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

OHIO WATER PLAN INVENTORY
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SANDY CREEK BASIN

UNDERGROUND WATER RESOURCES

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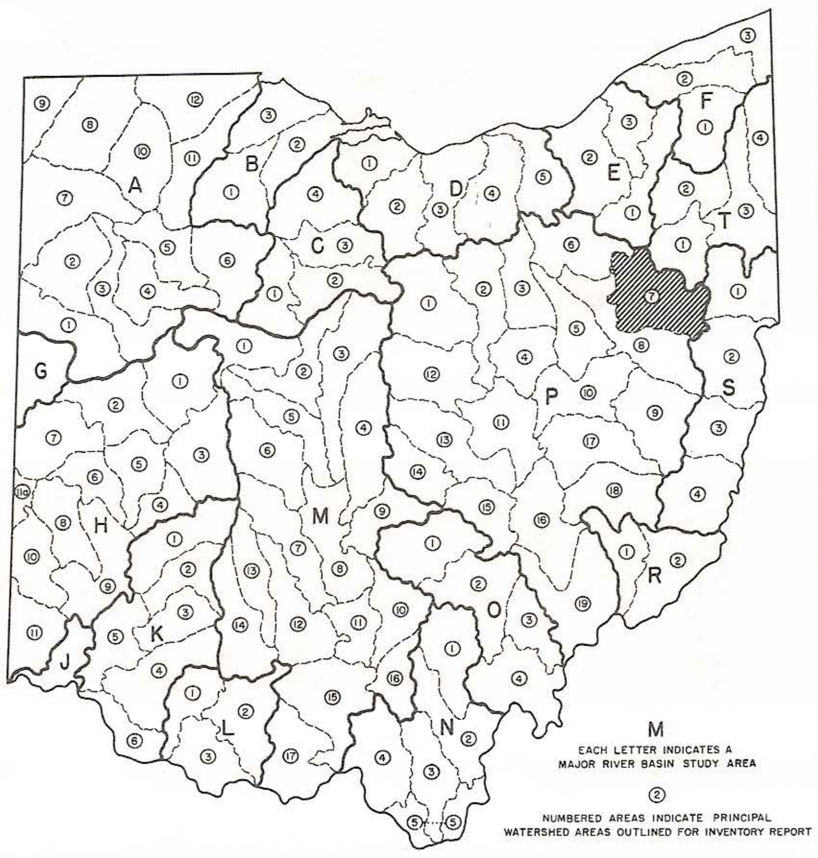

OUTLINE MAP SHOWING DISTRIBUTION OF RIVER BASIN AND WATERSHED AREAS IN OHIO FOR STUDY IN THE WATER INVENTORY PROGRAM

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GENERALIZED STRATIGRAPHIC SEQUENCE OF THE ROCKS IN THE SANDY CREEK BASIN

System or Series		Group or Formation	Character of Material	Water-bearing Characteristics
Quaternary	Recent		Clay and silt, with few thin lenses of sand and gravel, deposited on flood plains of the principal rivers.	Generally a poor source of ground water.
Quaternary	Pleistocene		Interbedded and interlensing layers of sand, gravel, and clay deposited in buried valleys by glacial meltwaters.	Quantity of water available depends on character of material and source of recharge. Yields exceeding 1000 gpm may be developed.
			Thin to thick deposits composed of thick layers of silt and clay interbedded with relatively thin lenses of sand and gravel.	Sand and gravel deposits yield 5 to 15 gpm.
Pennsylvanian			Alternating layers of shale, sandstone, limestone and coal.	Yields 5 to 20 gpm; yields to shallow wells in southeastern part of basin are generally meager.
			Thin to thick, coarse-grained sandstone, with some shale, coal, clay, and limestone.	Domestic, farm, and industrial supplies are readily available. Sandstone reported to yield as much as 650 gpm. Regional yield, however, seldom exceeds 15 gpm.

Water moves through the cracks, crevices, and the interconnected pore spaces between the grains of the rocks which occur beneath the surface of the earth. The development of supplies of underground water which are satisfactory from the standpoint of both quantity and quality depends upon the kinds of rocks in which the water occurs and the size, shape, and arrangement of the openings in the rocks. The many openings in most rocks are usually small, although some such as joints or crevices may be large. Water in deposits of sandstone and shale occurs in the small openings between the individual grains and also in cracks and channelways dissolved out of the rock by the water itself. Water in deposits of gravel, sand, silt, and clay occurs in the spaces between the individual grains or fragments of rock, which may be larger than the openings in sandstone and shale. Unconsolidated deposits of sand and gravel generally yield water to wells more readily than do consolidated deposits of sandstone, shale, and limestone.

Both the consolidated and unconsolidated rock formations which occur near the surface in the Sandy Creek Basin are of sedimentary origin. The kinds of rock which have been deposited in this basin and a brief description of the water-bearing characteristics of each of the rocks are presented in tabular form in the generalized stratigraphic sequence of the rocks.

