Miami Valley
Land Suitability Assessment -
Natural Environment Factors

2007

Miami Valley Regional Planning Commission

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For more information

Please visit www.mvrpc.org for a copy of this report. Questions or comments should be directed to Bethany Heim, GIS Specialist / Planner at bheim@mvrpc.org.

MVRPC is a voluntary association of governmental and non-governmental organizations serving as a forum and resource where regional partners identify priorities, develop public policy, and implement strategies to improve the quality of life and economic vitality throughout the Miami Valley Region.

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Introduction

Miami Valley Land Suitability Assessment - Natural Environment Factors

Purpose

The Miami Valley Regional Planning Commission (MVRPC) conducted the Miami Valley Land Suitability Assessment - Natural Environment Factors - as part of the existing conditions assessment phase of "Going Places - An Integrated Land Use Vision for the Miami Valley Region." The main purpose of this assessment is to identify locations within the Region that are better suited for physical development than others. Additional goals of this assessment include:

- Compiling regional natural resource data into one regional dataset
- Developing a systematic approach to combining this data into a meaningful single variable
- Using this single variable to create a Natural Environment Factors Composite Map.

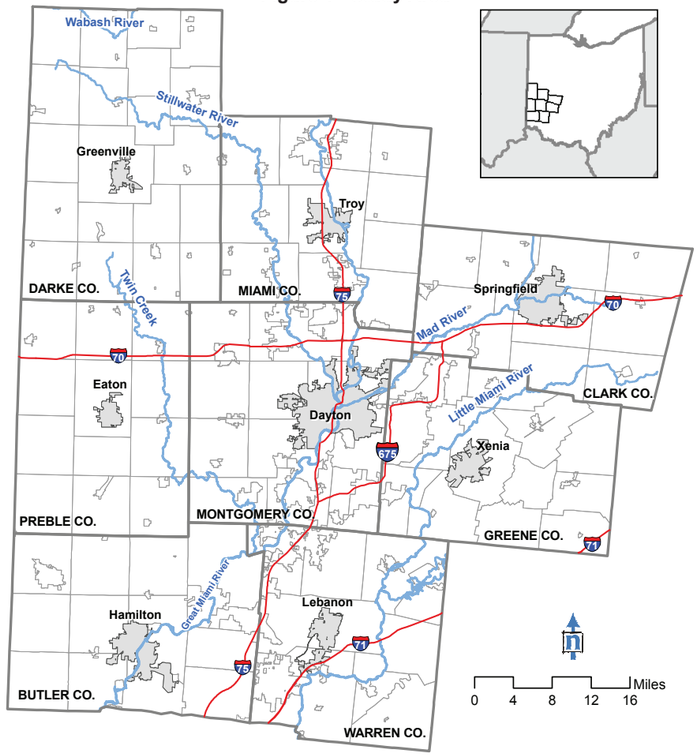
The natural environment factors analyzed in this assessment, such as soil, slope, vegetation, and hydrology, were included because of their significance in the context of land use planning. Technical analyses of each factor were conducted separately in order to determine the presence and conditions of each within a spatial context. This portion of the assessment not only comprises an important first step toward a land suitability evaluation process, but also provides geographically referenced information about opportunities and constraints for future land development. The Natural Environment Suitability Measure is the result of overlaying maps of these opportunities and constraints in order to generate overall suitability scores within the planning area.

This assessment alone is not meant to be a comprehensive land suitability assessment as it only focuses on natural environment factors. An assessment of built environment factors must be completed in order to have a complete understanding of the Region's physical landscape.

Study Area

The study area covers an eight county Region in the Dayton metropolitan area located in the southwest Ohio as illustrated in the map. The study area covers approximately 3,600 square miles with the Great Miami River being the major north-south river corridor.

Figure 1 - Study Area



Natural Environment Factors Considered

The 15 natural environment factors analyzed in this study are:

- Depth to Bedrock
- Floodplain
- Forested Areas
- Ground Water Pollution Potential
- Ground Water Yield
- Inundation Areas
- Load Bearing Strength
- Mineral Resources
- Prime Farmland
- Slope
- Soil Drainage
- Sole Source Aquifer
- Surface Water
- Well Field Protection Areas
- Wetlands

Report Structure

This report is a summary of the study and it is structured in five separate sections:

1. The Introduction section provides a brief overview of the study, which includes the purpose, the study area, factors included in the study, and contact information.

2. The Methodology section provides detailed information on how the study was implemented. Further, this section describes the methods used to generate the land suitability score from all 15 environmental factors.

3. The third section presents the individual natural environmental factors. Each page represents one factor and presents the definition, data sources, and data findings.

4. The last section is the presentation of the Natural Environment Factors Composite Map and a summary of the findings that was developed based on the land suitability score from all 15 factors.

5. The Conclusion is a summary of the findings from the factor analyses and the analysis of the Natural Environment Suitability Measure.

Acknowledgements

The study was made possible by datasets that were made available by various agencies listed throughout the report. MVRPC is grateful for this data and would like to thank those Federal, State, and local agencies for making the data available.

Methodology

Miami Valley Land Suitability Assessment - Natural Environment Factors

This assessment was carried out in four phases. The first phase was to identify the natural environmental factors to be included in the assessment, followed by the development of a regional dataset. The second phase focused on the development of a suitability score for each factor. The third phase of the assessment was to develop a land suitability composite map based on the aggregated total suitability score. The last phase includes a technical analysis of the 15 natural environment factors and a summary of data findings from the composite map.

A Geographic Information System (GIS) was used to carry out the assessment due to its unique capacity of spatial database management and analysis. The data developed and acquired for individual environmental factors were all brought into the GIS environment for spatial overlay and analysis and the conceptual framework for combining suitability scores from all 15 factors into a single aggregated suitability score was implemented through GIS.

Regional Dataset Development

The first step was to identify the natural environment factors to be included in the assessment and to develop a regional dataset for each factor. An extensive literature search was conducted to identify natural environment factors that are commonly used in land suitability assessments. The 15 factors selected for this assessment encompass three dimensions of natural environment considerations: resources, hazards, and physical impediments.

The 15 factors in the study can be grouped into these three dimensions as following:

<u>Resources</u>
- Forested Areas
- Ground Water Pollution Potential
- Ground Water Yield
- Mineral Resources
- Prime Farmland
- Sole Source Aquifer
- Well Field Protection Areas
- Wetlands

<u>Hazards</u>
- Floodplain
- Inundation Areas

<u>Physical Impediments</u>
- Depth to Bedrock
- Load Bearing Strength
- Slope
- Soil Drainage
- Surface Water

Two considerations were prominent during the search for reliable data sources - the availability of consistent data for all eight counties and the availability of data in a GIS format.

Individual county data was aggregated into an eight county regional dataset and was stored in the GIS format for technical analysis and mapping purposes.

Suitability Score Development

A three-step process was developed for calculating the Suitability Score for each of the 15 factors. First, the data attributes for each factor were classified into a Suitability Measure. Second, a numeric Attribute Score was assigned for each Suitability Measure. Third, a Weight Factor was applied to each Attribute Score to generate the final Suitability Score. (See Appendix for detailed table)

The *Suitability Measures* indicate whether certain data attributes are more or less suited to accomodate land development. The data attributes were classified into one of four general Suitability Measures: Suitable, Somewhat Suitable, Not Suitable, or Not Applicable. For most factors it was only necessary to use two or three of the Suitability Measure categories. For example, the data attributes for the Depth to Bedrock factor were classified simply as either Suitable, Not Suitable, or Not Applicable.

The Attribute Score translates the qualitative Suitability Measure into a quantitative measure ranging from one to five, with five representing the most suitable. This is a relative score within each factor, meaning that an Attribute Score of five does not mean that the attribute is five times more suitable than an attribute with a score of one.

The purpose of the *Weight Factor* is to weight the 15 factors against one another according to their importance in determining development potential. The Weight Factor ranges from one to four, with four indicating the highest degree of importance. As with the Attribute Score, the Weight Factor is a relative measure.

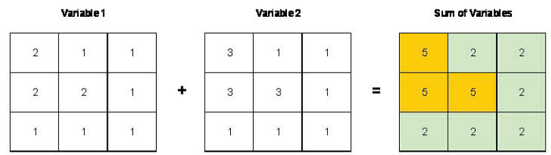
The *Suitability Score* is the final score that takes into account both of the measurements at the individual factor level and the relative importance of each factor among all 15 factors. It is derived by multiplying the Attribute Score by the Weight Factor. For example, for a data attribute from the Depth to Bedrock factor classified as Suitable, the Attribute Score would be five. Multiply that by a Weight Factor of two and the Suitability Score would be 10.

Natural Environment Suitability Measure Development

Conceptually, the Natural Environment Suitability Measure was generated by overlaying spatial data representing the Suitability Scores of all 15 factors, as illustrated in the figure to the right.

To make this possible, the entire study area was divided into a grid with cells measuring 2,500 square feet (50 feet by 50 feet). This grid was then applied to the GIS data layers representing the Suitability Scores for each factor. Finally, the grids were overlaid and the Suitability Scores in each grid cell were summed to create the Natural Environment Suitability Measure, as illustrated in Figure 3.

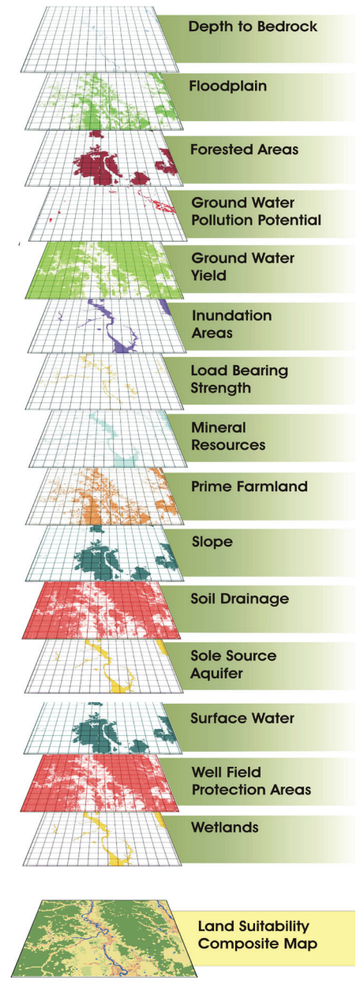
Figure 3 - Summing Suitability Scores



Technical Analysis

Analyses at the regional and county levels were conducted for each of the natural environment factors with special emphasis on presenting the analysis results in a spatial context. A similar analysis was conducted for the Natural Environment Factors Composite Map.

Figure 2 - Natural Environment Factors



Depth to Bedrock

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Depth to Bedrock?

According to the U.S. Department of Agriculture (USDA) depth to bedrock is defined as the distance from the surface of the soil to the rock layer.

For this study, land was classified as either having adequate depth to bedrock or shallow depth to bedrock, with shallow depth being defined as an area where the bedrock is less than 60 inches below the surface of the topsoil.

