GROUND WATER POLLUTION POTENTIAL OF COSHOCTON COUNTY, OHIO

BY

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ABSTRACT

A ground water pollution potential map of Coshocton County has been prepared using the DRASTIC mapping process. The DRASTIC system consists of two major elements: the designation of mappable units, termed hydrogeologic settings, and the superposition of a relative rating system for pollution potential.

Hydrogeologic settings form the basis of the system and incorporate the major hydrogeologic factors that affect and control ground water movement and occurrence including depth to water, net recharge, aquifer media, soil media, topography, impact of the vadose zone media, and hydraulic conductivity of the aquifer. These factors, which form the acronym DRASTIC, are incorporated into a relative ranking scheme that uses a combination of weights and ratings to produce a numerical value called the ground water pollution potential index. Hydrogeologic settings are combined with the pollution potential indexes to create units that can be graphically displayed on a map.

Coshocton County lies within the Glaciated and Unglaciated Central hydrogeologic region. Ground water yields are dependent on the type of aquifer and vary greatly throughout the county. Pollution potential indexes are relatively low to moderate in upland areas. Areas adjacent to streams have moderate pollution potential indexes. The Buried Valley settings are usually the most vulnerable to contamination and have the highest pollution potential values.

Ground water pollution potential analysis in Coshocton County resulted in a map with symbols and colors which illustrate areas of varying ground water contamination vulnerability. Six hydrogeologic settings were identified in Coshocton County with computed ground water pollution potential indexes ranging from 61 to 187.

The ground water pollution potential mapping program optimizes the use of existing data to rank areas with respect to relative vulnerability to contamination. The ground water pollution potential map of Coshocton County has been prepared to assist planners, managers, and local officials in evaluating the potential for contamination from various sources of pollution. This information can be used to help direct resources and land use activities to appropriate areas, or to assist in protection, monitoring, and clean-up efforts.

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INTRODUCTION

The need for protection and management of ground water resources in Ohio has been clearly recognized. About 42 percent of Ohio citizens rely on ground water for drinking and household use from both municipal and private wells. Industry and agriculture also utilize significant quantities of ground water for processing and irrigation. In Ohio, approximately 700,000 rural households depend on private wells; 4,000 of these wells exist in Coshocton County.

The characteristics of the many aquifer systems in the state make ground water highly vulnerable to contamination. Measures to protect ground water from contamination usually cost less and create less impact on ground water users than clean-up of a polluted aquifer. Based on these concerns for protection of the resource, staff of the Division of Water conducted a review of various mapping strategies useful for identifying vulnerable aquifer areas. They placed particular emphasis on reviewing mapping systems that would assist in state and local protection and management programs. Based on these factors and the quantity and quality of available data on ground water resources, the DRASTIC mapping process (Aller et al., 1987) was selected for application in the program.

Considerable interest in the mapping program followed successful production of a demonstration county map and led to the inclusion of the program as a recommended initiative in the Ohio Ground Water Protection and Management Strategy (Ohio EPA, 1986). Based on this recommendation, the Ohio General Assembly funded the mapping program. A dedicated mapping unit has been established in the Division of Water, Water Resources Section to implement the ground water pollution potential mapping program on a county-wide basis in Ohio.

The purpose of this report and map is to aid in the protection of our ground water resources. This protection can be enhanced by understanding and implementing the results of this study which utilizes the DRASTIC system of evaluating an area's potential for ground water pollution. The mapping program identifies areas that are vulnerable to contamination and displays this information graphically on maps. The system was not designed or intended to replace site-specific investigations, but rather to be used as a planning and management tool. The map and report can be combined with other information to assist in prioritizing local resources and in making land use decisions.

APPLICATIONS OF POLLUTION POTENTIAL MAPS

The pollution potential mapping program offers a wide variety of applications in many counties. The ground water pollution potential map of Coshocton County has been prepared to assist planners, managers, and state and local officials in evaluating the relative vulnerability of areas to ground water contamination from various sources of pollution. This information can be used to help direct resources and land use activities to appropriate areas, or to assist in protection, monitoring, and clean-up efforts.

An important application of the pollution potential maps for many areas will be to assist in county land use planning and resource expenditures related to solid waste disposal. A county may use the map to help identify areas that are suitable for disposal activities. Once these areas have been identified, a county can collect more site-specific information and combine this with other local factors to determine site suitability.

Pollution potential maps may be applied successfully where non-point source contamination is a concern. Non-point source contamination occurs where land use activities over large areas impact water quality. Maps providing information on relative vulnerability can be used to guide the selection and implementation of appropriate best management practices in different areas. Best management practices should be chosen based upon consideration of the chemical and physical processes that occur from the practice, and the effect these processes may have in areas of moderate to high vulnerability to contamination. For example, the use of agricultural best management practices that limit the infiltration of nitrates, or promote denitrification above the water table, would be beneficial to implement in areas of relatively high vulnerability to contamination.

A pollution potential map can assist in developing ground water protection strategies. By identifying areas more vulnerable to contamination, officials can direct resources to areas where special attention or protection efforts might be warranted. This information can be utilized effectively at the local level for integration into land use decisions and as an educational tool to promote public awareness of ground water resources. Pollution potential maps may be used to prioritize ground water monitoring and/or contamination clean-up efforts. Areas that are identified as being vulnerable to contamination may benefit from increased ground water monitoring for pollutants or from additional efforts to clean up an aquifer.

Other beneficial uses of the pollution potential maps will be recognized by individuals in the county who are familiar with specific land use and management problems. Planning commissions and zoning boards can use these maps to help make informed decisions about the development of areas within their jurisdiction. Developers proposing projects within ground water sensitive areas may be required to show how ground water will be protected.

Regardless of the application, emphasis must be placed on the fact that the system is not designed to replace a site-specific investigation. The strength of the system lies in its ability to make a "first-cut approximation" by identifying areas that are vulnerable to contamination. Any potential applications of the system should also recognize the assumptions inherent in the system.

SUMMARY OF THE DRASTIC MAPPING PROCESS

The system chosen for implementation of a ground water pollution potential mapping program in Ohio, DRASTIC, was developed by the National Water Well Association for the United States Environmental Protection Agency. A detailed discussion of this system can be found in Aller et al. (1987).

The DRASTIC mapping system allows the pollution potential of any area to be evaluated systematically using existing information. The vulnerability of an area to contamination is a combination of hydrogeologic factors, anthropogenic influences, and sources of contamination in any given area. The DRASTIC system focuses only on those hydrogeologic factors which influence ground water pollution potential. The system consists of two major elements: the designation of mappable units, termed hydrogeologic settings, and the superposition of a relative rating system to determine pollution potential.

The application of DRASTIC to an area requires the recognition of a set of assumptions made in the development of the system. DRASTIC evaluates the pollution potential of an area under the assumption that a contaminant with the mobility of water is introduced at the surface and flushed into the ground water by precipitation. Most important, DRASTIC cannot be applied to areas smaller than 100 acres in size and is not intended or designed to replace site-specific investigations.

Hydrogeologic Settings and Factors

To facilitate the designation of mappable units, the DRASTIC system used the framework of an existing classification system developed by Heath (1984), which divides the United States into 15 ground water regions based on the factors in a ground water system that affect occurrence and availability.

Within each major hydrogeologic region, smaller units representing specific hydrogeologic settings are identified. Hydrogeologic settings form the basis of the system and represent a composite description of the major geologic and hydrogeologic factors that control ground water movement into, through, and out of an area. A hydrogeologic setting represents a mappable unit with common hydrogeologic characteristics and, as a consequence, common vulnerability to contamination (Aller et al., 1987).

Figure 1 illustrates the format and description of a typical hydrogeologic setting found within Coshocton County. Inherent within each hydrogeologic setting are the physical characteristics which affect the ground water pollution potential. These characteristics or factors identified during the development of the DRASTIC system include:

D - Depth to Water

R - Net Recharge

A - Aquifer Media

S - Soil Media

T - Topography

I - Impact of the Vadose Zone Media

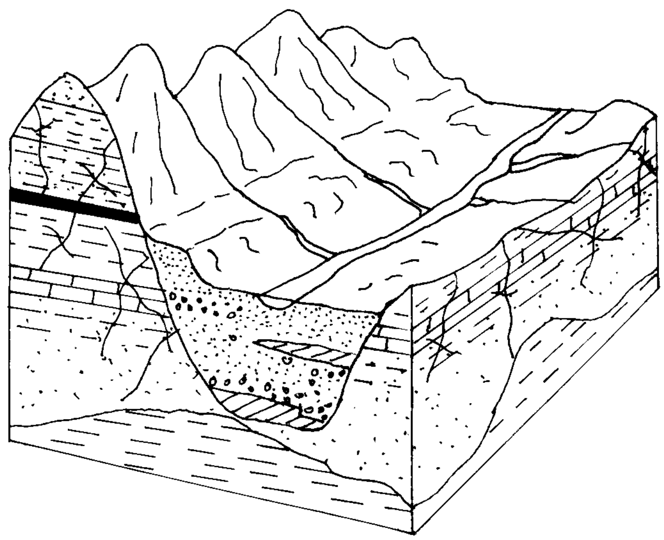
C - Conductivity (Hydraulic) of the Aquifer

These factors incorporate concepts and mechanisms such as attenuation, retardation, and time or distance of travel of a contaminant with respect to the physical characteristics of the hydrogeologic setting. Broad consideration of these factors and mechanisms coupled with existing conditions in a setting provide a basis for determination of the area's relative vulnerability to contamination.

Depth to water is considered to be the depth from the ground surface to the water table in unconfined aquifer conditions or the depth to the top of the aquifer under confined aquifer conditions. The depth to water determines the distance a contaminant would have to travel before reaching the aquifer. The greater the distance the contaminant has to travel, the greater the opportunity for attenuation to occur or restriction of movement by relatively impermeable layers.

Net recharge is the total amount of water reaching the land surface that infiltrates the aquifer measured in inches per year. Recharge water is available to transport a contaminant from the surface into the aquifer and affects the quantity of water available for dilution and dispersion of a contaminant. Factors to be included in the determination of net recharge include contributions due to infiltration of precipitation, in addition to infiltration from rivers, streams and lakes, irrigation, and artificial recharge.

Aquifer media represents consolidated or unconsolidated rock material capable of yielding sufficient quantities of water for use. Aquifer media accounts for the various physical characteristics of the rock that provide mechanisms of attenuation, retardation, and flow pathways that affect a contaminant reaching and moving through an aquifer.



<u>7D Buried Valley</u>

This setting is characterized by thick deposits of sand and gravel that have been deposited in a former topographic low (usually a pre-glacial river valley) by glacial meltwater. Many of the buried valleys in Coshocton County underlie the broad, flat lying floodplains of modern rivers. The boundary between the buried valley and the adjacent bedrock upland is usually prominent. The buried valleys contain substantial thicknesses of permeable sand and gravel, that serve as the aquifer. The aquifer is typically in hydraulic connection with the modern rivers. The vadose zone is typically composed of sand and gravel but significant amounts of silt and clay can be found in discrete areas. Silt loams, loams, and sandy loams are the typical soil types for this setting. Depth to water is typically under 30 feet for areas adjacent to modern rivers, and between 30 to 50 feet for terraces that border the bedrock uplands. Recharge is generally high due to permeable soils and vadose zones, shallow depth to water, and the presence of surface streams.

