interbedded with thin shale strata.

Thin to thick lenses of sand and gravel interbedded in thick clayey till deposited in buried valleys.

AREAS IN WHICH YIELDS OF LESS THAN 5 GALLONS PER MINUTE CAN BE DEVELOPED

Alternating layers of shale and thin sandstone. Drilled wells seldom yield more than 3 gpm; salt water is reported at depths exceeding 175 feet. Dug wells, cisterns, and springs are generally the principal source of water.



MAP OF A PART OF THE
WALHONDING RIVER BASIN
SHOWING
AVAILABILITY OF UNDERGROUND WATER

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

SCALE IN MILES 0 1 2 3 4 5