Why is it Important?

Having a shallow depth to bedrock can be a hindrance to development because it may increase costs by affecting construction techniques, maintenance, and utility service. Additional drawbacks may include the need for blasting or other expensive excavation techniques, and potential groundwater contamination from on-site sewage disposal due to insufficient wastewater infiltration.

How was the Data Developed?

The spatial and attribute data for depth to bedrock was obtained from the USDA, Soil Survey Geographic (SSURGO) Database. The SSURGO spatial data shows the boundaries of various soil types, and the attribute data provides various soil types and their properties. The soil types that have a shallow depth to bedrock (less than 60 inches) were classified using soil horizon depths, which indicates the depth of soil layers and bedrock.

Clark County was the only county in the Region that did not have a SSURGO spatial data file available and, therefore, the Soil Mapping Units data from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS) was used. However, the SSURGO attribute data for depth to bedrock was available for Clark County and joined to the Soil Mapping Units database. The final GIS layer indicates areas with Shallow Depth (Less than 60 inches), Adequate Depth (more than 60 inches), and soil types that are Not Rated.

Data Source

SSURGO Database, USDA, Natural Resources Conservation Service, available at soildatamart.nrcs.usda.gov.

- Butler County, September 11, 2006
- Clark County, August 3, 2007 (Attribute Data Only)
- Darke County, June 16, 2006
- Greene County, June 16, 2006
- Miami County, June 21, 2006
- Montgomery County, June 16, 2006
- Preble County, June 21, 2006
- Warren County, June 16, 2006

Soil Mapping Units Database, ODNR, Division of Soil and Water Conservation, available at www.ohiodnr.com/gims.

- Clark County, May 5, 1992

Data Findings

The majority (90.7%) of the land in the Region, as illustrated in Figure DBR.1, has an adequate depth to bedrock. Only 7.1% of the land in the 8-county study area has a shallow depth to bedrock. Table DBR.2 shows the results of the Depth to Bedrock classified data cross-tabulated by county, illustrating each county's acreage and percent share of land having eithr an adequate or shallow depth to bedrock. Butler (57.0%) and Miami (12.5%) counties, as shown in table DBR.2, have the largest shares of land with a shallow depth to bedrock.

DBR.1 - Regional Land by Depth to Bedrock Classification

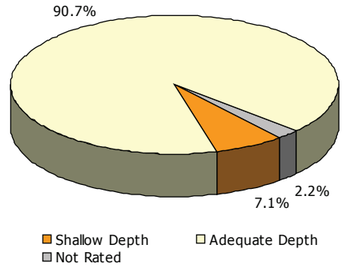
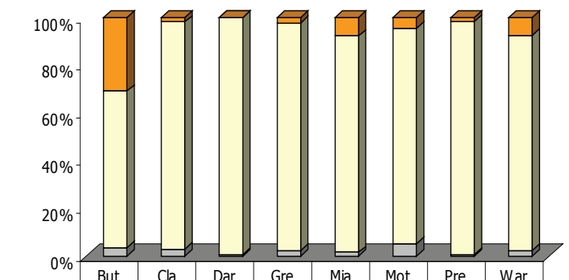


Figure DBR.3 presents the county level data findings, showing how much land has an adeuqate or shallow depth to bedrock in each county. Over 30% of the land in Butler County and 7.8% of land in Miami County has a shallow depth to bedrock (see figure DBR.3). Figure DBR.4 shows the spatial distribution of the depth to bedrock classification. Butler County visibly has the largest concentration of land with shallow depth to bedrock.

DBR.2 - County Share of Land by Depth to Bedrock Classification

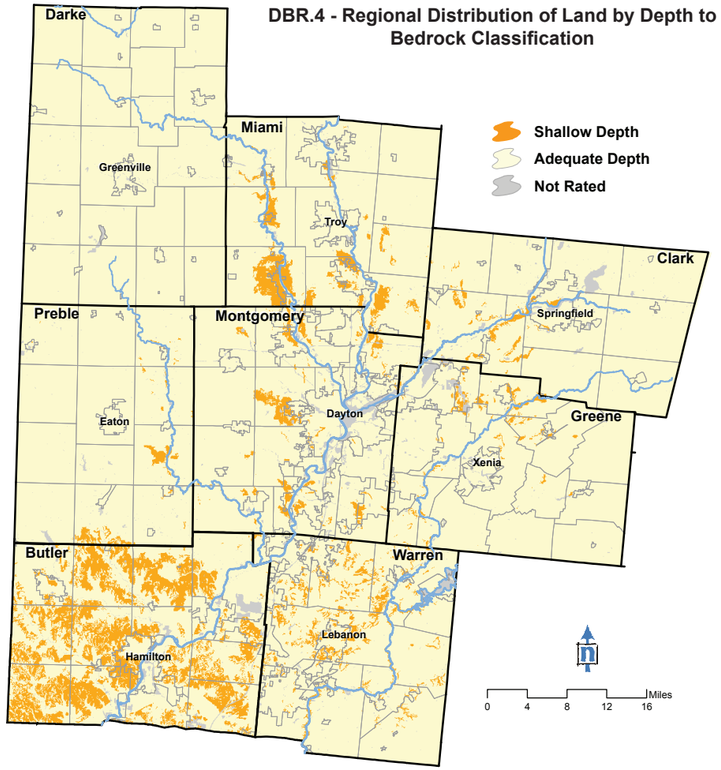
County	Shallow Depth		Adequate Depth		Not Rated		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	92,882.9	57.0%	197,379.2	9.5%	10,488.7	20.3%	300,750.8
Clark	5,180.9	3.2%	244,840.0	11.7%	6,888.3	13.3%	256,909.2
Darke	0.0	0.0%	382,028.0	18.3%	1,722.1	3.3%	383,750.1
Greene	6,404.7	3.9%	253,971.3	12.2%	5,868.6	11.4%	266,244.6
Miami	20,407.9	12.5%	238,220.8	11.4%	3,649.2	7.1%	262,278.0
Montgomery	13,445.8	8.3%	268,652.4	12.9%	15,174.6	29.4%	297,272.9
Preble	4,799.0	2.9%	266,088.8	12.8%	2,070.3	4.0%	272,958.0
Warren	19,693.2	12.1%	235,168.8	11.3%	5,805.9	11.2%	260,667.9
Regional Total	162,814.4	100.0%	2,086,349.4	100.0%	51,667.7	100.0%	2,300,831.5

DBR.3 - County Land by Depth to Bedrock Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Shallow Depth	30.9%	2.0%	0.0%	2.4%	7.8%	4.5%	1.8%	7.6%
Adequate Depth	65.6%	95.3%	99.6%	95.4%	90.8%	90.4%	97.5%	90.2%
Not Rated	3.5%	2.7%	0.4%	2.2%	1.4%	5.1%	0.8%	2.2%

DBR.4 - Regional Distribution of Land by Depth to Bedrock Classification



Floodplain

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is a Floodplain?

The Federal Emergency Management Agency (FEMA) defines a floodplain as “any land area susceptible to being inundated by flood waters from any source.”

FEMA categorizes floodplains into two types: the 100-year floodplain, and 500-year floodplain. The 100-year floodplain has a 1% chance of being inundated in any given year, and the 500-year floodplain has a 0.2% chance.

Following FEMA’s classification, the study classified the floodplain areas into 3 categories: 100-Year Floodplain, 500-Year Floodplain, and Outside Floodplain.

Why is it Important?

Land areas designated as floodplains pose limitations on future land development since there is a greater risk of flood damage.

How was the Data Developed?

The 100-Year Flood Hazard Areas data and Other Flood Hazard Areas data, illustrating 500-Year Flood Hazard Areas, that originated from FEMA National Flood Insurance Program (NFIP) maps were from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS).

Data Source

The National Flood Insurance Program (NFIP) maps originally developed by FEMA, available at www.ohiodnr.com/gims.

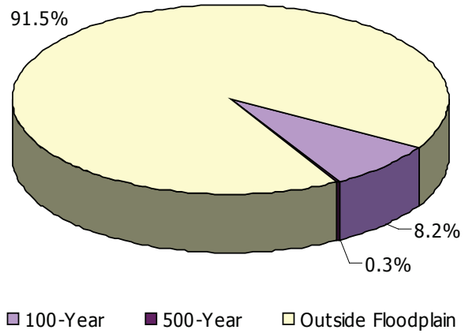
- Butler County, 1977
- Clark County, 1984
- Darke County, 1977
- Greene County, 1977
- Miami County, 1979
- Montgomery County, 1979
- Preble County, 1981
- Warren County, 1978

Data Findings

The majority (91.5%) of the Region is outside of floodplain zones, and only 8.5% is within 100- or 500-year floodplain zones (see figure FPL.1). Of the 188,752.6 acres of land that are within 100-year floodplain zones, Greene County contains the largest portion (16.4%) with a total of 30,990.4 acres, followed by Miami County (14.9%) (see table FPL.2). In addition, over half of the 500-year floodplain areas (55.1%) are located in Montgomery County.

Figure FPL.3 shows the composition of each county’s land according to floodplain classification. Over 10% of the land in Greene (11.6%) and Miami (10.7%) counties are 100-year floodplain zones. On the other hand, Darke County (3.5%) has the smallest percentage of 100-year floodplain zones. The map presented as figure FPL.4 shows the location of floodplain zones in the Region. As expected, the 100- and 500-year floodplain zones are located along major river corridors.