Figure 1. Format and description of the hydrogeologic setting - 7D Buried Valley

Soil media refers to the upper six feet of the unsaturated zone that is characterized by significant biological activity. The type of soil media can influence the amount of recharge that can move through the soil column due to variations in soil permeability. Various soil types also have the ability to attenuate or retard a contaminant as it moves throughout the soil profile. Soil media is based on textural classifications of soils and considers relative thicknesses and attenuation characteristics of each profile within the soil.

Topography refers to the slope of the land expressed as percent slope. The amount of slope in an area affects the likelihood that a contaminant will run off from an area or be ponded and ultimately infiltrate into the subsurface. Topography also affects soil development and often can be used to help determine the direction and gradient of ground water flow under water table conditions.

The impact of the vadose zone media refers to the attenuation and retardation processes that can occur as a contaminant moves through the unsaturated zone above the aquifer. The vadose zone represents that area below the soil horizon and above the aquifer that is unsaturated or discontinuously saturated. Various attenuation, travel time, and distance mechanisms related to the types of geologic materials present can affect the movement of contaminants in the vadose zone. Where an aquifer is unconfined, the vadose zone media represents the materials below the soil horizon and above the water table. Under confined aquifer conditions, the vadose zone is simply referred to as a confining layer. The presence of the confining layer in the unsaturated zone significantly impacts the pollution potential of the ground water in an area.

Hydraulic conductivity of an aquifer is a measure of the ability of the aquifer to transmit water, and is also related to ground water velocity and gradient. Hydraulic conductivity is dependent upon the amount and interconnectivity of void spaces and fractures within a consolidated or unconsolidated rock unit. Higher hydraulic conductivity typically corresponds to higher vulnerability to contamination. Hydraulic conductivity considers the capability for a contaminant that reaches an aquifer to be transported throughout that aquifer over time.

Weighting and Rating System

DRASTIC uses a numerical weighting and rating system that is combined with the DRASTIC factors to calculate a ground water pollution potential index or relative measure of vulnerability to contamination. The DRASTIC factors are weighted from 1 to 5 according to their relative importance to each other with regard to contamination potential (Table 1). Each factor is then divided into ranges or media types and assigned a rating from 1 to 10 based on their significance to pollution potential (Tables 2-8). The rating for each factor is selected based on available information and professional judgement. The selected rating for each factor is multiplied by the assigned weight for each factor. These numbers are summed to calculate the DRASTIC or pollution potential index.

Once a DRASTIC index has been calculated, it is possible to identify areas that are more likely to be susceptible to ground water contamination relative to other areas. The higher the DRASTIC index, the greater the vulnerability to contamination. The index generated provides only a relative evaluation tool and is not designed to produce absolute answers or to represent units of vulnerability. Pollution potential indexes of various settings should be compared to each other only with consideration of the factors that were evaluated in determining the vulnerability of the area.

Pesticide DRASTIC

A special version of DRASTIC was developed to be used where the application of pesticides is a concern. The weights assigned to the DRASTIC factors were changed to reflect the processes that affect pesticide movement into the subsurface with particular emphasis on soils. Where other agricultural practices, such as the application of fertilizers, are a concern, general DRASTIC should be used to evaluate relative vulnerability to contamination. The process for calculating the Pesticide DRASTIC index is identical to the process used for calculating the general DRASTIC index. However, general DRASTIC and Pesticide DRASTIC numbers should not be compared because the conceptual basis in factor weighting and evaluation differs significantly. Table 1 lists the weights used for general and pesticide DRASTIC.

TABLE 1. ASSIGNED WEIGHTS FOR DRASTIC FEATURES

Feature	General DRASTIC Weight	Pesticide DRASTIC Weight
Depth to Water	5	5
Net Recharge	4	4
Aquifer Media	3	3
Soil Media	2	5
Topography	1	3
Impact of the Vadose Zone Media	5	4
Hydraulic Conductivity of the Aquifer	3	2

TABLE 2. RANGES AND RATINGS FOR DEPTH TO WATER

DEPTH TO WATER (FEET)	
Range	Rating
0-5	10
5-15	9
15-30	7
30-50	5
50-75	3
75-100	2
100+	1
Weight: 5	Pesticide Weight: 5

TABLE 3. RANGES AND RATINGS FOR NET RECHARGE

NET RECHARGE (INCHES)	
Range	Rating
0-2	1
2-4	3
4-7	6
7-10	8
10+	9
Weight: 4	Pesticide Weight: 4

TABLE 4. RANGES AND RATINGS FOR AQUIFER MEDIA

AQUIFER MEDIA		
Range	Rating	Typical Rating
Massive Shale	1-3	2
Metamorphic / Igneous	2-5	3
Weathered Metamorphic / Igneous	3-5	4
Glacial Till	4-6	5
Bedded Sandstone, Limestone and Shale Sequences	5-9	6
Massive Sandstone	4-9	6
Massive Limestone	4-9	6
Sand and Gravel	4-9	8
Basalt	2-10	9
Karst Limestone	9-10	10
Weight: 3	Pesticide Weight: 3	

TABLE 5. RANGES AND RATINGS FOR SOIL MEDIA

SOIL MEDIA	
Range	Rating
Thin or Absent	10
Gravel	10
Sand	9
Peat	8
Shrinking and / or Aggregated Clay	7
Sandy Loam	6
Loam	5
Silty Loam	4
Clay Loam	3
Muck	2
Nonshrinking and Nonaggregated Clay	1
Weight: 2	Pesticide Weight: 5

TABLE 6. RANGES AND RATINGS FOR TOPOGRAPHY

TOPOGRAPHY (PERCENT SLOPE)	
Range	Rating
0-2	10
2-6	9
6-12	5
12-18	3
18+	1
Weight: 1	Pesticide Weight: 3

TABLE 7. RANGES AND RATINGS FOR IMPACT OF THE VADOSE ZONE MEDIA

IMPACT OF THE VADOSE ZONE MEDIA		
Range	Rating	Typical Rating
Confining Layer	1	1
Silt/Clay	2-6	3
Shale	2-5	3
LImestone	2-7	6
Sandstone	4-8	6
Bedded Limestone, Sandstone, Shale	4-8	6
Sand and Gravel with significant Silt and Clay	4-8	6
Metamorphic/Igneous	2-8	4
Sand and Gravel	6-9	8
Basalt	2-10	9
Karst Limestone	8-10	10
Weight: 5	Pesticide Weight: 4	

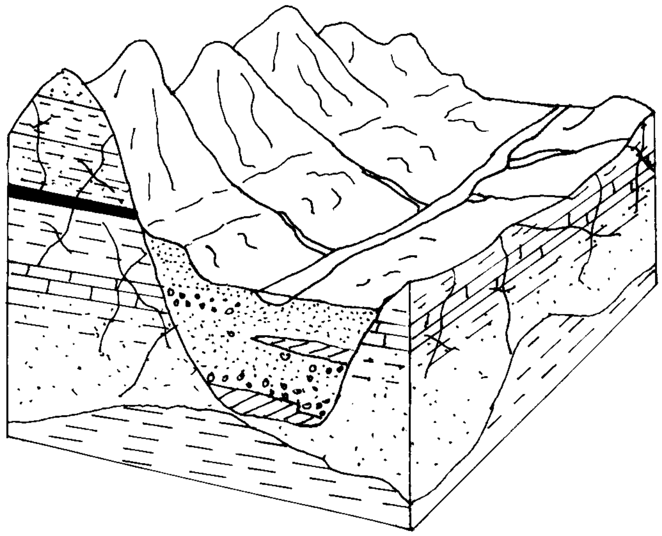
TABLE 8. RANGES AND RATINGS FOR HYDRAULIC CONDUCTIVITY

HYDRAULIC CONDUCTIVITY (GPD/FT^2)	
Range	Rating
1-100	1
100-300	2
300-700	4
700-1000	6
1000-2000	8
2000+	10
Weight: 3	Pesticide Weight: 2

Integration of Hydrogeologic Settings and DRASTIC Factors

Figure 2 illustrates the hydrogeologic setting 7D1 Buried Valley, identified in mapping Coshocton County, and the pollution potential index calculated for the setting. Based on selected ratings for this setting, the pollution potential index is calculated to be 106. This numerical value has no intrinsic meaning, but can be readily compared to a value obtained for other settings in the county. DRASTIC indexes for typical hydrogeologic settings and values across the United States range from 65 to 223. The diversity of hydrogeologic conditions in Coshocton County produces settings with a wide range of vulnerability to ground water contamination. Calculated pollution potential indexes for the six settings identified in the county range from 61 to 187.

Hydrogeologic settings identified in an area are combined with the pollution potential indexes to create units that can be graphically displayed on maps. Pollution potential analysis in Coshocton County resulted in a map with symbols and colors that illustrate areas of ground water vulnerability. The map describing the ground water pollution potential of Coshocton County is included with this report.



SETTING 7D1		GENERAL		
FEATURE	RANGE	WEIGHT	RATING	NUMBER
Depth to Water	30-50	5	5	25
Net Recharge	4-7	4	6	24
Aquifer Media	Sand & Gravel	3	6	18
Soil Media	Silt Loam	2	4	8
Topography	6-12%	1	5	5
Impact of Vadose Zone	Silt/Clay	5	4	20
Hydraulic Conductivity	100-300	3	2	6
		DRASTIC	INDEX	106

Figure 2. Description of the hydrogeologic setting - 7D1 Buried Valley

INTERPRETATION AND USE OF A GROUND WATER POLLUTION POTENTIAL MAP

The application of the DRASTIC system to evaluate an area's vulnerability to contamination produces hydrogeologic settings with corresponding pollution potential indexes. The higher the pollution potential index, the greater the susceptibility to contamination. This numeric value determined for one area can be compared to the pollution potential index calculated for another area.

The map accompanying this report displays both the hydrogeologic settings identified in the county and the associated pollution potential indexes calculated in those hydrogeologic settings. The symbols on the map represent the following information:

7D1 - defines the hydrogeologic region and setting
106 - defines the relative pollution potential

Here the first number (7) refers to the major hydrogeologic region and the letter (D) refers to a specific hydrogeologic setting. The following number (1) references a certain set of DRASTIC parameters that are unique to this setting and are described in the corresponding setting chart. The second number (106) is the calculated pollution potential index for this unique setting. The charts for each setting provide a reference to show how the pollution potential index was derived in an area.

The maps are color-coded using ranges depicted on the map legend. The color codes used are part of a national color-coding scheme developed to assist the user in gaining a general insight into the vulnerability of the ground water in the area. The color codes were chosen to represent the colors of the spectrum, with warm colors (red, orange, and yellow) representing areas of higher vulnerability (higher pollution potential indexes), and cool colors (greens, blues, and violet) representing areas of lower vulnerability to contamination.