The consolidated formations in this basin comprise a wide range of types of rocks including sandstone, shale, limestone, and coal. The sandstones and, to a lesser extent, the shales are the most important sources of water in this group of rocks. Sandstone formations may yield large quantities of water to wells locally, as shown by records of an industrial well between Canton and Louisville and a municipal well in North Canton, both of which are reported to produce in excess of 600 gallons per minute (gpm). They often grade, however, from a permeable rock which yields large quantities of water to a non-water-bearing or low-yielding sandy shale or shale from one locality to another. The sizes of the individual sand grains, the degree of cementation of the grains, and the composition of the cement which binds the grains together control the rate of movement of water through the rocks. In addition to these factors, the thickness, areal extent, and accessibility to recharge also affect the yields of wells over a long period.

The logs of the two wells referred to above indicate how the rocks may change over a relatively small area. The log of the municipal well shows three sandstone beds: 56, 91, and 105 feet thick; the log of the industrial well shows three sandstone beds, the thickest of which is 20 feet thick. Although their production rates are reported to be nearly the same, only after controlled pumping tests could the long-term performances of these wells be compared with any degree of accuracy.

Unconsolidated materials deposited upon the eroded bedrock surface include both glacial and non-glacial deposits. The boundary separating these two types of deposits is described generally by a west-east line through the southern parts of Canton and Osnaburg townships and eastward along the Columbiana-Carroll county line to the eastern boundary of the basin. North of this line the unconsolidated deposits, which in places in the Canton area are more than 200 feet thick, contain thick beds and lenses of well-sorted sand and gravel. These deposits within the solid blue area on the accompanying map contain the thickest and most extensive coarse water-bearing deposits in this basin. As much as 2600 gpm has been pumped from these deposits through an individual conventional vertical well, and in excess of 3400 gpm through a horizontal ground-water collector. These large yields are possible where coarse sands and gravels permit infiltration of large quantities of river water to the wells. Although the large yields referred to above may be greater than those obtainable in some parts of this area, it should be possible to locate, through test drilling, areas throughout this part of the basin where the water-bearing materials yield 500 to 1000 gpm.

The unconsolidated deposits beneath the flood plain of Sandy Creek, which are more than 200 feet thick, also constitute a potentially good source of large supplies of underground water. Wells less than 100 feet deep are reported to produce from 600 to 1000 gpm. The yield which could be developed through infiltration from the stream could be determined only after adequate test drilling and test pumping.

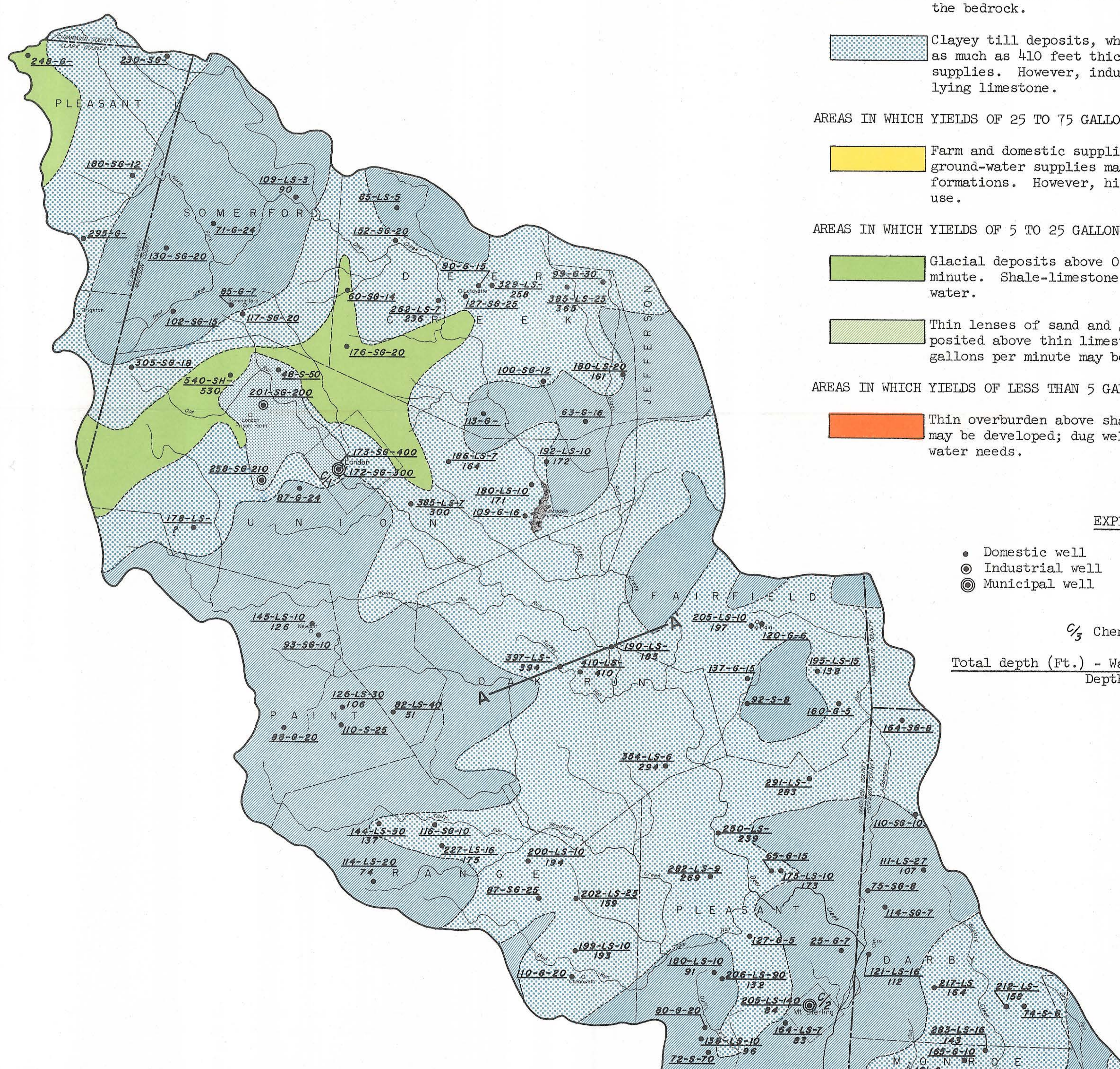
Moderately thick deposits of unconsolidated materials occur in a narrow area extending from northern Marlboro to southeastern Washington Township. These deposits contain beds and lenses of well-sorted sand and gravel. Yields up to 50 gpm may be developed from the more extensive permeable materials within these deposits.