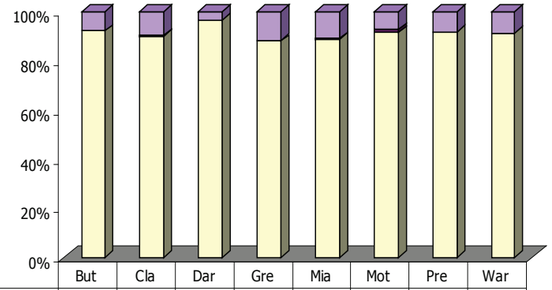
FPL.1 - Regional Land by Floodplain Classification



FPL.2 - County Share of Land by Floodplain Classification

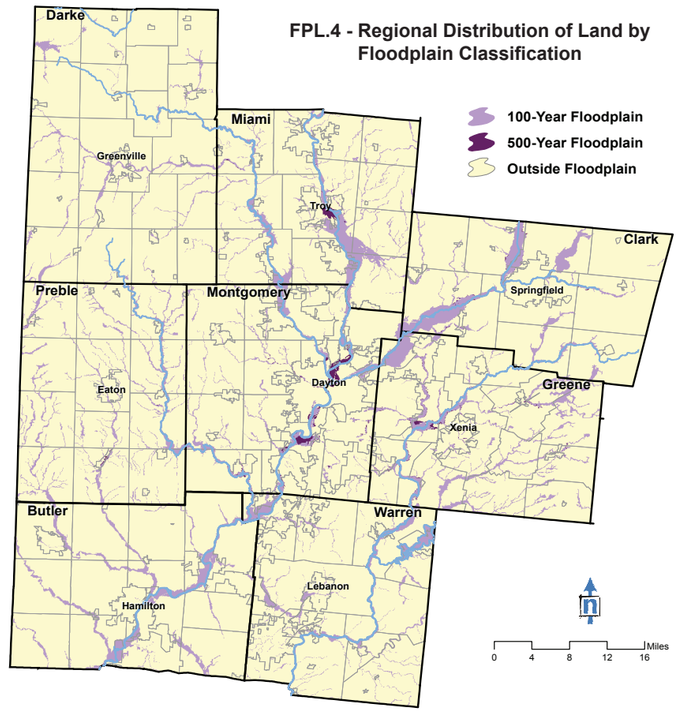
County	100-Year		500-Year		Outside Floodplain		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	23,582.7	12.5%	0.0	0.0%	277,243.1	13.2%	300,825.7
Clark	24,963.3	13.2%	317.8	5.0%	231,608.6	11.0%	256,889.7
Darke	13,588.1	7.2%	8.6	0.1%	370,234.5	17.6%	383,831.2
Greene	30,990.4	16.4%	1,270.4	19.9%	233,927.9	11.1%	266,188.8
Miami	28,194.5	14.9%	1,042.2	16.3%	233,126.2	11.1%	262,363.0
Montgomery	22,068.5	11.7%	3,515.5	55.1%	271,643.0	12.9%	297,227.1
Preble	22,571.3	12.0%	223.0	3.5%	250,135.8	11.9%	272,930.1
Warren	22,793.8	12.1%	0.0	0.0%	237,936.1	11.3%	260,729.8
Regional Total	188,752.6	100.0%	6,377.6	100.0%	2,105,855.2	100.0%	2,300,985.4

FPL.3 - County Land by Floodplain Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
100-Year	7.8%	9.7%	3.5%	11.6%	10.7%	7.4%	8.3%	8.7%
500-Year	0.0%	0.1%	0.0%	0.5%	0.4%	1.2%	0.1%	0.0%
Outside Floodplain	92.2%	90.2%	96.5%	87.9%	88.9%	91.4%	91.6%	91.3%

FPL.4 - Regional Distribution of Land by Floodplain Classification



Forested Areas

Miami Valley Land Suitability Assessment - Natural Environment Factors

What are Forested Areas?

The U.S. Environmental Protection Agency (USEPA) defines a forested area as “land which is at least 20 percent occupied by forest trees of any size or formerly having had such tree cover and not currently developed for non-forest use.”

The Ohio Department of Natural Resources (ODNR), however, defines Forest Lands in the Land Use/Land Cover data as an area with a “tree-crown areal density (crown closure percentage) of 10 percent or more, are stocked with trees capable of producing timber or other wood products, and exert an influence on the climate or water regime.”

Using ODNR’s Forest Land definition, the study classifies the land into two categories: Forested Areas and Non-Forested Areas.

Why are they Important?

Forested areas not only contribute to the improvement of the Region’s air, soil and water quality, but also supplies the Region’s economy with quality timber products. Further, the area provides scenic beauty and recreational opportunities.

How was the Data Developed?

The regional dataset for forested areas was compiled from the county level Land Use/Land Cover dataset from the ODNR Geographic Information Management Systems (GIMS). Using the classification information available for the database, forested areas in the Region were identified by the following categories:

- General Forest Land
- Deciduous Forested Land
- Evergreen Forested Land
- Mixed Forested Land
- Clearcut Forest Land

Data Source

County Land Use/Land Cover, ODNR, available at www.ohiodnr.com/gims.

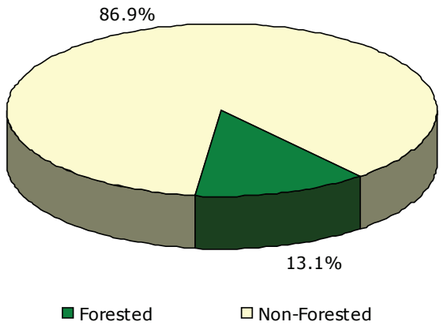
- Butler County, 1994
- Clark County, 1994
- Darke County, 1994
- Greene County, 1994
- Miami County, 1994
- Montgomery County, 1994
- Preble County, 1994
- Warren County, 1994

Data Findings

The majority (86.9%) of the Region, as shown in figure FL.1, is non-forested land. Table FL.2 shows that Warren (22.2%) and Butler (16.3%) counties have the largest share of the Region’s forested lands and that Miami (8.1%) and Clark (8.4%) counties have the smallest shares.

Figure FL.3 shows the precent of each county’s forested and non-forested areas. Over one-fourth of Warren County’s land (25.7%) is forested while only 7.1% of Darke County’s land is forested. The spatial distribution of forested lands, as seen in figure FL.4, appears to be more dense near waterways and in the southern portion of the Region.

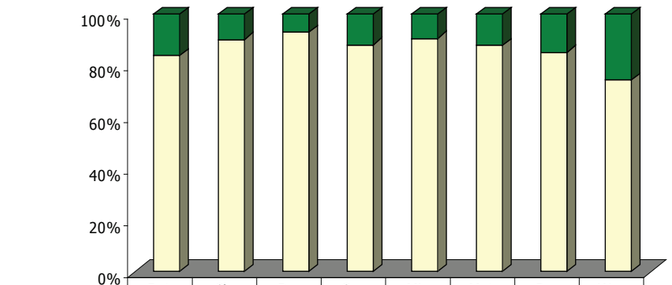
FL.1 - Regional Land by Forest Classification



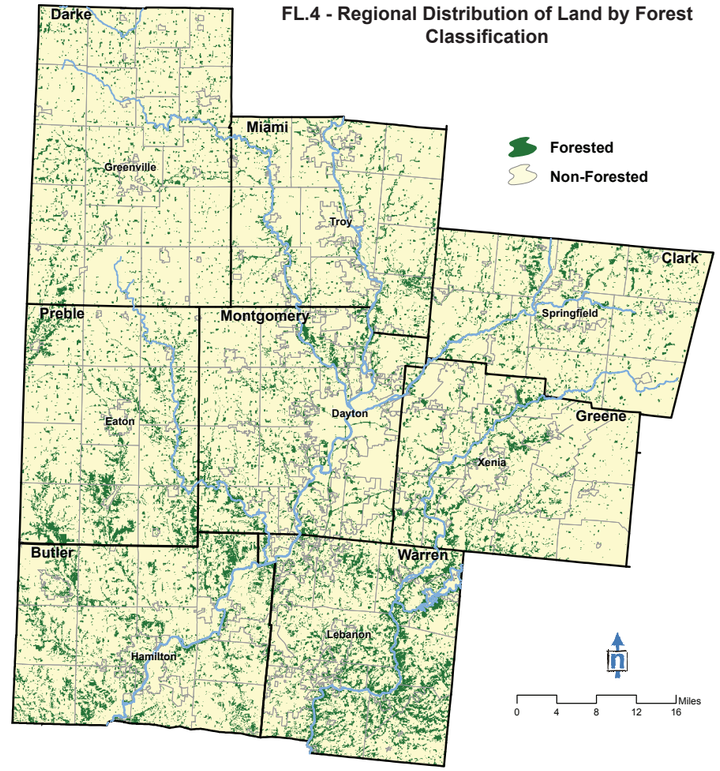
FL.2 - County Share of Land by Forest Classification

County	Forested		Non-Forested		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	49,118.6	16.3%	251,780.0	12.6%	300,898.5
Clark	25,211.1	8.4%	231,684.7	11.6%	256,895.9
Darke	27,208.3	9.0%	356,632.9	17.8%	383,841.3
Greene	31,679.0	10.5%	234,509.4	11.7%	266,188.4
Miami	24,519.0	8.1%	237,841.2	11.9%	262,360.2
Montgomery	36,318.0	12.0%	260,918.2	13.1%	297,236.2
Preble	40,756.7	13.5%	232,142.6	11.6%	272,899.2
Warren	66,940.6	22.2%	193,855.7	9.7%	260,796.3
Regional Total	301,751.4	100.0%	1,999,364.7	100.0%	2,301,116.0

FL.3 - County Land by Forest Classification



FL.4 - Regional Distribution of Land by Forest Classification



Ground Water Pollution Potential

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Ground Water Pollution Potential?

The Ohio Department of Natural Resources (ODNR) defines ground water pollution potential as a relative measure, based on the soil's physical and chemical factors, that rates the land's susceptibility to pollution and the possibility of ground water contamination. The relative pollution potential is commonly measured using a composite Ground Water Pollution Potential (GWPP) Index that incorporates various factors such as depth to water, soil types, etc.

ODNR uses the DRASTIC Index system as a composite GWPP Index to measure the pollution potential. The composite DRASTIC index incorporates 7 factors that are major hydrogeologic characteristics that affect and control ground water movement in the area: Depth to Water; Recharge (Net Recharge); Aquifer Media; Soil Media; Topography (% Slope); Impact of the Vadose Zone Media; and Conductivity (Hydraulic of the Aquifer).

The study used three levels of relative pollution potential measurement: high, medium and low, using the DRASTIC index.

Why is it Important?

The higher the GWPP, the greater the vulnerability to contamination and the less suitable the land is for development due to the possibility of contaminating water resources. Once ground water resources are contaminated, the cost of supplying quality water to residents and industry will greatly increase.

How was the Data Developed?

The Ground Water Pollution Potential data was obtained from the ODNR Division of Water through the Geographic Information Management Systems (GIMS). The Ground Water Pollution Potential Index was classified into three categories using the DRASTIC Index: high potential (Index score greater than 150); medium potential (100-150) and low potential (Index score less than 100) values.

Data Source

GWPP Database, ODNR Division of Water, available at www.ohiodnr.com/gims.

- Butler County, 1991
- Clark County, 1995
- Darke County, 1994
- Greene County, 1995
- Miami County, 1995
- Montgomery County, 1994
- Preble County, 1992
- Warren County, 1990

Data Findings

More than half (59%) of the Region has medium ground water pollution potential and 12% has high pollution potential, as illustrated in figure GWP.1. Table GWP.2 shows each county's share of regional land according to the ground water pollution potential classification. Clark County has the largest proportion of high groundwater pollution potential land (26.2%), followed by Butler (17.8%) and Montgomery (16.4%) counties (see table GWP.2). Table GWP.2 also shows that Warren and Butler counties have a larger share of regional land with low ground water pollution potential (29.0% and 20.3% respectively).