The map includes information on the locations of selected observation wells. Available information on these observation wells is referenced in Appendix A, Description of the Logic in Factor Selection. Large man-made features such as landfills, quarries, or strip mines have also been marked on the map for reference.

Physiography and Climate

Coshocton County is located in east-central Ohio. The county is divided into 22 townships. Coshocton County is bounded to the north by Holmes County, to the east by Tuscarawas County, to the southeast by Guernsey County, to the south by Muskingum County, to the southwest by Licking County, and to the West by Knox County (Figure 3). The county seat is Coshocton. The population of Coshocton County was estimated to be 35,427 in 1990 (Ohio Department of Development, 1991).

Land use in Coshocton County is predominantly agricultural. In 1976, approximately 51.33 percent of the County was classified as agricultural. The remaining land was classified as 42.74 percent forested, 3.09 percent urban, 2.72 percent barren, and .12 percent surface water (U.S. Department of Interior, 1978a, 1978b).

Coshocton County lies within the Glaciated Plateau and Unglaciated Plateau Physiographic Provinces of Ohio (Fenneman, 1938). Most of the county lies within the Unglaciated Plateau Region. The Glaciated Plateau section occupies a small area in the west-central part of the county (Figure 4).

Precipitation and temperature are recorded at the wastewater treatment plant and at the Agricultural Research Station in Coshocton County. The normal annual average amount of precipitation for the period from 1961 to 1990 was 39.98 inches at the wastewater treatment plant and 36.69 inches at the Agricultural Research Station (United States Department of Commerce, 1992). The normal average annual temperature for the same time period was 50.5 degrees Fahrenheit at the wastewater treatment plant and 49.8 degrees Fahrenheit at the Agricultural Research Station (United States Department of Commerce, 1992). Table 9 lists the normal monthly averages for precipitation and temperature at both locations.

Figure 3. Location of Coshocton County

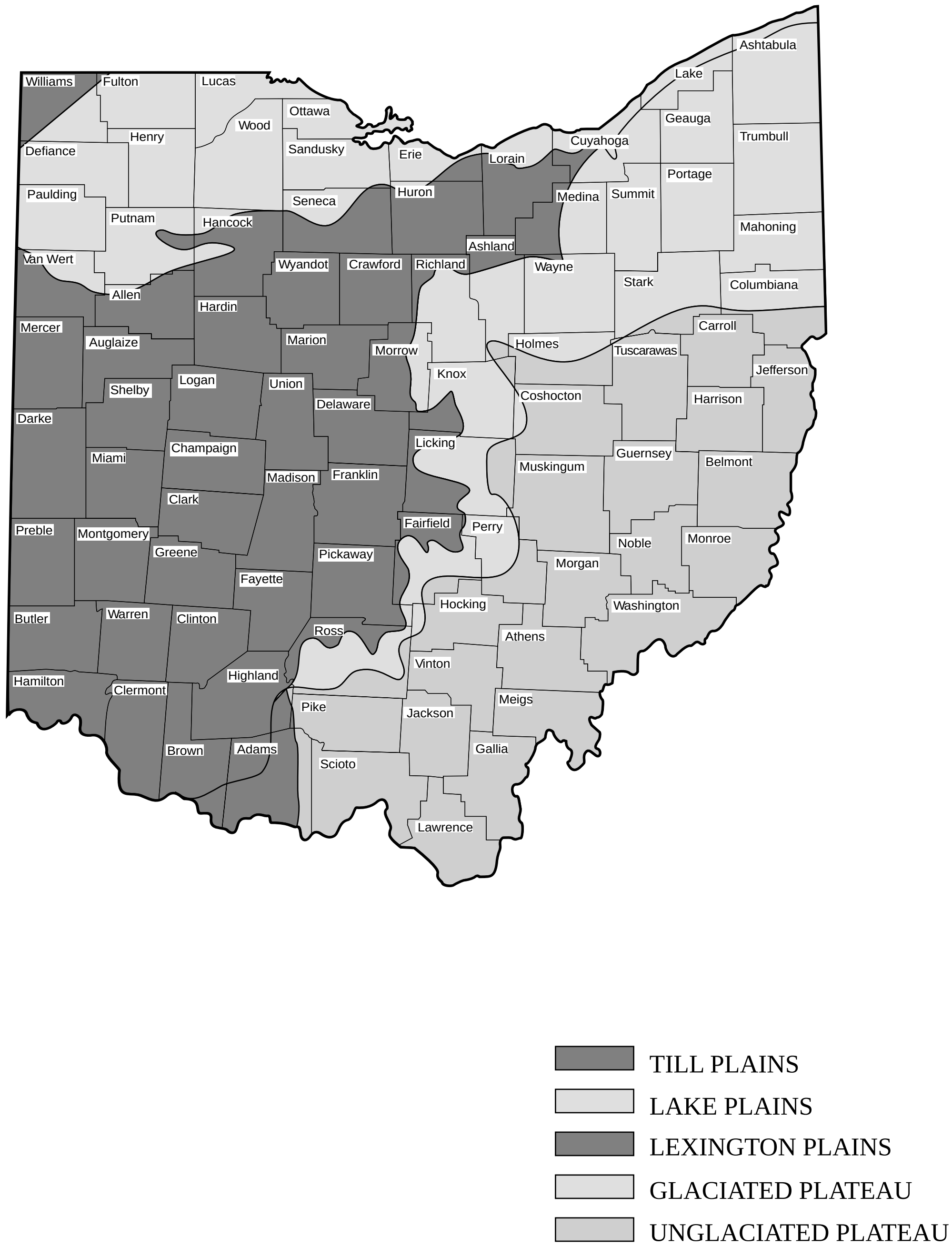


Figure 4. Physiographic Sections of Ohio (Modified from Ohio Department of Natural Resources, 1982)

Table 9. Normal Averages for Precipitation (Inches) and Temperature (Degrees Fahrenheit), (from U.S. Department of Commerce, 1992)

	Wastewater Treatment Plant		Agricultural Research Station	
Month	Precipitation	Temperature	Precipitation	Temperature
January	2.28	26.1	2.11	24.3
February	2.45	29.2	2.09	27.0
March	3.35	40.0	3.15	38.0
April	3.74	49.8	3.32	48.8
May	3.99	60.0	3.77	59.6
June	3.73	68.4	3.66	68.0
July	4.63	72.1	4.23	72.1
August	3.70	70.6	3.32	70.7
September	3.14	64.1	3.05	64.4
October	2.59	52.5	2.34	52.8
November	3.36	42.2	3.00	41.8
December	3.02	31.5	2.65	30.1
TOTALS	39.98	50.5	36.69	49.8

Modern Drainage

Coshocton County lies within the Muskingum River Basin. The Muskingum River Basin is divided into smaller sub-basins (Ohio Department of Natural Resources, 1985). Sub-basins include the Lower Mohican River Basin, the Kokosing River Basin, the Walhonding River Basin, the Lower Tuscarawas River Basin, and the Lower Wills Creek Basin (Figure 5). Areas adjacent to major rivers and tributaries within the basins and sub-basins usually have the highest DRASTIC index values.

Bedrock Geology

The bedrock of Coshocton County that outcrops at the surface consists of sedimentary rocks from the Mississippian and Pennsylvanian System. The bedrock units vary in thickness and dip to the southeast (Lamborn, 1954).

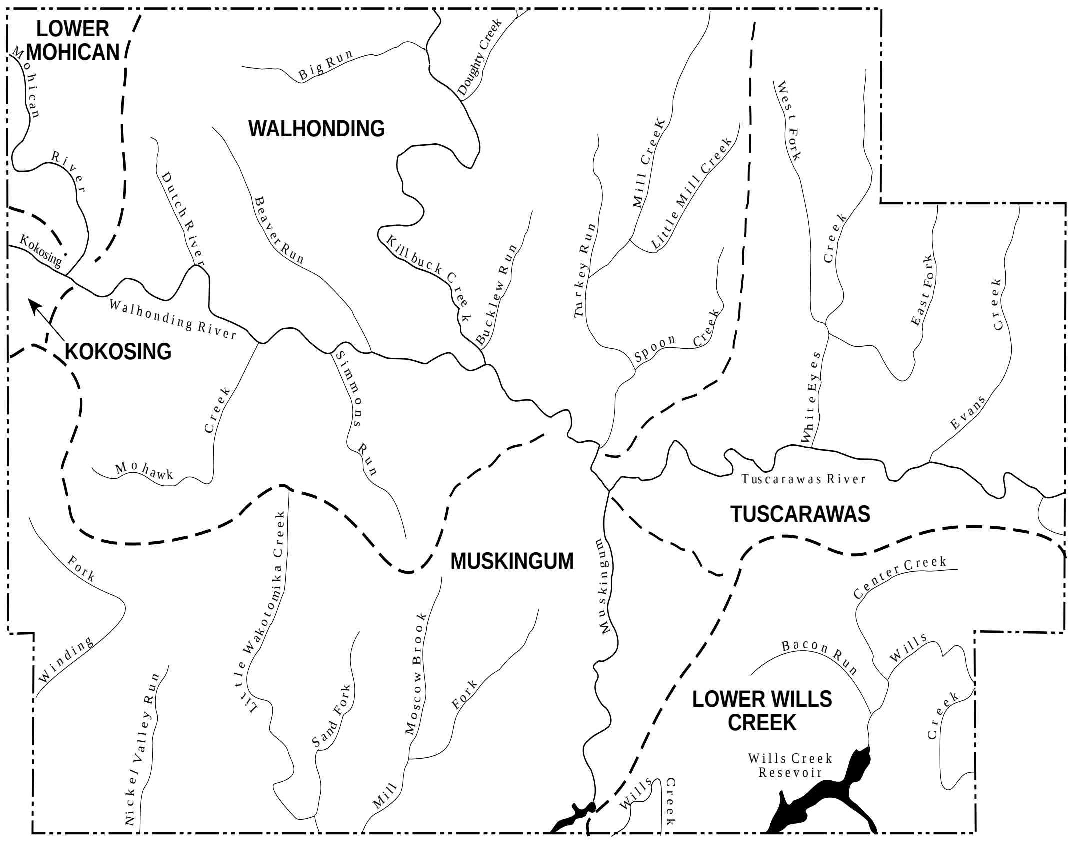
The Mississippian System of rocks is exposed on the lower slopes of deep valleys in the northwest and southwest areas of Coshocton County. The rocks consist of beds of greenish-gray to brown fine grained sandstones and siltstones interbedded with shales (Lamborn, 1954). These units are referred to as the Logan Formation (Table 10).

The Pennsylvanian System of rocks has an outcrop area of about eighty-five percent in Coshocton County (Lamborn, 1954). The rocks consist of recurring beds of coal, clay, limestone, shale, and sandstone. In Coshocton County, the Pennsylvanian System is divided into the Pottsville, Allegheny, and Conemaugh series (Table 10).