Numerous valleys tributary to the main streams in this basin contain thick deposits of unconsolidated materials. Most of these materials, however, are too fine-grained to yield more than relatively small quantities. Although it is possible to locate a limited area in which greater amounts of water may be obtained, the yields of the more permeable deposits generally are less than 25 gpm. If these permeable deposits are not present, ample domestic supplies may be developed in the bedrock.

QUALITY OF UNDERGROUND WATER

Well number	C-1	C-2	C-3	C-4	C-5	C-6	C-7
Depth (Ft.)	127	140	69	147	250	100	130
Water-bearing formation	Sandstone	Sand and gravel	Sand and gravel	Sand and gravel	Sandstone	Sand and gravel	Sandstone
	Parts per million						
Iron (Fe)	0.6	0.45	0.4	0.50	1.2	0.03	0.45
Chloride (Cl)	6.	11.	2.	25.	8.	2.	3.
Dissolved solids	308.	397.	286.	556.	525.	195.	294.
Total hardness	254.	328.	246.	467.	382.	146.	139.
pH	7.4	7.5	7.2	7.8	7.2	7.7	7.3

The partial analyses of samples of water from four wells finished in sand and gravel and three wells finished in sandstone show little difference in the concentrations of the chemical constituents listed in the accompanying tabulation. Except for water from wells C-6 and C-7, all of the water is hard and would have to be softened before it could be used for many purposes. The one other constituent which is most objectionable, iron, is present in excessive concentrations in all samples except the one from well C-6. Although the concentrations of dissolved solids in these samples are variable, evaluation of this constituent would have to be made on the basis of the needs of the water user.



AREA CONTINUED ON REVERSE SIDE

AREAS IN WHICH YIELDS OF 500 TO 1000 GALLONS PER MINUTE MAY BE DEVELOPED

- Thick permeable sand and gravel deposits adjacent to the Scioto River. Large sustained yields may be recharged by stream infiltration.

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

- Thick permeable glacial material deposited as buried outwash plain near London. Tested wells have developed as much as 400 gallons per minute. Permeable glacial deposits adjacent to Deer Creek are untested. However, character of deposits indicate that yields should exceed 100 gallons per minute.
- Municipal and industrial wells may be developed from limestone bedrock. Relatively thick glacial deposits are often encountered above the bedrock.
- Clayey till deposits, which fill remnant buried drainage channels are as much as 410 feet thick. Glacial deposits yield farm and domestic supplies. However, industrial supplies may be developed in underlying limestone.

AREAS IN WHICH YIELDS OF 25 TO 75 GALLONS PER MINUTE MAY BE DEVELOPED

- Farm and domestic supplies developed in glacial drift. Industrial ground-water supplies may be developed in relatively thin limestone formations. However, high percentage of mineralization may deter its use.

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

- Glacial deposits above Ordovician bedrock yield 5 to 25 gallons per minute. Shale-limestone bedrock yields meager quantities of ground water.
- Thin lenses of sand and gravel interbedded in clayey till and deposited above thin limestone formations or shale. Yields of 5 to 10 gallons per minute may be expected.

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

- Thin overburden above shale bedrock. Less than 2 gallons per minute may be developed; dug wells and cisterns are necessary to supplement water needs.

EXPLANATION OF SYMBOLS

•	Domestic well	S	Sand
◉	Industrial well	G	Gravel
◎	Municipal well	SH	Shale
		LS	Limestone

C/3 Chemical analysis in text.

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