GWP.1 - Regional Land by Ground Water Pollution Potential Classification

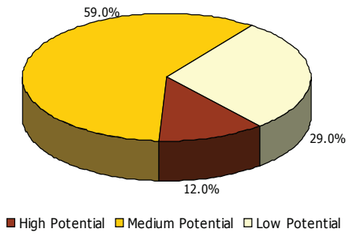
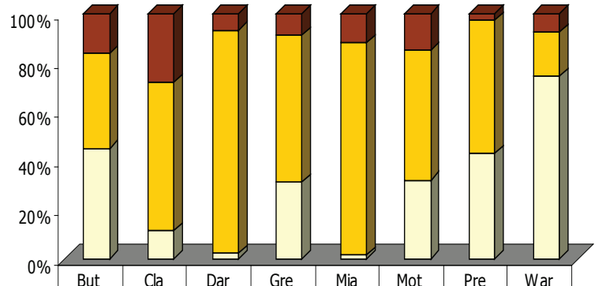


Figure GWP.3 illustrates the breakdown of each county's land by the ground water pollution potential. Over 90% of Miami and Dark counties' land area has either high or medium pollution potential (98.5% and 97.8% respectively; see figure GWP.3). Figure GWP.4 shows the spatial distribution of the three ground water pollution potential classifications across the Region. The areas with a high potential for contamination are located along waterway corridors, such as the Great Miami River, the Mad River and the Great Miami Buried Valley Aquifer.

GWP.2 - County Share of Land by Ground Water Pollution Potential Classification

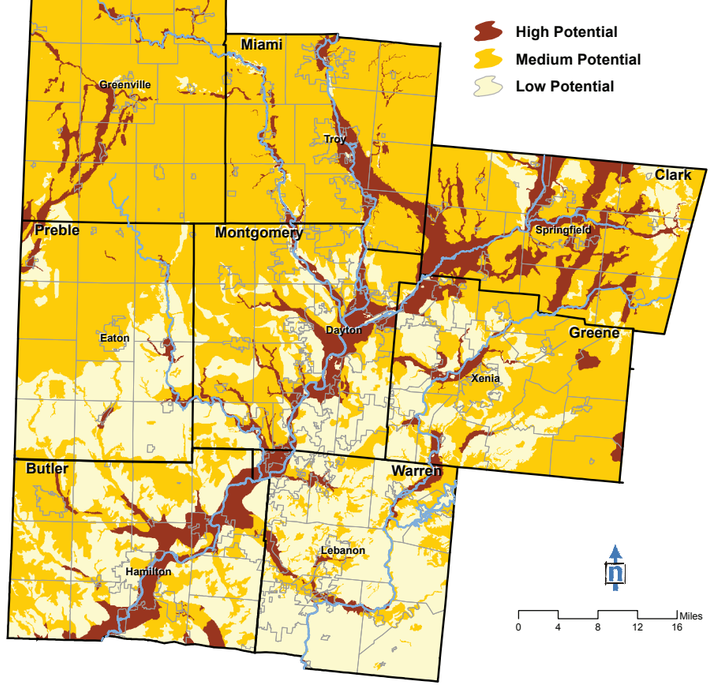
County	High Potential		Medium Potential		Low Potential		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	49,228.8	17.8%	116,202.4	8.6%	135,306.1	20.3%	300,737.3
Clark	72,542.6	26.2%	154,619.7	11.4%	29,708.3	4.5%	256,870.6
Darke	26,117.6	9.4%	349,266.5	25.7%	8,404.5	1.3%	383,788.6
Greene	24,125.2	8.7%	158,518.6	11.7%	83,570.6	12.5%	266,214.5
Miami	31,588.3	11.4%	226,796.3	16.7%	3,866.1	0.6%	262,250.7
Montgomery	45,450.3	16.4%	156,242.3	11.5%	95,529.3	14.3%	297,221.9
Preble	7,638.5	2.8%	148,427.0	10.9%	116,841.2	17.5%	272,906.6
Warren	19,746.7	7.1%	47,491.2	3.5%	193,423.6	29.0%	260,661.4
Regional Total	276,438.0	100.0%	1,357,563.9	100.0%	666,649.7	100.0%	2,300,651.6

GWP.3 - County Land by Ground Water Pollution Potential Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
High Potential	16.4%	28.2%	6.8%	9.1%	12.0%	15.3%	2.8%	7.6%
Medium Potential	38.6%	60.2%	91.0%	59.5%	86.5%	52.6%	54.4%	18.2%
Low Potential	45.0%	11.6%	2.2%	31.4%	1.5%	32.1%	42.8%	74.2%

GWP.4 - Regional Distribution of Land by Ground Water Pollution Potential Classification



Ground Water Yield

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Ground Water Yield?

The Ohio Department of Natural Resources (ODNR) defines groundwater yield as the quantity of water expressed as a rate of flow or total quantity per length of time that can be collected for a given use from groundwater sources. It is commonly measured by using Gallons of water Per Minute (GPM).

The study used three levels of ground water yield measurement: high, medium and low using the GPM information.

Why is it Important?

There are advantages to developing land that has a high groundwater yield as it provides a reliable and cost-effective supply of water. Much of the Region's groundwater comes from the Great Miami Buried Valley Aquifer (GMBVA), which is one of the most productive aquifers in the state and a valuable resource for the Region.

How was the Data Developed?

The groundwater yield data was developed by combining two aquifer GIS databases obtained from the ODNR Division of Water. The aquifer GIS databases were combined into one GIS database while retaining the spatial and ground water yield tabular information from the original aquifer databases. The groundwater yield information was then categorized into three levels of measurement: low (0 to 25 GPM); medium (25-100 GPM); and high (greater than 100 GPM) yields based on the highest yielding aquifer.

Data Source

Unconsolidated Aquifer Map Coverages, Statewide Aquifer Mapping Project (SAMP) 1997-2000, ODNR, Division of Water, Ground Water Mapping and Technical Services, available at www.dnr.state.oh.us/water/samp.

Consolidated Aquifer Map Coverages, Statewide Aquifer Mapping Project (SAMP) 1997-2000, ODNR, Division of Water, Ground Water Mapping and Technical Services, available at www.dnr.state.oh.us/water/samp.

Data Findings

Approximately half of the Region's land has either a high (19.0%) or medium (30.2%) ground water yield capacity (see figure GWY.1). Over 40% of land with a high groundwater yield is located in Darke County (41.5%) while only 1.1% is in Preble County (see table GWY.2). Table GWY.2 also shows Butler, Greene and Warren counties each sharing approximately 20% of the Region's land with low ground water yields.

GWY.1 - Regional Land by Ground Water Yield Classification

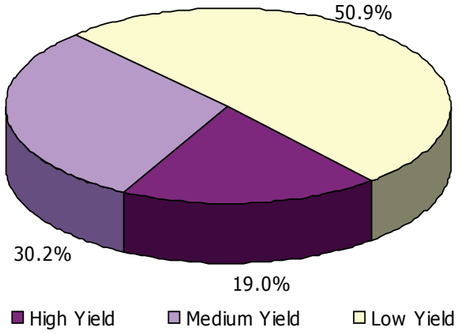
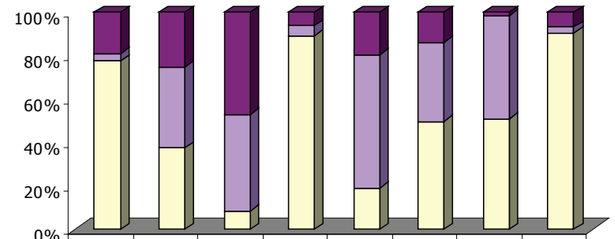


Figure GWY.3 shows the percent of land that produces high, moderate, and low ground water yields at the county level. Over 90% of the land in Darke County is found to have high/medium yield capacity. Other counties that have larger percentages of land with low ground water yields were Greene (88.8%) and Warren (90.4%). Figure GWY.4 shows the spatial distribution of land according to the ground water yield classification.

GWY.2 - County Share of Land by Ground Water Yield Classification

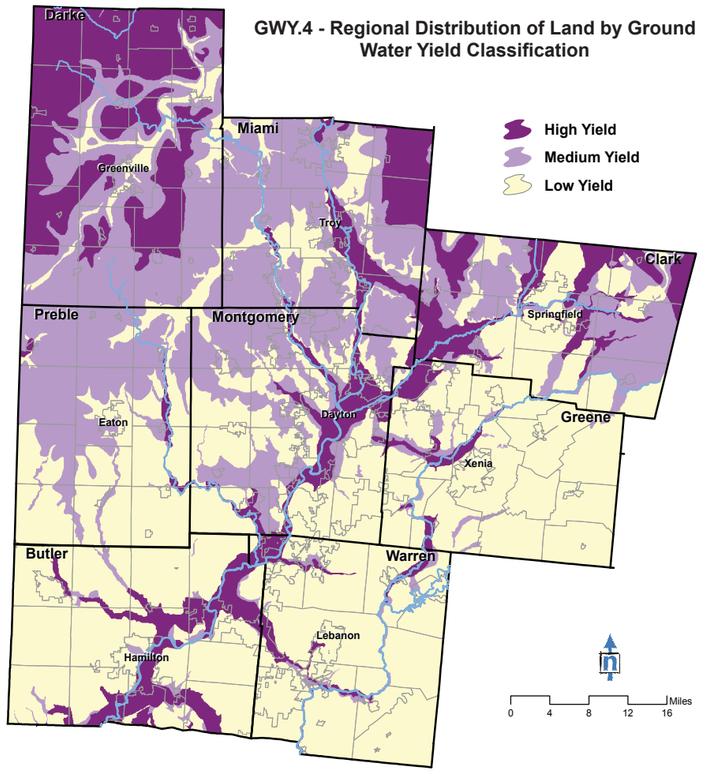
County	High Yield		Medium Yield		Low Yield		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	56,827.5	13.0%	11,091.7	1.6%	232,931.8	19.9%	300,850.9
Clark	64,899.6	14.9%	95,499.7	13.8%	96,605.4	8.3%	257,004.6
Darke	180,956.3	41.5%	169,958.4	24.5%	33,028.6	2.8%	383,943.3
Greene	16,731.8	3.8%	12,976.2	1.9%	236,555.3	20.2%	266,263.3
Miami	51,933.2	11.9%	160,251.0	23.1%	49,808.8	4.3%	261,993.0
Montgomery	41,871.9	9.6%	108,142.5	15.6%	147,140.4	12.6%	297,154.8
Preble	4,971.5	1.1%	128,712.3	18.6%	139,047.9	11.9%	272,731.7
Warren	17,922.3	4.1%	7,100.6	1.0%	235,572.7	20.1%	260,595.6
Regional Total	436,114.0	100.0%	693,732.4	100.0%	1,170,690.8	100.0%	2,300,537.2

GWY.3 - County Land by Ground Water Yield Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
High Yield	18.9%	25.3%	47.1%	6.3%	19.8%	14.1%	1.8%	6.9%
Medium Yield	3.7%	37.2%	44.3%	4.9%	61.2%	36.4%	47.2%	2.7%
Low Yield	77.4%	37.6%	8.6%	88.8%	19.0%	49.5%	51.0%	90.4%

GWY.4 - Regional Distribution of Land by Ground Water Yield Classification



Inundation Areas

Miami Valley Land Suitability Assessment - Natural Environment Factors

What are Inundation Areas?