Quaternary Geology

The quaternary deposits of Coshocton County consist of dissected ground moraine, lacustrine silts, outwash, alluvium, and colluvium (Hull, 1993; Goldthwait and Pavey, 1993). Most of the older materials (ground moraine, lacustrine silts, outwash) were deposited by ice and streams leading from the glaciers during periods of glaciation. Recent quaternary deposits are a result of deposition by water (alluvium) and by weathering of bedrock (colluvium).

Figure 5. Map of Coshocton County Drainage (Modified from Ohio Department of Natural Resources, 1985)



– – – – Drainage Basin Divides

Streams and Rivers

Table 10. Generalized Bedrock Stratigraphy of Coshocton County, Ohio. (Modified from Lamborn, 1954)

SYSTEM	SERIES	SIGNIFICANT MEMBERS OR BEDS
PENNSYLVANIAN	Conemaugh	Undifferentiated limestone, shale, sandstone, coal, and clays.
	Allegheny	
	Pottsville	
MISSISSIPPIAN		Sandstones and shales

During the Pleistocene Epoch (two million to ten thousand years ago), at least four episodes of glaciation occurred in North America. In Coshocton County, evidence exists for the two most recent glacial stages; the Illinoin and the Wisconsinan. The Illinoian occurred at least 120,000 years ago and the Wisconsinan occurred between 70,000 and 10,000 years ago.

Known deposits of dissected ground moraine are found in western Coshocton County in Perry and Newcastle townships. These Illinoian deposits consist of silty loam till occurring on ridgetops and mixed with weathered bedrock as colluvium on slopes. Oil and gas records show drift in this area having a maximum thickness of 103 feet (Pavey, in progress (e)).

Lacustrine silts were deposited in low velocity water of glacial and slackwater lakes and are found in valleys where pre-existing drainage was blocked. The deposits are late Wisconsinan in age and are composed of poorly-to well- laminated silts that may contain fine sand or clay.

Outwash deposits are found in several locations in Coshocton County. Outwash is well sorted and stratified sand and gravel that may contain some silts and clays. It was deposited during the Illinoian and Late Wisconsinan by meltwater flowing in front of glacial ice. Surficial outwash deposits occur primarily as terraces or as low plains. Older outwash deposits can occur as small benches or high terraces that are several feet above modern drainage. Outwash deposits have filled pre-existing valleys in parts of Coshocton County with up to 225 feet of material.

Alluvium and alluvial terraces were deposited within the past 10,000 years by water in present and former floodplains. Deposits are highly variable and heterogeneous, ranging in composition from silty clay to gravel.

Colluvium is a loose, heterogeneous mass of soil and/or rock fragments deposited by slow continuous downslope creep. Colluvium is present at the base of gentle slopes or hillsides in much of the unglaciated areas of Coshocton County. Colluvium can be found in areas that include residuum, weathered material, landslides, and bedrock outcrop.

Ground Water Resources

In Coshocton County, ground water occurs in two distinct aquifer media: bedrock and unconsolidated sand and gravel. Both aquifer media serve as water sources for municipal and private supplies. Well log and drilling reports for the county reveal that wells developed in the sand and gravel aquifers are typically less than 100 feet deep and seldom exceed 180 feet. Well depths in the bedrock aquifers are highly variable but seldom exceed 400 feet.

The unconsolidated sand and gravel aquifers in Coshocton County are found in buried valleys. Some of these aquifers may have a saturated thickness of up to 150 feet. The coarse, permeable sand and gravel deposits underlying the Kokosing River, Walhonding River, Killbuck Creek, Tuscawarwas River, and Muskingum River are the most productive aquifers in the county. Yields of more than 500 gallons per minute (GPM) may be developed in most of these aquifers (Sugar, 1988). Aquifers underlying the Mohican River and Wills Creek contain significant deposits of silt and clay that separate the sand and gravel aquifers. Aquifers within these areas may yield up to 100 GPM, depending on the extent of coarse sand and gravel present. Yields of 10 to 25 GPM may be developed in smaller buried valleys and glacial lake areas that contain valley fill material. Wells not encountering sand and gravel aquifers in these areas are often developed in the underlying bedrock.

The bedrock aquifers of Coshocton County consist of Mississippian and Pennsylvanian age rocks. Wells developed in the bedrock often penetrate several aquifers or water-producing zones. Yields are influenced by the number of fractures or bedding planes intersected by the well. Higher yields are often associated with shallower bedrock wells located in valleys. This may be the result of an increase in fractures due to stress relief. This phenomenon may be similar to that observed by Wyrick and Borchers (1981). Well yields for bedrock aquifers are also dependant on the stratigraphic unit in which the well is developed. Wells developed in the sandstones, shales, and limestones of the lower Pennsylvanian and in the upper Mississippian sandstone and shales typically yield 3 to 25 GPM (Sugar, 1988). Wells developed in the sandstone, shale, and limestone sequences of the middle to lower Pennsylvanian usually yield less that 3 GPM.

Strip and Underground Mined Areas

The pollution potential of strip mined and abandoned underground mined areas was not evaluated in Coshocton County. Although "DRASTIC: A Standardized System for Evaluating Ground Water Pollution Using Hydrogeologic Settings (Aller et al., 1987)" does identify mining as a possible source of ground water contamination, it does not discuss a methodology to evaluate the vulnerability of aquifers to contamination in these areas.

Many geologic and hydrogeologic changes occur in areas that have undergone or are undergoing mining and reclamation activities (Bonta et al., 1992 and Razem, 1983). The extent of these changes may not be known or may have a high degree of variability from one location to another.

Mining activities have the ability to affect all DRASTIC parameters. Tables 11 and 12 are lists of the DRASTIC parameters and the possible impacts that mining may have on the rating scheme. These tables are not meant to be a comprehensive listing of the impacts of mining on ground water systems. They are provided to illustrate the uncertainty of evaluating the pollution potential of mined areas.

Although the pollution potential of strip and abandoned underground mined areas was not evaluated, these areas were delineated. Only the most prominent and conspicuous mined areas were delineated on the Pollution Potential Map of Coshocton County. Delineations of mined areas were made using information from the Soils Survey of Coshocton County, Ohio (Hempel et al., 1993), abandoned underground mine maps (Ohio Department of Natural Resources, Division of Geological Survey, open file maps), and the Coshocton County portion of United States Geological Survey 7.5 minute quadrangle maps. Site-specific information for mined areas can be obtained from the Ohio Department of Natural Resources, Division of Reclamation and Division of Geological Survey.

Table 11. Potential Factors Influencing DRASTIC Ratings for Strip Mined Areas

Parameter	Impacts and effects of activity on DRASTIC Ratings
Depth to Water	removal of material overlying the aquifer will decrease the depth to water (i.e. increase DRASTIC rating); removal of uppermost aquifer will increase the depth to water (i.e. decrease DRASTIC rating)
Net Recharge	mineral extraction and reclamation could increase the degree of fracturing, increase the permeability of the vadose zone and soils therefore increasing the amount of recharge (i.e. increase DRASTIC rating); compaction of fine grained spoils could decrease the amount of recharge to the aquifer (i.e. decrease DRASTIC rating)
Aquifer Media	mineral extraction could remove the uppermost aquifer
Soil Media	removal of soils will provide less of a barrier for contaminant transport (i.e. increase soil rating); reclaimed soils may have a lower permeability than the original cover (i.e. decrease soil rating)
Topography	strip mining can change the contour of the land surface making delineation of this parameter virtually impossible
Impact of Vadose Zone	fracturing of vadose zone media could increase the permeability (i.e. increase rating); compaction of soils during reclamation could decrease the permeability (i.e. decrease rating)
Hydraulic Conductivity	fracturing of aquifer media could increase the conductivity (i.e. increase DRASTIC rating)

Table 12. Potential Factors Influencing DRASTIC Ratings for Underground Mined Areas

Parameter	Impact of Activity and effects on DRASTIC Ratings
Depth to Water	collapse of underground mines have the potential to fracture overlying confining units, therefore causing a dewatering of overlying aquifers (i.e. decrease rating)
Net Recharge	fracturing of overlying strata can increase amount of recharge to the aquifer (i.e. increase rating)
Aquifer Media	upper aquifers could be dewatered and underground mine could become the aquifer
Soil Media	fractures may extend to the land surface
Topography	this factor will not be affected unless severe subsidence occurs
Impact of Vadose Zone	fracturing and air shafts in the vadose zone could increase the permeability and provide a direct conduit for contamination (i.e. increase rating)
Hydraulic Conductivity	upper aquifers not dewatered as a result of fracturing or subsidence would have higher conductivity values, underground mines serving as the aquifer media will have high conductivity values (i.e. higher rating)

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APPENDIX A

DESCRIPTION OF THE LOGIC IN FACTOR SELECTION

Depth to Water

Depth to water was evaluated using information obtained from Well Log and Drilling Reports on file at the Ohio Department of Natural Resources (ODNR), Division of Water. In areas lacking well log information, an interpretation of the geomorphology was made to evaluate the depth to water. Depth to water evaluations were dependant on whether the aquifer examined was assumed to be unconfined, semi-confined (leaky), or confined.

Depth to water for unconfined aquifers was evaluated as the depth from the land surface (in feet) to the point where the unconsolidated or lithified aquifer medium is saturated with water. This was assumed to be the static water level on well log and drilling reports. Regionally extensive sand and gravel aquifers within the Buried Valley setting (7D) and portions of the Alluvium without Overbank setting (6Fb) and the Glacial Lake/Slackwater Terrace setting (7Fa) exhibited unconfined conditions. Depths to water for these settings ranged from 5 to 50 feet below the land surface which corresponds to DRASTIC ratings of (9) to (5) (Table 2). Depth to water in these settings was usually shallowest in discharge areas adjacent to stream channels and became deeper on stream and slackwater terraces.

Depth to water for confined aquifers was assumed to be the distance (in feet) from the land surface to the top of the aquifer . DRASTIC does not permit the user to designate an aquifer as semi-confined (Aller et al., (1987). Therefore, a quantitative judgement with respect to pollution potential was made as to the degree of confinement of the aquifer. Due to relative low permeability of the bedrock aquifers and their overlying rock units, wells developed in the bedrock aquifers were evaluated as confined.

Well log information reveals that residential wells often penetrate several "aquifers" or water-producing zones that are sometimes separated by rock units of a lower permeability. Well log and drilling reports show that aquifers and confining units are discontinuous and not laterally extensive. The combined amount of water from each of these aquifers usually yields less that 10 gallons per minute (GPM) to wells. The static water levels in confined and semi-confined aquifers, as noted in well log and drilling reports, is dependant on the depth to which a well is drilled. The general correlation observed for wells penetrating these aquifers was that the deeper the well, the deeper the static level. The distance from the land surface to the top of a bedrock aquifer located beneath ridges and hillsides was assumed to be 50 to 100 feet. This corresponds to a DRASTIC rating of (3) to (2) (Table 2) for most of the bedrock aquifers evaluated in the Thin Regolith over Bedded Sedimentary Rock setting (6Da) and for portions of the bedrock aquifers evaluated in the Till over Sedimentary Rocks setting (7Aa). Depth to water for settings at lower elevations, such as the Alluvium over Sedimentary Rocks setting (6Fa) and Glacial Lake/Slackwater Terrace setting (7Fa), were generally shallower. Depth to water (or the top of the aquifer) could usually be found 30 to 75 feet below the land surface. These depths correspond to a DRASTIC rating of (5) to (3) (Table 2).