In general, the term inundation area commonly refers to areas downstream of a dam that would be at high risk in the event of a dam breach. However, this study uses the term inundation area to refer to temporary storm water storage basins located upstream from a dam. Therefore, in the context of this study, inundation areas are storm water storage areas, also known as the flood retarding basins, and their primary purpose is to help decrease flood risk for areas downstream by holding water from heavy rain events until the dam can safety discharge the stored water.

The study divided the Region's land into 2 classes: Inundation Areas and Non-Inundation Areas.

Why are they Important?

Inundation areas are not suitable for development because their position and elevation is hazardous due to the fact they are designed to flood, especially during heavy rain events.

How was the Data Developed?

Inundation areas are interpreted from digital elevation data and are identified according to the land's elevation and proximity to a dam. The hydrography dataset available in Digital Line Graph (DLG) format was obtained from the Ohio Office of Information Technology. The inundation areas were then identified adjacent to riverways and dam locations.

Data Source

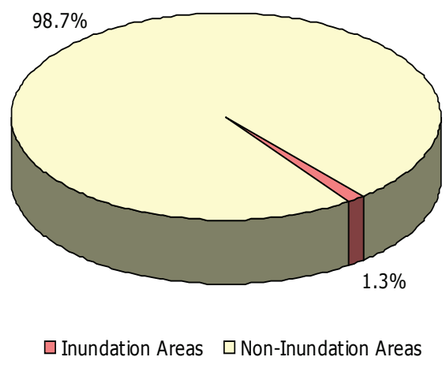
Hydrography Digital Line Graph Data (DLG), Ohio Office of Information Technology (OIT) available at www.oit.ohio.gov/sdd/ess/gis/data.asp.

Data Findings

Inundation areas account only for 1.3% of total regional land (see figure INA.1). Although the regional proportion of inundation areas is very small, table INA.2 reveals that more than half of the Region's inundation areas are located in Miami County (52.1%).

Over 95% of land in seven of the eight counties in the Region is classified as a non-inundation area. In Miami County, only 94.1% of the land is classified as a non-inundation area (see figure INA.3). The spatial distribution of inundation areas in the Region, as shown in Figure INA.4, reveals that there are three large concentrations of inundation areas, one each in Miami, Greene and in Montgomery counties.

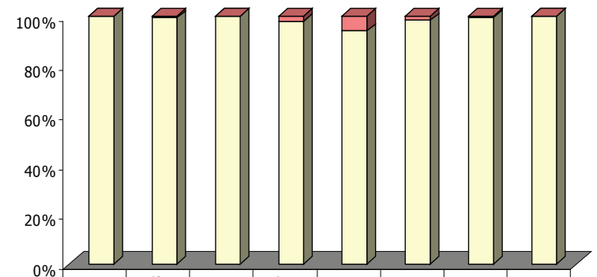
INA.1 - Regional Land by Inundation Classification



INA.2 - County Share of Land by Inundation Classification

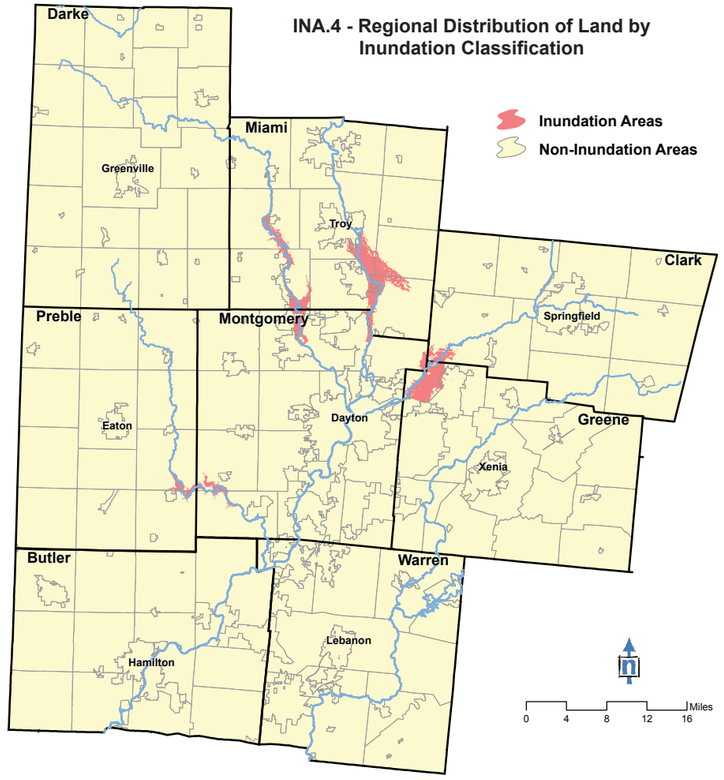
County	Inundation Areas		Non-Inundation Areas		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	0.0	0.0%	300,810.3	13.2%	300,810.3
Clark	1,667.7	5.6%	255,219.9	11.2%	256,887.5
Darke	0.0	0.0%	383,827.7	16.9%	383,827.7
Greene	5,619.8	19.0%	260,569.0	11.5%	266,188.8
Miami	15,382.6	52.1%	246,980.4	10.9%	262,363.0
Montgomery	5,341.9	18.1%	291,878.1	12.9%	297,220.0
Preble	1,532.7	5.2%	271,354.6	11.9%	272,887.2
Warren	0.0	0.0%	260,727.8	11.5%	260,727.8
Regional Total	29,544.7	100.0%	2,271,367.6	100.0%	2,300,912.3

INA.3 - County Land by Inundation Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Inundation Areas	0.0%	0.6%	0.0%	2.1%	5.9%	1.8%	0.6%	0.0%
Non-Inundation Areas	100.0%	99.4%	100.0%	97.9%	94.1%	98.2%	99.4%	100.0%

INA.4 - Regional Distribution of Land by Inundation Classification



Load Bearing Strength

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Load Bearing Strength?

The Montana State University Ecosystem Restoration Program defines load bearing strength as the soil's ability to support the weight of a load, such as a house or car, before the soil gives way causing the load to sink. Load bearing strength is determined prior to construction and is typically measured from a core sample taken from the site.

The study classified the load bearing strength into two classes: low load bearing strength and adequate strength.

Why is it Important?

The load bearing strength of soil is an important factor in determining land development potential. Areas with inadequate load bearing strength may not be recommended for land development since the area does not provide adequate foundation support. Also, the areas may affect the construction techniques used to erect a stable structure and potentially increase the cost of construction.

How was the Data Developed?

The load bearing strength data was derived fro the spatial and attribute data obtained from the US Department of Agricultlure (USDA) Soil Survey Geographic (SSURGO) database. The SSURGO database provides information regarding soil properties such as the presence of muck, high organidc matter, and soil subsidence. Soils having one or more of these properties were classified as potentially having low load bearing strength.

Clark County was the only county in the Region that did not have a SSURGO spatial data file available and, therefore, the Soil Mapping Units data from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS) were used. However, the SSURGO attribute data was used since it was available for Clark County.

Data Source

SSURGO Database, USDA, Natural Resources Conservation Service, available at soildatamart.nrcs.usda.gov.

- Butler County, September 11, 2006
- Clark County, August 3, 2007 (Attribute Data Only)
- Darke County, June 16, 2006
- Greene County, June 16, 2006
- Miami County, June 21, 2006
- Montgomery County, June 16, 2006
- Preble County, June 21, 2006
- Warren County, June 16, 2006

Soil Mapping Units Database, ODNR, Division of Soil and Water Conservation, available at www.ohiodnr.com/gims.

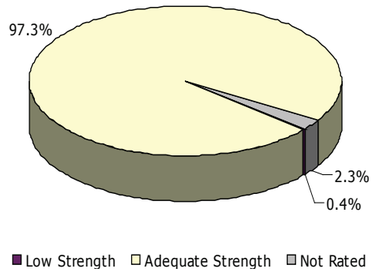
- Clark County, May 5, 1992

Data Findings

Over 97% of land in the study area has adequate load bearing strength (see figure LBS.1). Only a small portion of land in Clark (3,531.1 acres), Miami (2,152.8 acres), Darke (1,879.6 acres), Greene (1,057.6 acres), Warren (89.3 acres), and Montgomery (50.0 acres) counties have inadequate load bearing strength (see table LBS.2).

Although very small in size, Clark (1.4%) and Miami (0.8%) counties have the highest percentages of land with inadequate strength (see figure LBS.3). Figure LBS.4 shows the geographic distribution of load bearing strength. Much of the land with low load bearing strength is located in western Darke County and scattered across both Miami and Clark counties.

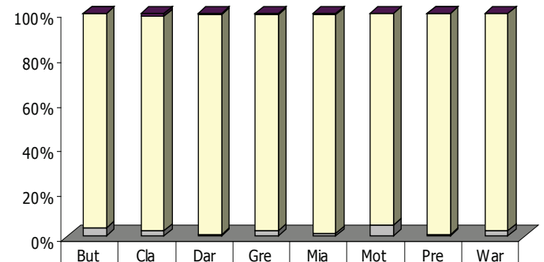
LBS.1 - Regional Land by Load Bearing Strength Classification



LBS.2 - County Share of Land by Load Bearing Strength Classification

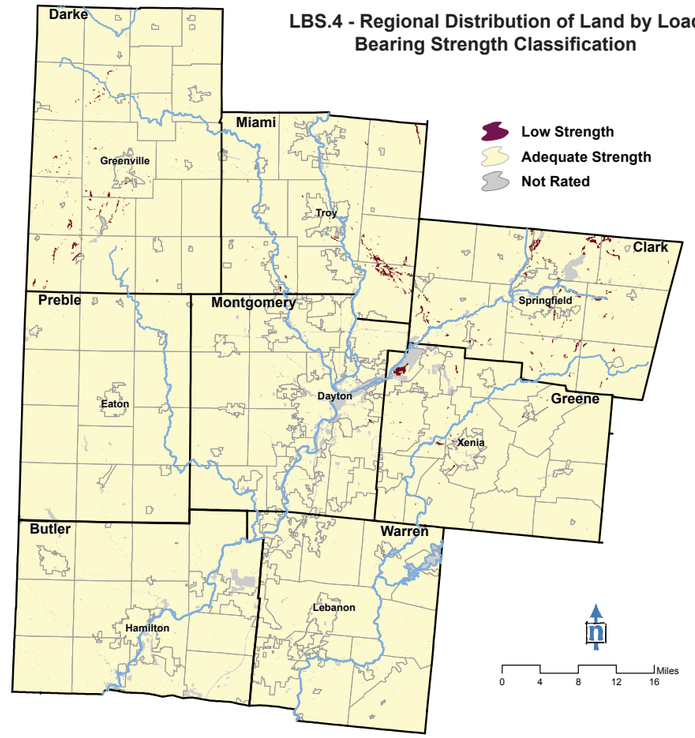
County	Low Strength		Adequate Strength		Not Rated		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	0.0	0.0%	290,261.8	13.0%	10,489.0	19.8%	300,750.8
Clark	3,531.1	40.3%	246,489.7	11.0%	6,888.3	13.0%	256,909.2
Darke	1,879.6	21.5%	380,148.4	17.0%	1,722.1	3.3%	383,750.1
Greene	1,057.6	12.1%	258,064.6	11.5%	7,122.4	13.5%	266,244.6
Miami	2,152.8	24.6%	256,476.6	11.5%	3,648.5	6.9%	262,278.0
Montgomery	50.0	0.6%	282,048.2	12.6%	15,174.6	28.7%	297,272.9
Preble	0.0	0.0%	270,888.1	12.1%	2,070.0	3.9%	272,958.0
Warren	89.3	1.0%	254,772.7	11.4%	5,805.9	11.0%	260,667.9
Regional Total	8,760.4	100.0%	2,239,150.1	100.0%	52,920.9	100.0%	2,300,831.5

LBS.3 - County Land by Load Bearing Strength Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Low Strength	0.0%	1.4%	0.5%	0.4%	0.8%	0.0%	0.0%	0.0%
Adequate Strength	96.5%	95.9%	99.1%	96.9%	97.8%	94.9%	99.2%	97.7%
Not Rated	3.5%	2.7%	0.4%	2.7%	1.4%	5.1%	0.8%	2.2%

LBS.4 - Regional Distribution of Land by Load Bearing Strength Classification



Mineral Resources

Miami Valley Land Suitability Assessment - Natural Environment Factors

What are Mineral Resources?

The U.S. Geological Survey (USGS) defines a mineral as "a naturally occurring inorganic element or compound having an orderly internal structure and characteristic chemical composition, crystal morphology and physical properties such as density and hardness." The most common minerals found in the Miami Valley are sand and gravel, both which are valuable resources for producing construction materials.

The study classified the land area into two classes: Areas Mineral Resources Likely Present and Areas Mineral Resources Not-Likely Present.

Why are they Important?

Mineral resources are valuable assets to the economy and their amounts are finite. Being that they are located under the earth's surface, it would be advantageous to not develop areas where mineral resources are known to be located. This would increase the cost of removing the minerals and complicate the excavation process.

How was the Data Developed?

The spatial and attribute data for mineral resources was obtained from the US Department of Agriculture (USDA), Soil Survey Geographic (SSURGO) Database. The soil types that contain sand and gravel were classified to potentially have mineral resources below the earth's surface.

Clark County was the only county in the Region that did not have a SSURGO spatial data file available and, therefore, the Soil Mapping Units data from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS) were used. However, the SSURGO attribute data was used since it was available for Clark County.

Data Source

SSURGO Database, USDA, Natural Resources Conservation Service, available at soildatamart.nrcs.usda.gov.

- Butler County, September 11, 2006
- Clark County, August 3, 2007 (Attribute Data Only)
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- Preble County, June 21, 2006
- Warren County, June 16, 2006

Soil Mapping Units Database, ODNR, Division of Soil and Water Conservation, available at www.ohiodnr.com/gims.

- Clark County, May 5, 1992

Data Findings

Approximately 6.1% of the land in the Region has the potential to contain mineral resources (see figure MNR.1). Clark (41.6%) and Montgomery (21.1%) counties have the largest shares and acreage of the Region's land that is likely to contain mineral resources, while Warren (0.4%) and Miami (0.8%) counties have the smallest shares and acreage (see table MNR.2).

MNR.1 - Regional Land by Mineral Resources Classification

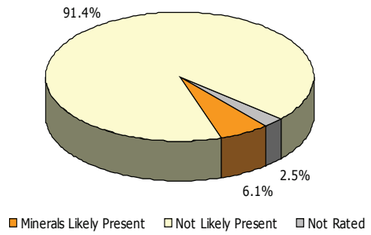
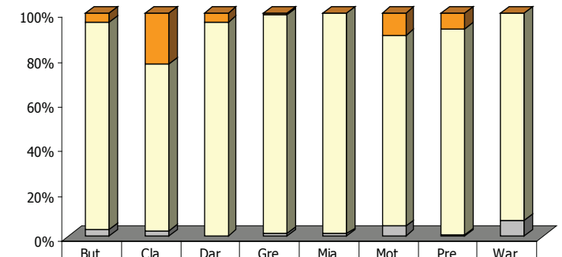


Figure MNR.3 shows the percent of land identified as potentially containing mineral resources. Clark County has the largest percentage of land likely to have mineral resources present with 22.7%. In contrast, only 0.2% of Warren County and 0.4% of Miami County likely have mineral resources. Figure MNR.4 shows the spatial distribution of the Region's mineral resources.

MNR.2 - County Share of Land by Mineral Resources Classification

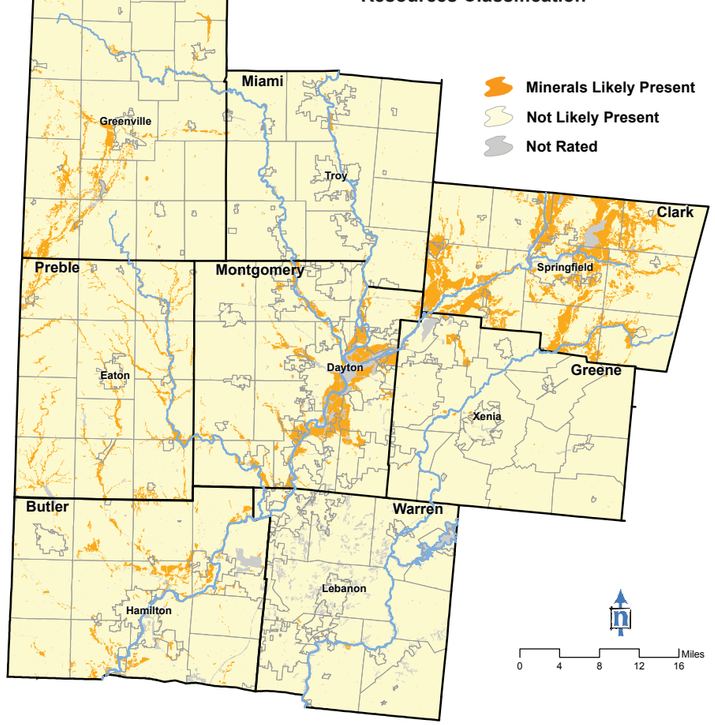
County	Minerals Likely Present		Not Likely Present		Not Rated		Total
	Acreage	County Share of Regional Land	Acreage	County Share of Regional Lands	Acreage	County Share of Regional Lands	
Butler	12,760.7	9.1%	278,627.9	13.3%	9,362.2	16.2%	300,750.8
Clark	58,334.0	41.6%	192,398.6	9.1%	6,176.7	10.7%	256,909.2
Darke	16,134.4	11.5%	365,893.5	17.4%	1,722.1	3.0%	383,750.1
Greene	2,181.1	1.6%	260,376.1	12.4%	3,687.5	6.4%	266,244.6
Miami	1,173.7	0.8%	258,268.7	12.3%	2,835.5	4.9%	262,278.0
Montgomery	29,645.1	21.1%	254,105.2	12.1%	13,522.6	23.4%	297,272.9
Preble	19,442.5	13.9%	251,813.6	12.0%	1,701.9	2.9%	272,958.0
Warren	506.7	0.4%	241,320.5	11.5%	18,840.7	32.6%	260,667.9
Regional Total	140,178.2	100.0%	2,102,804.1	100.0%	57,849.1	100.0%	2,300,831.5

MNR.3 - County Land by Mineral Resources Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Minerals Likely Present	4.2%	22.7%	4.2%	0.8%	0.4%	10.0%	7.1%	0.2%
Not Likely Present	92.6%	74.9%	95.3%	97.8%	98.5%	85.5%	92.3%	92.6%
Not Rated	3.1%	2.4%	0.4%	1.4%	1.1%	4.5%	0.6%	7.2%

MNR.4 - Regional Distribution of Land by Mineral Resources Classification



Prime Farmland

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Prime Farmland?

The U.S. Department of Agriculture (USDA) defines prime farmland as "land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses." Another category of Prime Farmland is Prime Farmland with Conditions, which is land that could be used for farmland but would require the land to be artificially drained and/or protected from flood to produce an economically viable crop.

The study classified the farmland into three categories: Naturally Prime, Prime with Conditions, and Not Prime Farmland.

Why is it Important?

According to the Ohio Farm Bureau Federation, Ohio's prime farmland is a valuable asset and resource for Ohio's economy and the nation's food supply. In Montgomery County, for example, agriculture contributes $3 billion in output and employs over 45,300 people. Efforts should be made to direct development away from lands that are efficient agricultural land.

How was the Data Developed?

The Soil Survey Geographic (SSURGO) Database obtained from the USDA classified each soil type into six categories: All Areas are Prime Farmland; Farmland of Local Importance; Prime Farmland if Drained; Prime Farmland if Drained and Either Protected from Flooding or not Frequently Flooded; Prime Farmland if Protected from Flooding or not Frequently Flooded; and Not Prime Farmland.

For this study, these six categories were combined into three categories: Naturally Prime, Prime with Conditions, and Not Prime Farmland.

- Naturally Prime - All Areas are Prime Farmland and Farmland of Local Importance
- Prime with Conditions - Prime Farmland if Drained, Prime Farmland if Drained and Either Protected from Flooding or not Frequently Flooded, and Prime Farmland if Protected from Flooding or not Frequently Flooded
- Not Prime - Not Prime Farmland

Clark County was the only county in the Region that did not have a SSURGO spatial data file available and, therefore, the Soil Mapping Units data from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS) were used. However, the SSURGO attribute data was used since it was available for Clark County.

Data Source

SSURGO Database, USDA, Natural Resources Conservation Service, available at soildatamart.nrcs.usda.gov.

- Butler County, September 11, 2006
- Clark County, August 3, 2007 (Attribute Data Only)
- Darke County, June 16, 2006
- Greene County, June 16, 2006
- Miami County, June 21, 2006
- Montgomery County, June 16, 2006
- Preble County, June 21, 2006
- Warren County, June 16, 2006

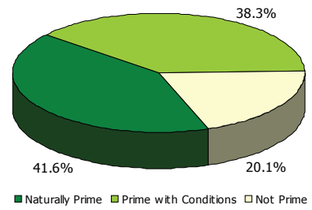
Soil Mapping Units Database, ODNR, Division of Soil and Water Conservation, available at www.ohiodnr.com/gims.

- Clark County, May 5, 1992

Data Findings

Over 40% of the Region's land (41.6%) is naturally prime farmland and 38.3% is prime farmland with conditions (see Figure PFL.1). Table PFL.2 illustrates county shares of land by prime farmland classification. Butler County (15.4%) leads the Region with the largest share of naturally prime farmland while Darke County (8.4%) has the smallest share.