Net Recharge

As used in DRASTIC methodology, net recharge is defined as the total quantity of precipitation, in inches per year, applied to the ground surface that infiltrates to the aquifer (Aller et al., 1987). The average annual amount of precipitation for Coshocton County is approximately 38 inches per year (United States Department of Commerce, 1992). Only a portion of the rainfall actually recharges the aquifer. The remaining amount is lost through evaporation, transpiration, withdrawal, and runoff. Factors influencing the rate of ground water recharge include: the amount of precipitation, the permeability and degree of fracturing of the soil and vadose zone media, topography, and depth to water.

Areas mapped as Thin Regolith over Bedded Sedimentary Rocks (6Da) generally have a deep depth to water, aquifer and vadose zone material of a low permeability, and steep-sided slopes. Some of the precipitation that does not become runoff moves laterally and discharges as springs, while the remainder moves slowly downward as leakage. These factors limit the amount of recharge to the aquifer. The average effective recharge rate during a year of normal precipitation for bedrock areas that contain thin layers of sandstone, shale, and limestone is 3.77 inches per year (179,000 gallons per day per square mile (GPD/Sq. Mi.)) (Pettyjohn and Henning, 1979). Therefore, the majority of the settings mapped as Thin Regolith over Bedded Sedimentary Rocks (6Da) were given a DRASTIC rating for recharge of (3) (2 to 4 inches per year) (Table 3).

Areas mapped as Alluvium without overbank deposits (6Fb), Glacial Lake/Slackwater Terrace (7Fb), Alluvium over Bedded Sedimentary Rocks (7Ec), Till over Bedded Sedimentary Rocks (7Aa), and portions of the Buried Valley (7D) and portions of the Thin Regolith over Bedrock (6Da) settings were given a DRASTIC rating for recharge of (6) (4 to 7 inches per year) (Table 3). These settings were given the higher DRASTIC rating relative to the Thin Regolith over Bedded Sedimentary Rock setting (6Da) because the depths to water were generally shallower, the aquifer and vadose zone material were believed to be more permeable due to increase in fractures, and the slopes were less steep (i.e. less runoff).

The Buried Valley Setting (7D) is characterized by unconfined aquifers that have very permeable sand and gravel vadose zones and relatively shallow depth to water. A DRASTIC rating of (8) (7 to 10 inches per year) was assigned for recharge to the majority of the Buried Valley setting (7D). This corresponds to the average effective recharge rate during a year of normal precipitation of 8.9 inches per year (426,000 GPD/Sq. Mi.) for extensive and permeable outwash (Pettyjohn and Henning, 1979).

Aquifer Media

Aquifer Media is defined as the consolidated or unconsolidated material that yields sufficient quantities of water for use (Aller et al., 1987). DRASTIC ratings are assigned to aquifer media based on the degree of fracturing and bedding of bedrock aquifers, and on the degree of sorting and the amount of fine material present in the sand and gravel aquifers. Aquifer Media were evaluated using information obtained from the following sources: well log and drilling reports on file at the ODNR Division of Water, Stout et al. (1943), Wyrick and Borchers (1981), Sugar (1988), Lamborn (1954), Bonta et al. (1992), and Razem (1983).

The bedrock aquifers in Coshocton County were evaluated as hydrostratigraphic units. A hydrostratigraphic unit is defined as a formation, part of a formation, or a group of formations in which there are similar hydrologic characteristics allowing for grouping into aquifers or confining layers (Fetter, 1980). The hydrostratigraphic units correspond to well yields that were delineated by Sugar (1988) and to the stratigraphy described by Lamborn (1954). Bedded sedimentary rocks evaluated as aquifer media can be found in all of the hydrogeologic settings mapped for Coshocton County.

Areas in which wells were developed in sandstone, shale, limestone, and coal sequences of the middle to lower Pennsylvanian System and which yield less than 3 gallons per minute (GPM) were given a DRASTIC rating of (3) for aquifer media. Areas in which wells were developed in the sandstone, shale, and coal sequences of the lower Pennsylvanian system and sandstone and shale sequences of the upper Mississippian system, and which yield 3 to 10 GPM were given a DRASTIC rating of (4) for aquifer media. Areas in which wells were developed in the sandstone, shale, and coal sequences of the lower Pennsylvanian system and sandstone and shale sequences of the upper Mississippian system, and which yield 10 to 25 GPM were given a DRASTIC rating of (5) for aquifer media.

The sand and gravel aquifers of Coshocton County were given DRASTIC ratings of (6), (7), or (8) depending on the degree of sorting, coarseness, and the composition of the deposits. A DRASTIC rating of (8) was given to the aquifer medium for the Buried Valley settings (7D) located beneath the Walhonding, Tuscararwas, and the Muskingum Rivers. A DRASTIC rating of (7) was given to the sand and gravel aquifer located beneath the Mohican River and Wills Creek. A DRASTIC rating of (6) was given to the sand and gravel aquifers that are present in many of the smaller tributaries in Coshocton County.

Soils

Soils were mapped using the soil survey of Coshocton County (Hempal et al., 1993). Each soil was evaluated and given a DRASTIC rating for soil media (Table 5). Evaluations were based on the texture, permeability, and shrink swell potential for each soil material. The soils of Coshocton County showed a high degree of variability. This is a reflection of the parent material. Table 13 is a list of the soils and their corresponding DRASTIC values for Coshocton County.

Topography

Topography, or percent slope, was evaluated using USGS 7.5 minute quadrangle maps. Topography values in Coshocton County ranged from 0 to over 18 percent and were assigned DRASTIC ratings of (10) to (1).

Impact of the Vadose Zone Media

Vadose Zone media evaluated in Coshocton County consisted of bedded sedimentary rocks (interbedded sandstone, limestone, shale, and coal), silt and clay, sand and gravel, and sand and gravel with significant silt and clay. DRASTIC values were assigned based on the composition, thickness, and permeability of the medium evaluated. This parameter was evaluated using data obtained from well log and drilling reports on file at the ODNR, Division of Water.

A DRASTIC rating of (4) was given to all areas in which bedded sedimentary rocks were the vadose zone material. This material and rating are found in most of the Thin Regolith over Bedded Sedimentary Rock setting (6Da). Silt and clay were given a DRASTIC rating of

(4) or (5) for vadose zone. Silt and clay as a vadose zone material was usually found below streams, flood plains and slackwater terraces. Silt and clay were evaluated as the vadose zone material for major portions of the Alluvium without Overbank (6Fb), Buried Valley (7D), Alluvium over Till (7Ec), and the Glacial Lake / Slackwater Terrace (7Fa) settings.

Sand and gravel was the vadose zone material for the Buried Valley settings (7D) located adjacent to Killbuck Creek, and the Walhonding, Tuscararwas, Muskingum, and Mohican Rivers. These coarse sands and gravel were given a DRASTIC rating of (7) or (8). Sand and gravel with significant silt and clay was given a DRASTIC rating of (5) or (6) for vadose zone material for the Alluvium Without Overbank Deposits (6Fb), Buried Valley (7D), and Glacial Lake / Slackwater Terrace (7Fa) settings.

Table 13. Coshocton County Soils (After Hempal et al., 1993)

Soil Name	DRASTIC Rating	Soil Media
Aaron	7	shrink/swell clay
Alford	4	silt loam
Bethesda	4	silt loam
Bethesda (channery)	5	loam
Brownsville	4	silt loam
Brownsville (outcrop)	10	absent
Caneadea	3	clay loam
Chili	6	sandy loam
Chili (urban)	6	sandy loam
Cindermill	5	loam
Clarksburg	3	clay loam
Coshocton	3	clay loam
Coshocton - Rigley	6	sandy loam
Coshocton - Westmoreland	5	loam
Dekalb	6	sandy loam
Dumps	Not Rated	
Euclid	4	silt loam
Fairpoint	4	silt loam
Farmerstown	5	loam
Fitchville	4	silt loam
Germano	6	sandy loam
Gilpin	5	loam
Glenford	4	silt loam
Guernsey	7	shrink/swell clay
Hazelton	6	sandy loam
Hazelton (chanery)	6	sandy loam
Homewood	3	clay loam
Huntington	4	silt loam
Jimtown	6	sandy loam
Keene	4	silt loam
Landes	6	sandy loam
Lobdell	4	silt loam
Lounden	4	silt loam
Loundonville	4	silt loam
Markland	7	shrink/swell clay
Melvin	4	silt loam
Mentor	4	silt loam
Nework	4	silt loam
Nolin	4	silt loam
Orville	5	loam
Pits (gravel)	Not Rated	
Pits (quarry)	Not Rated	
Richland	5	loam
Rigley	6	sandy loam
Sebring	4	silt loam
Tioga	6	sandy loam
Titusville	3	clay loam
Waterstown	6	sandy loam
Wappinges	5	loam
Wellston	4	silt loam
Westmorelnd	4	silt loam
Whelling	5	loam
Zip	3	clay loam

Hydraulic Conductivity

Hydraulic conductivity values were assigned based on an interpretation of the following references: Sugar (1988), Freeze and Cherry (1979), Bonta et al. (1992), and well log and drilling reports on file at the ODNR, Division of Water.

The bedrock aquifers (interbedded limestone, sandstone, shale, and coal) of the middle to lower Pennsylvanian system hydrostratigraphic units were rated as having the lowest DRASTIC values for hydraulic conductivity in the county. They were assigned DRASTIC ratings of (1) for hydraulic conductivity. This corresponds to 1 to 100 gallons per day per square foot ($GPD/Ft.^2$) (Table 8). Bedrock aquifers of the Lower Pennsylvanian and Upper Mississippian hydrostratigraphic units were assigned a DRASTIC rating of (2) or 100 to 300 $GPD/Ft.^2$.

The sand and gravel aquifers of Coshocton County were assigned DRASTIC ratings of (2), (4), (6), or (8) for hydraulic conductivity. Sand and gravel aquifers located in smaller tributary valleys and areas adjacent to Wills Creek were given a DRASTIC rating of (2) or 100 to 300 $GPD/Ft.^2$. The sand and gravel aquifer below the Mohican River and Wills Creek was given a DRASTIC rating for hydraulic conductivity of (4) or 300 to 700 $GPD/Ft.^2$. The Buried Valley setting (7D) along the Walhonding River and Killbuck Creek was given a DRASTIC rating of (6) or 700 to 1000 $GPD/Ft.^2$. The highest DRASTIC rating for hydraulic conductivity were given to the aquifers within the Buried Valley Settings (7D) along the Tuscarawas and Muskingum Rivers. A rating of (8) (1000 to 2000 $GPD/Ft.^2$) was given to those settings.