PFL.1 - Regional Land by Prime Farmland Classification

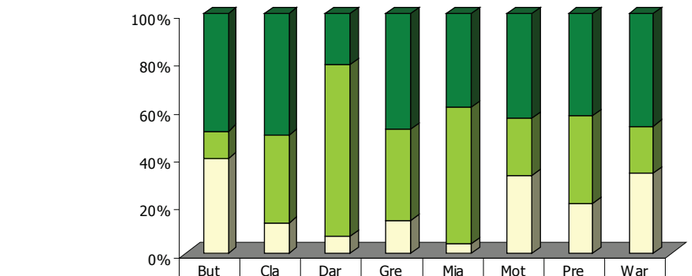


Nearly half of the land in Clark (50.7%) and Butler (49.0%) counties is naturally prime farmland (see figure PFL.3). In contrast, large portions of land in Butler (39.5%) and Warren (33.3%) counties are not prime farmland. Figure PFL.4 shows the spatial distribution of the three prime farmland classifications across the Region.

PFL.2 - County Share of Land by Prime Farmland Classification

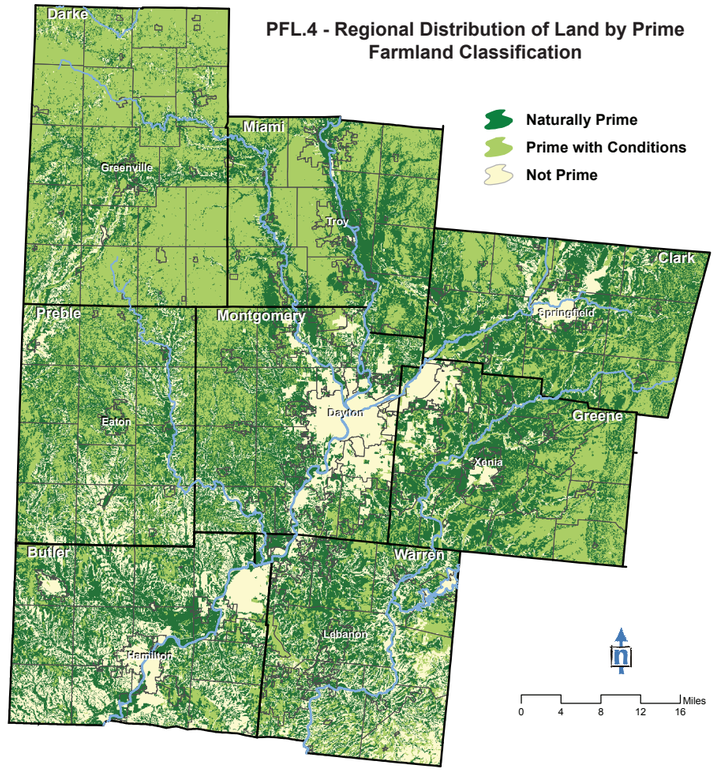
County	Naturally Prime		Prime with Conditions		Not Prime		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	147,304.3	15.4%	34,693.9	3.9%	118,752.7	25.7%	300,750.8
Clark	130,139.0	13.6%	94,900.6	10.8%	31,869.1	6.9%	256,908.8
Darke	80,687.9	8.4%	276,988.6	31.4%	26,073.6	5.6%	383,750.1
Greene	128,352.6	13.4%	101,994.3	11.6%	35,897.7	7.8%	266,244.6
Miami	102,143.6	10.7%	149,593.6	17.0%	10,540.7	2.3%	262,278.0
Montgomery	130,198.5	13.6%	70,492.8	8.0%	96,581.6	20.9%	297,272.9
Preble	115,752.1	12.1%	101,129.9	11.5%	56,075.9	12.1%	272,958.0
Warren	122,416.5	12.8%	51,419.3	5.8%	86,832.1	18.8%	260,667.9
Regional Total	956,994.6	100.0%	881,213.0	100.0%	462,623.4	100.0%	2,300,831.0

PFL.3 - County Land by Prime Farmland Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Naturally Prime	49.0%	50.7%	21.0%	48.2%	38.9%	43.8%	42.4%	47.0%
Prime with Conditions	11.5%	36.9%	72.2%	38.3%	57.0%	23.7%	37.0%	19.7%
Not Prime	39.5%	12.4%	6.8%	13.5%	4.0%	32.5%	20.5%	33.3%

PFL.4 - Regional Distribution of Land by Prime Farmland Classification



Slope

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Slope?

The U.S. Department of Agriculture (USDA) defines slope as the vertical change in elevation over a given horizontal distance and can be measured as a percentage, a ratio or an angle.

The study categorizes the Region's land into three different slope types: Flat, Rolling and Steep based on the percentage measure.

Why is it Important?

Development on steep slopes can result in significant destruction of the community's scenic beauty, degradation of water quality, increased down-stream runoff and flooding problems, loss of sensitive biological habitats and habitat linkages, erosion, slope failures, high utility costs, lack of safe access for emergency vehicles and high costs for maintenance of public improvements. In addition, slope is an important consideration for development and land use because it greatly influences development costs.

How was the Data Developed?

The Ohio 10 Meter Digital Elevation Model data published by the Ohio Environmental Protection Agency (OEPA) Division of Emergency and Remedial Response was downloaded through Ohio Metadata Explorer (metadataexplorer.gis.state.oh.us/metadataexplorer/explorer.jsp). The elevation value contained in the data obtained was converted into a slope value and reclassified into three nominal categories: Flat (Slope less than 6%), Rolling (6% to 12%), and Steep (Slope greater than 12%).

Data Source

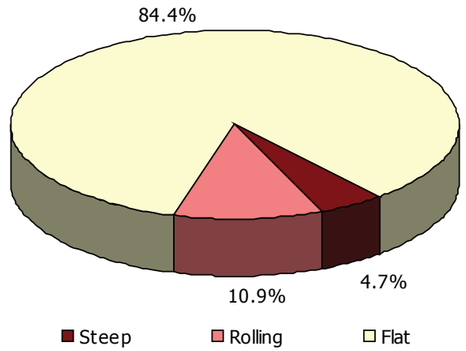
Ohio 10 Meter Digital Elevation Model, OEPA, Division of Emergency and Remedial Response, available through metadataexplorer.gis.state.oh.us/metadataexplorer/explorer.jsp.

Data Findings

The Region, in general, is made up of flat land that is less than a 6% slope (see Figure SLP.1). Only 15.6% of the Region's land have rolling or steep slopes. Table SLP.2 shows each county's acreage and share of the regional land areas by slope classification. Butler (28.5%) and Warren (23.7%) counties contain the largest regional shares of land with a steep slope. Butler County also contains over one-fourth (25.5%) of the regional land with rolling slope.

Figure SLP.3 shows the percentage distribution of each county's land by the three slope categories. Over 90% of the land in Darke (95.4%) and Miami (93.0%) counties is flat with less than a 6% slope while 10.3% of Butler County has steep slopes. Figure SLP.4 shows that the southern part of the Region has more steep land than the north.

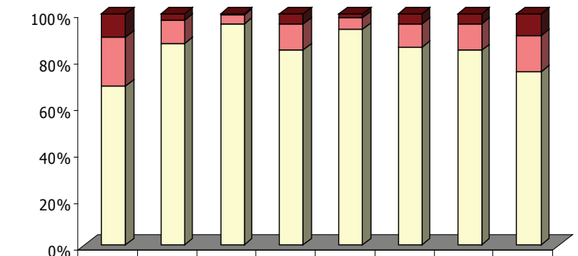
SLP.1 - Regional Land by Slope Classification



SLP.2 - County Share of Land by Slope Classification

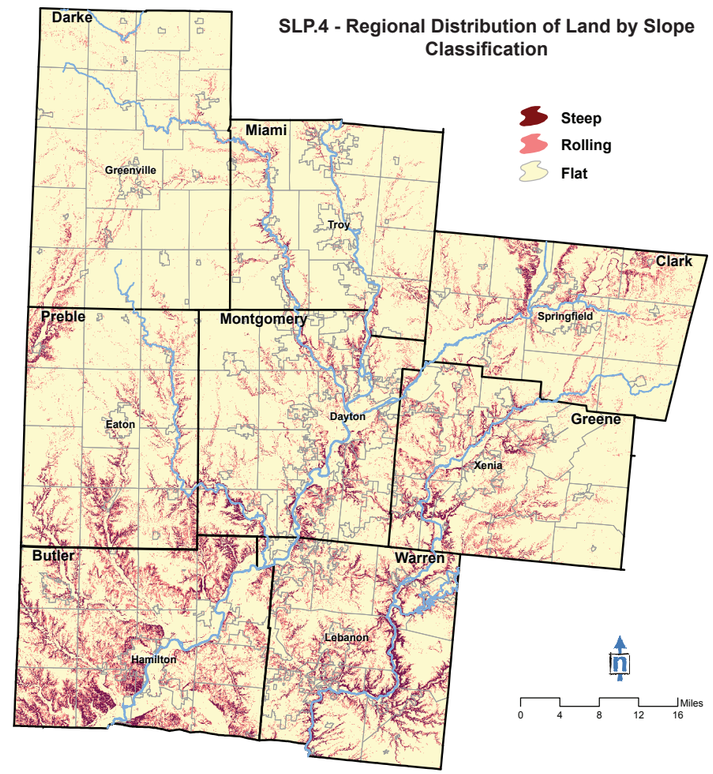
County	Steep		Rolling		Flat		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	30,850.9	28.5%	64,133.0	25.5%	205,878.0	10.6%	300,861.8
Clark	7,070.4	6.5%	26,080.0	10.4%	223,845.4	11.5%	256,995.8
Darke	1,862.9	1.7%	15,778.3	6.3%	366,369.4	18.9%	384,010.5
Greene	11,846.1	11.0%	30,462.5	12.1%	223,951.0	11.5%	266,259.6
Miami	4,486.9	4.1%	13,786.9	5.5%	243,730.2	12.6%	262,004.0
Montgomery	13,420.2	12.4%	30,226.4	12.0%	253,510.6	13.1%	297,157.2
Preble	12,973.7	12.0%	30,795.0	12.2%	229,068.9	11.8%	272,837.6
Warren	25,665.3	23.7%	40,147.5	16.0%	194,784.5	10.0%	260,597.3
Regional Total	108,176.3	100.0%	251,409.6	100.0%	1,941,137.8	100.0%	2,300,723.7

SLP.3 - County Land by Slope Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Steep	10.3%	2.8%	0.5%	4.4%	1.7%	4.5%	4.8%	9.8%
Rolling	21.3%	10.1%	4.1%	11.4%	5.3%	10.2%	11.3%	15.4%
Flat	68.4%	87.1%	95.4%	84.1%	93.0%	85.3%	84.0%	74.7%

SLP.4 - Regional Distribution of Land by Slope Classification



Soil Drainage

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Soil Drainage?

The U.S. Department of Agriculture (USDA) defines soil drainage as the removal of excess water from the soil.

The study classified the soil drainage into four categories: Well Drained; Somewhat Poorly Drained; Poorly Drained; and Not Rated

Why is it Important?