APPENDIX B

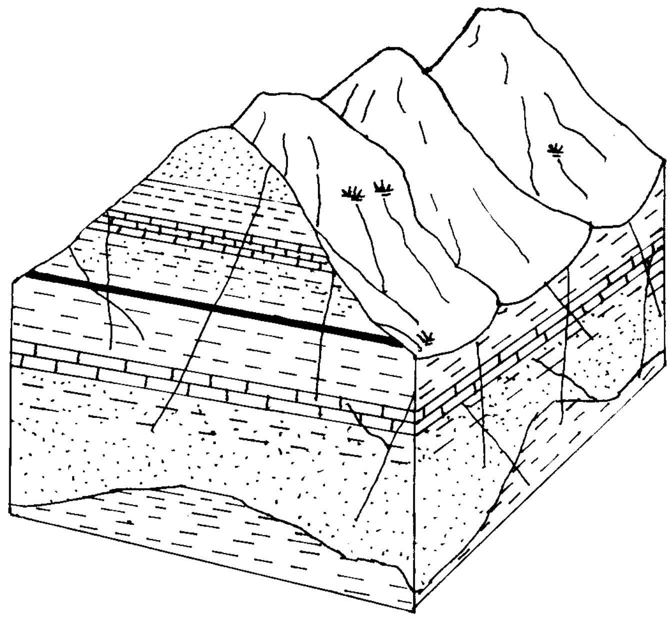
DESCRIPTION OF HYDROGEOLOGIC SETTINGS AND CHARTS

Ground water pollution potential mapping in Coshocton County resulted in the identification of six hydrogeologic settings within the Glaciated Central Region. The list of these settings, the range of pollution potential index calculations, and the number of index calculations for each setting are provided in Table 14. Computed pollution potential indexes for Coshocton County range from 61 to 187.

Table 14. Hydrogeologic Settings Mapped in Coshocton County, Ohio.

Hydrogeologic Settings	Range of GWPP Indexes	Number of Index Calculations
6Da - Alternating Sandstone, Limestone,, Shale	61 - 103	64
6Fb - River Alluvium Without Overbank Deposits	107 - 142	14
7Aa - Glacial Till Over Bedded Sedimentaty Rock	91 - 97	4
7D - Buried Valley	103 - 187	44
7Ec - Alluvium Over Sedimentary Rock	124	1
7Fa - Glacial Lakes and Slackwater Terraces	97 - 144	18

The following information provides a description of each hydrogeologic setting identified in the county, a block diagram illustrating the characteristics of the setting, and a listing of the charts for each unique combination of pollution potential indexes calculated for each setting. The charts provide information on how the ground water pollution potential index was derived and are a quick and easy reference for the accompanying ground water pollution potential map. A complete discussion of the rating and evaluation of each factor in the hydrogeologic settings is provided in Appendix A, Description of the Logic in Factor Selection.



6Da Alternating Sandstone, Limestone, Shale

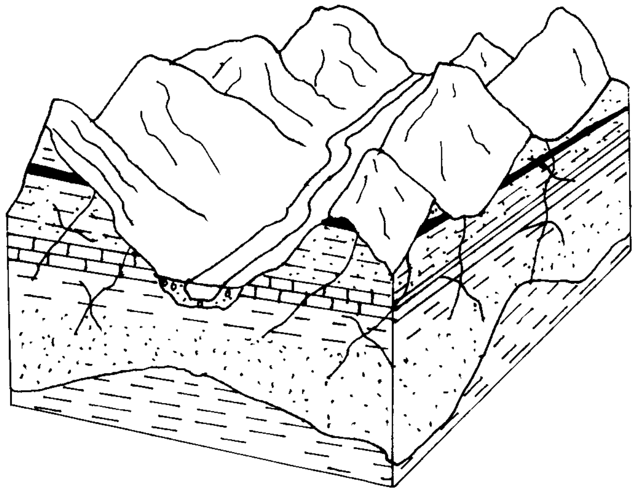
This hydrogeologic setting was used extensively in the mapping of Coshocton County. The area is characterized by high relief. Slopes are broad and relatively steep and ridgetops are somewhat flat and narrow. Vadose zone and aquifer media consist of slightly dipping, fractured, alternating sequences of sandstone, shale, limestone, coal, and clay. Ground water is obtained primarily from fractures or bedding planes within the bedrock. Water supplies are usually obtained from wells that penetrate multiple aquifers. Depth to water is generally deep. Shale or clayey layers often form aquitards, and where sufficient relief is present, perched groundwater zones and springs are commonly developed for water supplies. Soils types are highly variable and usually reflect the composition of the underlying bedrock. Yields from wells developed in this setting are typically low. Recharge is limited by steep slopes, deep aquifers, and layers of impermeable bedrock.

GWPP index values for the hydrogeologic setting of alternating sandstone, limestone, shale range from 61 to 103 with the total number of GWPP index calculations equaling 64.

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
6Da1	75-100	2-4	Interbedded Sedimentary Rock	Sandy Loam	18+	Interbedded Sedimentary Rocks	1-100	67	82
6Da2	75-100	2-4	Interbedded Sedimentary Rock	Loam	18+	Interbedded Sedimentary Rocks	1-100	65	77
6Da3	75-100	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	1-100	63	72
6Da4	75-100	2-4	Interbedded Sedimentary Rock	Clay Loam	18+	Interbedded Sedimentary Rocks	1-100	61	67
6Da5	75-100	2-4	Interbedded Sedimentary Rock	Loam	18+	Interbedded Sedimentary Rocks	100-300	74	85
6Da6	75-100	2-4	Interbedded Sedimentary Rock	Loam	12-18	Interbedded Sedimentary Rocks	1-100	70	86

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
6Da7	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	18+	Interbedded Sedimentary Rocks	1-100	69	75
6Da8	50-75	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	1-100	71	80
6Da9	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	1-100	71	81
6Da10	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Interbedded Sedimentary Rocks	1-100	97	114
6Da11	75-100	2-4	Interbedded Sedimentary Rock	Sandy Loam	18+	Interbedded Sedimentary Rocks	1-100	70	85
6Da12	50-75	2-4	Interbedded Sedimentary Rock	Silty Loam	12-18	Interbedded Sedimentary Rocks	1-100	73	86
6Da13	75-100	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	1-100	66	75
6Da14	30-50	2-4	Interbedded Sedimentary Rock	Clay Loam	18+	Interbedded Sedimentary Rocks	1-100	79	85
6Da15	30-50	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	1-100	81	90
6Da16	30-50	2-4	Interbedded Sedimentary Rock	Sandy Loam	18+	Interbedded Sedimentary Rocks	1-100	85	100
6Da17	50-75	2-4	Interbedded Sedimentary Rock	Sandy Loam	18+	Interbedded Sedimentary Rocks	1-100	75	90
6Da18	50-75	2-4	Interbedded Sedimentary Rock	Loam	18+	Interbedded Sedimentary Rocks	1-100	73	85
6Da19	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	18+	Interbedded Sedimentary Rocks	100-300	75	80
6Da21	50-75	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	100-300	77	85
6Da22	50-75	2-4	Interbedded Sedimentary Rock	Loam	18+	Interbedded Sedimentary Rocks	100-300	79	90
6Da23	50-75	2-4	Interbedded Sedimentary Rock	Sandy Loam	18+	Interbedded Sedimentary Rocks	100-300	81	95
6Da24	50-75	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	18+	Interbedded Sedimentary Rocks	100-300	83	100
6Da25	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	100-300	77	86
6Da26	75-100	2-4	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	1-100	66	76
6Da27	75-100	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	1-100	68	82
6Da28	75-100	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	6-12	Interbedded Sedimentary Rocks	1-100	76	102
6Da29	75-100	2-4	Interbedded Sedimentary Rock	Sandy Loam	12-18	Interbedded Sedimentary Rocks	1-100	72	91
6Da30	50-75	2-4	Interbedded Sedimentary Rock	Loam	12-18	Interbedded Sedimentary Rocks	100-300	81	96
6Da31	75-100	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	100-300	74	87
6Da32	75-100	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	6-12	Interbedded Sedimentary Rocks	100-300	82	107
6Da33	50-75	2-4	Interbedded Sedimentary Rock	Silty Loam	12-18	Interbedded Sedimentary Rocks	100-300	79	91
6Da34	50-75	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	12-18	Interbedded Sedimentary Rocks	100-300	85	106
6Da35	50-75	4-7	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	2-6	Interbedded Sedimentary Rocks	100-300	103	136
6Da36	50-75	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	18+	Interbedded Sedimentary Rocks	1-100	77	95
6Da37	75-100	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	12-18	Interbedded Sedimentary Rocks	1-100	74	96

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
6Da38	75-100	2-4	Interbedded Sedimentary Rock	Silty Loam	12-18	Interbedded Sedimentary Rocks	1-100	68	81
6Da39	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Interbedded Sedimentary Rocks	100-300	103	119
6Da40	50-75	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	1-100	68	77
6Da41	75-100	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	1-100	65	79
6Da42	30-50	4-7	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	100-300	101	114
6Da43	30-50	2-4	Interbedded Sedimentary Rock	Clay Loam	18+	Interbedded Sedimentary Rocks	100-300	85	90
6Da44	30-50	2-4	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	100-300	87	96
6Da45	30-50	2-4	Interbedded Sedimentary Rock	Silty Loam	12-18	Interbedded Sedimentary Rocks	100-300	89	101
6Da46	50-75	2-4	Interbedded Sedimentary Rock	Loam	12-18	Interbedded Sedimentary Rocks	1-100	75	91
6Da47	30-50	2-4	Interbedded Sedimentary Rock	Loam	18+	Interbedded Sedimentary Rocks	100-300	89	100
6Da48	75-100	2-4	Interbedded Sedimentary Rock	Sandy Loam	12-18	Interbedded Sedimentary Rocks	1-100	69	88
6Da49	30-50	2-4	Interbedded Sedimentary Rock	Loam	12-18	Interbedded Sedimentary Rocks	100-300	91	106
6Da50	30-50	2-4	Interbedded Sedimentary Rock	Silty Loam	18+	Interbedded Sedimentary Rocks	100-300	87	95
6Da51	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	1-100	73	87
6Da52	50-75	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	100-300	79	92
6Da53	50-75	2-4	Interbedded Sedimentary Rock	Sandy Loam	12-18	Interbedded Sedimentary Rocks	100-300	83	101
6Da54	30-50	4-7	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	1-100	93	103
6Da55	30-50	4-7	Interbedded Sedimentary Rock	Sandy Loam	6-12	Interbedded Sedimentary Rocks	1-100	101	124
6Da56	50-75	2-4	Interbedded Sedimentary Rock	Sandy Loam	12-18	Interbedded Sedimentary Rocks	1-100	77	96
6Da57	30-50	4-7	Interbedded Sedimentary Rock	Loam	12-18	Interbedded Sedimentary Rocks	1-100	97	113
6Da58	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	12-18	Interbedded Sedimentary Rocks	1-100	95	108
6Da59	30-50	4-7	Interbedded Sedimentary Rock	Clay Loam	12-18	Interbedded Sedimentary Rocks	100-300	99	108
6Da60	30-50	4-7	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	18+	Interbedded Sedimentary Rocks	1-100	99	117
6Da61	75-100	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	12-18	Interbedded Sedimentary Rocks	100-300	80	101
6Da62	75-100	2-4	Interbedded Sedimentary Rock	Shrink-Swell (Aggregated) Clay	18+	Interbedded Sedimentary Rocks	1-100	72	90
6Da63	30-50	2-4	Interbedded Sedimentary Rock	Loam	6-12	Interbedded Sedimentary Rocks	100-300	93	112
6Da64	30-50	2-4	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	1-100	83	97

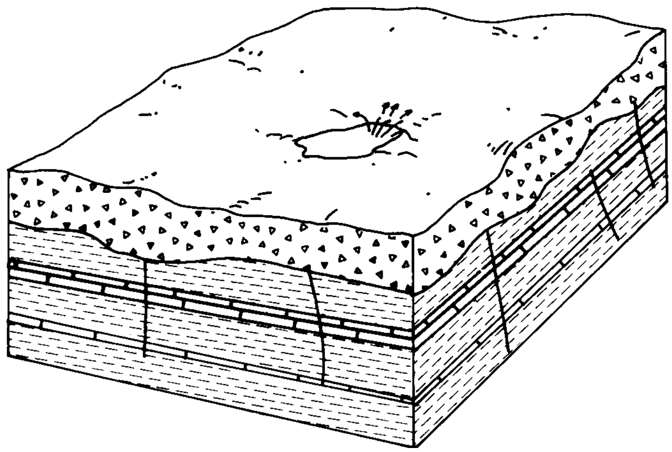


6Fb River Alluvium without Overbank Deposits

This setting is characterized by narrow, relatively flat bottomed, stream valleys that are flanked by steep bedrock slopes. Depth to water is typically shallow. Soils are predominately silt loams or loams. The alluvium is composed of fine grained sediments that contain lenses of sand and gravel that are usually saturated. Sand and gravel serves as the aquifer where deposits are thick and extensive. In areas where alluvium deposits are thin, the underlying bedrock serves as the aquifer. The alluvium is usually hydraulically connected to the underlying bedrock. Recharge is moderate but typically higher than the surrounding steep bedrock slopes.

GWPP index values for the hydrogeologic setting of river alluvium without overbank deposits range from 107 to 142 with the total number of GWPP index calculations equaling 14.

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topogr aphy	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
6Fb1	15-30	4-7	Interbedded Sedimentary Rock	Loam	6-12	Silt/Clay	1-100	109	129
6Fb2	15-30	4-7	Interbedded Sedimentary Rock	Loam	2-6	Silt/Clay	1-100	118	145
6Fb3	15-30	4-7	Sand and Gravel	Loam	2-6	Silt/Clay	100-300	124	150
6Fb4	5-15	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Interbedded Sedimentary Rocks	1-100	126	150
6Fb5	15-30	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Interbedded Sedimentary Rocks	100-300	122	145
6Fb6	15-30	4-7	Interbedded Sedimentary Rock	Loam	2-6	Interbedded Sedimentary Rocks	100-300	124	150
6Fb7	5-15	4-7	Sand and Gravel	Loam	2-6	Interbedded Sedimentary Rocks	100-300	137	163
6Fb9	15-30	4-7	Sand and Gravel	Loam	2-6	Sand and Gravel w/Significant Silt	100-300	132	157
6Fb10	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Interbedded Sedimentary Rocks	100-300	108	123
6Fb12	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Interbedded Sedimentary Rocks	100-300	107	131
6Fb13	15-30	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	142	170
6Fb14	5-15	4-7	Sand and Gravel	Loam	2-6	Sand and Gravel w/Significant Silt	100-300	142	167

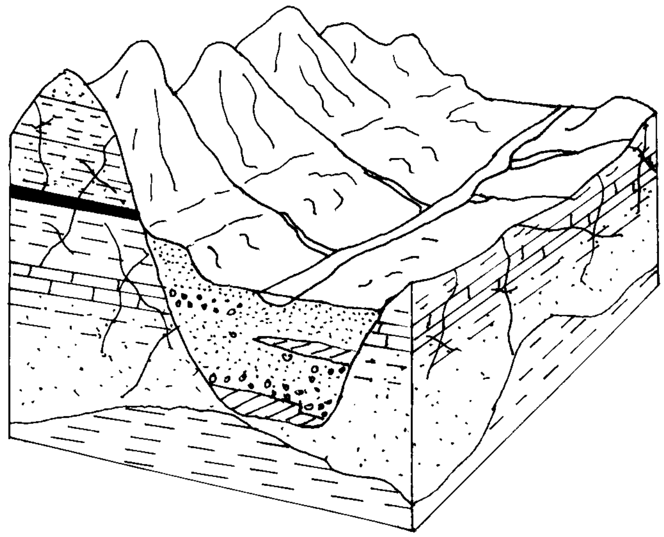


7Aa Glacial Till Over Bedded Sedimentary Rock

This hydrogeologic setting is characacterized by relatively flat-lying, fractured sedimentary rocks covered by more than ten feet of glacial till. The fractured bedrock consists of interbedded limestone and shale. The till consists primarily of clay with varying amounts of silt, sand, and gravel. Sand and gravel deposits within the till are extremely thin or nonexistent. Small supplies of ground water are obtained from the upper weathered portion of the bedrock and from intersecting fractures and bedding planes. Soils in this setting are typically clay or silt loams. Recharge is moderate to low because of low permeability of the overlying till and soils. Relief in this setting is moderate to steep. Depth to water is variable, ranging between 5 and 50 feet, but averages around 30 feet.

GWPP index values for the hydrogeologic setting of glacial till over bedded sedimentary rock range from 91 to 97 with the total number of GWPP index calculations equaling 4.

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7Aa1	50-75	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Interbedded Sedimentary Rocks	100-300	97	121
7Aa2	50-75	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Interbedded Sedimentary Rocks	100-300	93	109
7Aa3	50-75	4-7	Interbedded Sedimentary Rock	Clay Loam	2-6	Interbedded Sedimentary Rocks	100-300	95	116
7Aa4	50-75	4-7	Interbedded Sedimentary Rock	Clay Loam	6-12	Interbedded Sedimentary Rocks	100-300	91	104



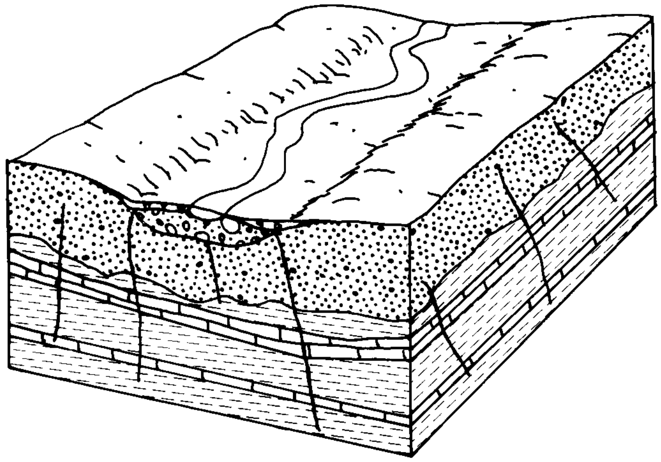
7D Buried Valley

This setting is characterized by thick deposits of sand and gravel that have been deposited in a former topographic low (usually a pre-glacial river valley) by glacial meltwater. Many of the buried valleys in Coshocton County underlie the broad, flat lying floodplains of modern rivers. The boundary between the buried valley and the adjacent bedrock upland is usually prominent. The buried valleys contain substantial thicknesses of permeable sand and gravel, that serve as the aquifer. The aquifer is typically in hydraulic connection with the modern rivers. The vadose zone is typically composed of sand and gravel but significant amounts of silt and clay can be found in discrete areas. Silt loams, loams, and sandy loams are the typical soil types for this setting. Depth to water is typically under 30 feet for areas adjacent to modern rivers, and between 30 to 50 feet for terraces that border the bedrock uplands. Recharge is generally high due to permeable soils and vadose zones, shallow depth to water, and the presence of surface streams.

GWPP index values for the hydrogeologic setting of buried valley range from 103 to 187 with the total number of GWPP index calculations equaling 44.

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7D2	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	300-700	153	176
7D3	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel w/Significant Silt	300-700	157	186
7D4	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	300-700	143	166
7D5	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel w/Significant Silt	300-700	147	176
7D7	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	0-2	Silt/Clay	100-300	111	137
7D8	30-50	4-7	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	119	148

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topogr aphy	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7D9	30-50	4-7	Sand and Gravel	Sandy Loam	6-12	Sand and Gravel w/Significant Silt	100-300	115	136
7D10	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel w/Significant Silt	100-300	136	164
7D11	30-50	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel w/Significant Silt	100-300	128	159
7D12	30-50	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	300-700	136	163
7D14	30-50	4-7	Sand and Gravel	Silty Loam	6-12	Sand and Gravel w/Significant Silt	100-300	111	126
7D15	30-50	4-7	Sand and Gravel	Silty Loam	2-6	Sand and Gravel w/Significant Silt	300-700	124	145
7D16	15-30	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	137	166
7D17	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	100-300	134	159
7D18	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	100-300	144	169
7D20	15-30	7-10	Sand and Gravel	Silty Loam	2-6	Sand and Gravel w/Significant Silt	300-700	142	163
7D21	15-30	4-7	Interbedded Sedimentary Rock	Sandy Loam	6-12	Sand and Gravel w/Significant Silt	100-300	122	143
7D22	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Sand and Gravel w/Significant Silt	100-300	112	135
7D23	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	187	209
7D24	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	177	199
7D25	30-50	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	1000-2000	167	189
7D26	5-15	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	1000-2000	185	204
7D27	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	1000-2000	183	199
7D28	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	1000-2000	175	194
7D29	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	1000-2000	173	189
7D30	30-50	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	132	160
7D31	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Sand and Gravel w/Significant Silt	100-300	108	123
7D32	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel w/Significant Silt	300-700	159	187
7D33	5-15	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel w/Significant Silt	300-700	157	182
7D34	5-15	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	700-1000	176	201
7D35	30-50	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	700-1000	156	181
7D36	50-75	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	700-1000	146	171
7D37	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	700-1000	172	191
7D38	30-50	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel	700-1000	154	176
7D39	15-30	4-7	Sand and Gravel	Silty Loam	2-6	Sand and Gravel w/Significant Silt	100-300	130	152
7D40	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	700-1000	162	181
7D41	15-30	7-10	Sand and Gravel	Sandy Loam	0-2	Sand and Gravel	700-1000	166	191
7D42	30-50	4-7	Interbedded Sedimentary Rock	Sandy Loam	2-6	Sand and Gravel	100-300	126	153
7D43	15-30	4-7	Interbedded Sedimentary Rock	Silty Loam	0-2	Sand and Gravel w/Significant Silt	100-300	128	152
7D44	30-50	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel	1000-2000	163	179

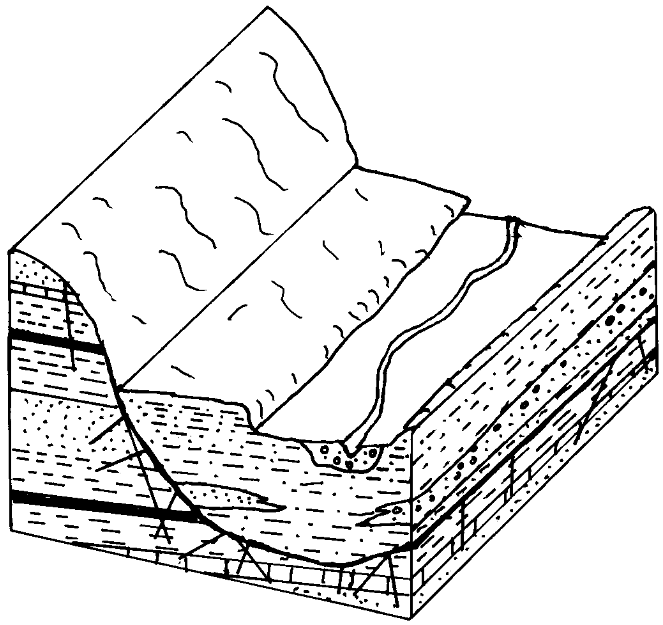


7Ec Alluvium Over Sedimentary Rock

This hydrogeologic setting is characterized by low relief with thin to moderate thicknesses of modern, stream-deposited alluvium. The alluvium is composed of silt, sand, gravel, and clay. Depth to water is shallow, and the stream is usually in hydraulic contact with the alluvial deposits. The alluvium is underlain by interbedded Ordovician limestone and shale or Silurian limestone. Usually the upper portion of the bedrock serves as the aquifer in this setting. Infiltration of precipitation or induced infiltration of stream waters serve as a source of recharge to the bedrock. Recharge is moderately high due to the highly permeable soils and the relatively shallow depth to water. Soils range from silt loam to sandy loam.

GWPP index value for the hydrogeologic setting of alluvium over sedimentary rock is 124 with the total number of GWPP index calculations equaling 1.

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7Ec1	15-30	4-7	Interbedded Sedimentary Rock	Loam	2-6	Silt/Clay	100-300	124	150



7Fa Glacial Lakes and Slackwater Terraces

This setting is characterized by flat lying areas that were formed in the low velocity water of glacial and slackwater lakes that filled pre-exsisting drainage systems. These areas are often dissected by modern streams and contain remnant terraces. The terraces are mainly composed of silt, but occasionally are made of outwash sand and gravel. The setting is bordered by non-glaciated uplands that contain sequences of sedimentary bedrock that have a steep slope. Variable thicknesses of lacustrine silt, clays, and fine grained sand deposits are found within this setting. Sand and gravel, where present, serve as the aquifer media. Depth to water is typically shallow due to the presence of modern streams found within the setting. Thin deposits of alluvium can be found adjacent to the modern streams. Recharge within this setting is supplied by precipitation and from runoff of water from the surrounding uplands. Soils are typically silt loams but loams and sandy loams are present.

GWPP index values for the hydrogeologic setting of glacial lakes and slackwater terraces range from 97 to 144 with the total number of GWPP index calculations equaling 18.

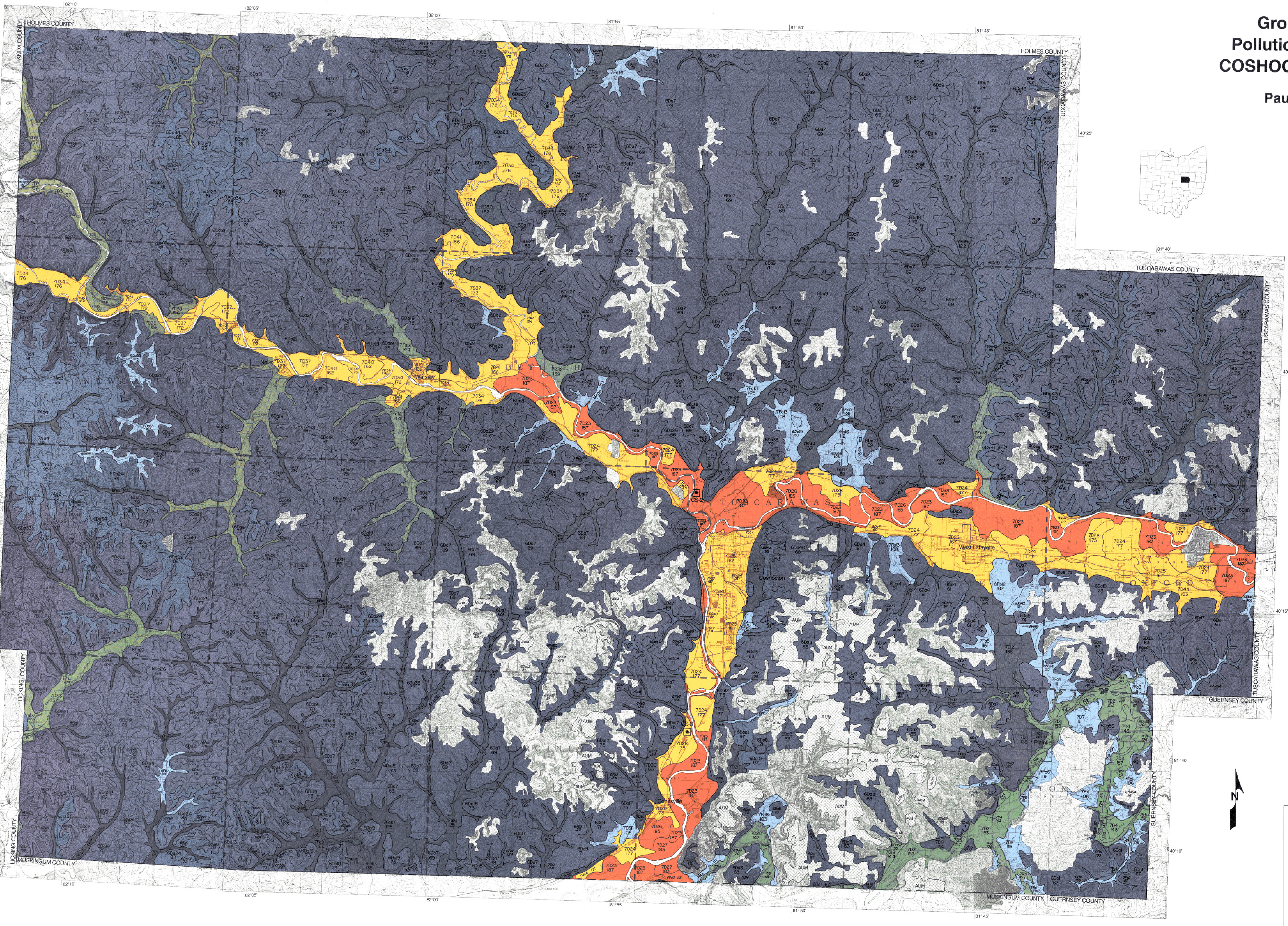
Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7Fa1	30-50	4-7	Sand and Gravel	Silty Loam	6-12	Silt/Clay	100-300	106	122
7Fa2	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Interbedded Sedimentary Rocks	1-100	97	114
7Fa3	30-50	4-7	Interbedded Sedimentary Rock	Sandy Loam	6-12	Silt/Clay	100-300	110	132
7Fa4	30-50	4-7	Sand and Gravel	Silty Loam	6-12	Sand and Gravel w/Significant Silt	100-300	111	126
7Fa5	30-50	4-7	Sand and Gravel	Silty Loam	2-6	Sand and Gravel w/Significant Silt	100-300	115	138
7Fa6	30-50	4-7	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	119	148

Setting	Depth to Water (ft)	Recharge (In/Yr)	Aquifer Media	Soil Media	Topography	Vadose Zone Media	Hydraulic Conductivity	Rating	Pest Rating
7Fa7	15-30	4-7	Sand and Gravel	Loam	2-6	Silt/Clay	100-300	124	150
7Fa8	30-50	4-7	Sand and Gravel	Silty Loam	6-12	Silt/Clay	100-300	103	119
7Fa9	15-30	4-7	Interbedded Sedimentary Rock	Silty Loam	2-6	Silt/Clay	100-300	122	145
7Fa10	15-30	4-7	Sand and Gravel	Silty Loam	2-6	Silt/Clay	100-300	125	148
7Fa11	5-15	4-7	Sand and Gravel	Silty Loam	2-6	Silt/Clay	100-300	135	158
7Fa12	5-15	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	100-300	144	169
7Fa13	30-50	4-7	Interbedded Sedimentary Rock	Silty Loam	6-12	Silt/Clay	100-300	108	123
7Fa14	15-30	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	137	166
7Fa15	15-30	7-10	Sand and Gravel	Silty Loam	0-2	Sand and Gravel w/Significant Silt	100-300	134	159
7Fa16	30-50	4-7	Interbedded Sedimentary Rock	Sandy Loam	6-12	Silt/Clay	100-300	112	133
7Fa17	15-30	7-10	Sand and Gravel	Loam	0-2	Sand and Gravel w/Significant Silt	100-300	136	164
7Fa18	15-30	7-10	Sand and Gravel	Sandy Loam	2-6	Sand and Gravel w/Significant Silt	100-300	142	170

Ground Water Pollution Potential of COSHOCTON COUNTY

by

Paul N. Spahr



CONTOUR INTERVAL 20 FEET

— — —	County Line
- - - -	Township Line
— · — ·	Incorporated City Limit

Pollution Potential Index Range

180 - 199	Higher
160 - 179	
140 - 159	
120 - 139	to
100 - 119	
80 - 99	
< 79	Lower

Description of Map Symbols

Hydrogeologic Region — Hydrogeologic Setting

7Ad6
98 ← Relative Pollution Potential

Observation Well Site *

Gravel Pit / Quarry / Strip Mine

AUM (Abandoned Underground Mine)

*Observation well sites indicate the location of wells used to collect ground water level information. These wells are part of the state observation well network. Hydrographs of the water levels recorded in these and other State observation wells can be obtained through ODNR-Division of Water.

Hydrogeologic Settings

6Da – Alternating Sandstone, Limestone, Shale
6Fb – River Alluvium Without Overbank Deposits
7Aa – Till Over Bedded Sedimentary Rock
7D – Buried Valley
7Ec – Alluvium Over Sedimentary Rock
7Fa – Glacial Lake - Slackwater Terrace

A more detailed description of the hydrogeologic settings and the evaluation of the pollution potential may be found in the publication "Ground Water Pollution Potential of Coshocton County", GWPP Report No. 32, Ohio Department of Natural Resources, Division of Water.

The ground water pollution potential of this county has been mapped using the methodology described in U.S. EPA Publication EPA/600-2-87/035, "DRASTIC: A Standardized System for Evaluating Ground Water Pollution Potential Using Hydrogeologic Settings" (Aller et al., 1987).

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