Areas with poor drainage present a limitation for development because it may cause high water tables that could become hazard and damage structures. More specifically, areas with poor drainage may result in wet basements, ponding, root restriction that inhibits the growth of landscaping plants and trees around houses, and dysfunctional septic tank absorption fields.

How was the Data Developed?

The Soil Survey Geographic (SSURGO) Database obtained from the USDA classified each soil type into eight categories: Excessively Drained; Somewhat Excessively Drained; Well Drained; Moderately Well Drained; Somewhat Poorly Drained; Poorly Drained; Very Poorly Drained; and Not Rated based on the frequency and duration of wet periods.

For this study, these eight categories were combined into four categories: Well Drained; Somewhat Poorly Drained; Poorly Drained; and Not Rated.

- Well Drained - Excessively Drained, Somewhat Excessively Drained, Well Drained, and Moderately Well Drained
- Somewhat Poorly Drained - Somewhat Poorly Drained
- Poorly Drained - Poorly Drained and Very Poorly Drained
- Not Rated

Clark County was the only county in the Region that did not have a SSURGO spatial data file available and, therefore, the Soil Mapping Units data from the Ohio Department of Natural Resources (ODNR) Geographic Information Management Systems (GIMS) were used. However, the SSURGO attribute data was used since it was available for Clark County.

Data Source

SSURGO Database, USDA, Natural Resources Conservation Service, available at soildatamart.nrcs.usda.gov.

- Butler County, September 11, 2006
- Clark County, August 3, 2007 (Attribute Data Only)
- Darke County, June 16, 2006
- Greene County, June 16, 2006
- Miami County, June 21, 2006
- Montgomery County, June 16, 2006
- Preble County, June 21, 2006
- Warren County, June 16, 2006

Soil Mapping Units Database, ODNR, Division of Soil and Water Conservation, available at www.ohiodnr.com/gims.

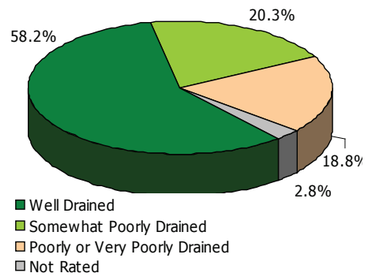
- Clark County, May 5, 1992

Data Findings

The majority (58.2%) of the land in the Region, as shown in figure SDR.1, is composed of soil types that provide good drainage. Approximately 18.8% of the Region, however, has poor or very poor drainage. Darke County has the highest proportion of land with poor or very poor drainage (24.6%), followed by Clark (16.3%) and Greene (15.5%) counties. (see table SDR.2)

Figure SDR.3 shows the percent of land with soil drainage classifications at the county level. Over 80% of land in Butler (84.7%), Warren (71.2%) and Montgomery (68.8%) counties has soil types that provide good drainage. On the contrary, more than half of the land in Darke (72.7%) and Miami (57.2%) counties has somwhat poor or very poorly drained soils. The map presented in Figure SDR.4 provides an overview of the Region based on soil drainage classification.

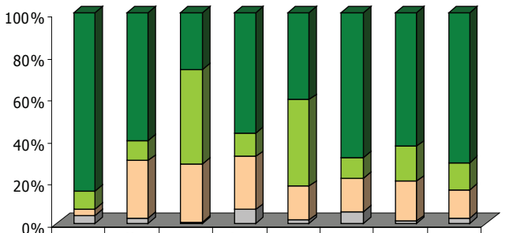
SDR.1 - Regional Land by Soil Drainage Classification



SDR.2 - County Share of Land by Soil Drainage Classifications

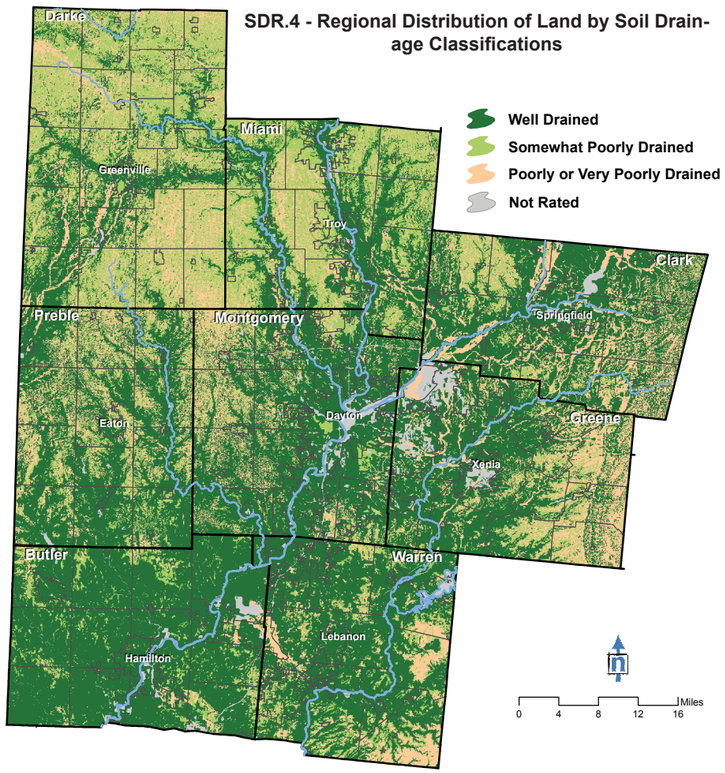
County	Well Drained		Somewhat Poorly Drained		Poorly / Very Poorly Drained		Not Rated		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	254,813.8	19.0%	25,860.4	5.5%	9,588.0	2.2%	10,488.7	16.5%	300,750.8
Clark	156,427.1	11.7%	23,792.5	5.1%	70,483.8	16.3%	6,205.9	9.7%	256,909.2
Darke	103,159.8	7.7%	172,568.0	37.0%	106,300.1	24.6%	1,722.1	2.7%	383,750.1
Greene	151,571.4	11.3%	30,528.5	6.5%	66,915.1	15.5%	17,229.7	27.1%	266,244.6
Miami	108,652.0	8.1%	107,542.3	23.0%	42,434.5	9.8%	3,649.2	5.7%	262,278.0
Montgomery	204,566.9	15.3%	28,700.2	6.1%	47,590.9	11.0%	16,414.9	25.8%	297,272.9
Preble	173,777.1	13.0%	44,611.2	9.6%	52,499.5	12.2%	2,070.3	3.3%	272,958.0
Warren	185,639.3	13.9%	33,287.1	7.1%	35,868.2	8.3%	5,873.3	9.2%	260,667.9
Regional Total	1,338,607.2	100.0%	466,890.2	100.0%	431,680.0	100.0%	63,654.1	100.0%	2,300,831.4

SDR.3 - County Land by Soil Drainage Classifications



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Well Drained	84.7%	60.9%	26.9%	56.9%	41.4%	68.8%	63.7%	71.2%
Somewhat Poorly Drained	8.6%	9.3%	45.0%	11.5%	41.0%	9.7%	16.3%	12.8%
Poorly or Very Poorly Drained	3.2%	27.4%	27.7%	25.1%	16.2%	16.0%	19.2%	13.8%
Not Rated	3.5%	2.4%	0.4%	6.5%	1.4%	5.5%	0.8%	2.3%

SDR.4 - Regional Distribution of Land by Soil Drainage Classifications



Sole Source Aquifer

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is a Sole Source Aquifer?

The U.S. Environmental Protection Agency (USEPA) defines a sole source aquifer (SSA) as an aquifer (a soil or rock formation that is capable of storing, transmitting, and yielding groundwater to wells) "designated by U.S. Environmental Protection Agency (EPA) as the 'sole or principal source' of drinking water for a given service area, supplying 50% or more of the drinking water for the area."

The USEPA designates sole source aquifers into two classes: Class I and Class II.

- Class I SSA - An aquifer that has high to high-intermediate potential productivity based on its characteristics and proximity to recharge.
- Class II SSA - An aquifer that has low-intermediate to low potential productivity based on aquifer characteristics and proximity to recharge.

Following the USEPA's classification, the study classified the Region into 3 areas: Class I SSA designated area; Class II SSA designated area; and Non-SSA area.

Why is it Important?

A SSA is the main supply of drinking water for an area and for which there are no reasonably available alternative sources should the aquifer become contaminated. The USEPA designates SSAs to ensure that proposed projects receiving federal assistance do not jeopardize the quality of this resource. The development of areas overlying a SSA should be carefully considered and planned with this resource in mind.

The Great Miami Buried Valley Aquifer (GMBVA) provides quality drinking water to 97% of Miami Valley residents and was designated as a sole source aquifer by the USEPA in 1988. In many places, the depth to groundwater is less than 20 feet, making the GMBVA highly susceptible to contamination from surface sources.

How was the Data Developed?

The delineation of the GMBVA SSA was based on the County Groundwater Resource Maps prepared by the Ohio Department of Natural Resources (ODNR) using the well log data to identify areas of similar groundwater yield potential and aquifer characteristics. This was a joint effort between the Miami Valley Regional Planning Commission (MVRPC) and the Ohio, Kentucky, Indiana (OKI) Regional Council of Governments.

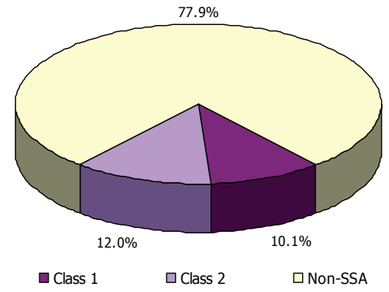
Data Source

Sole Source Aquifer Mapping, MVRPC.

Data Findings

Twenty-two percent of the land in the Region contains either Class I or Class II SSAs (see figure SSA.1). Land containing SSA I designated aquifers located in Butler (31.3%) and Montgomery (20.4%) counties account for over half of the total land containing SSA I designated aquifers in the Region. Over 20% of the Region's SSA II designated aquifers are located in Clark (21.6%), Miami (24.5%) and Montgomery (22.3%) counties (see table SSA.2).

SSA.1 - Regional Land by Sole Source Aquifer Classification

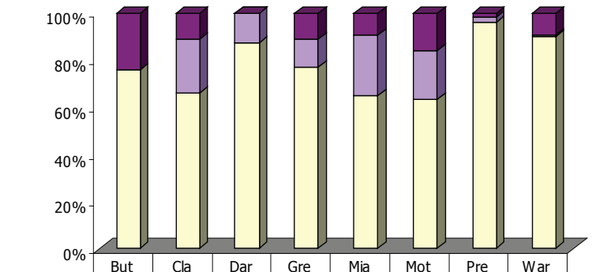


Montgomery (36.7%), Miami (35.2%) and Clark (34.0%) counties have larger percentages of class I and II SSA aquifers than the other four counties in the Region. Preble (95.9%) and Warren (90.2%) counties have the smallest amounts of class I and II SSAs. Figure SSA.4 shows that the class I and II SSA resources follow the GMBVA and extend northwest into Miami and Darke counties.

SSA.2 - County Share of Land by Sole Source Aquifer Classification

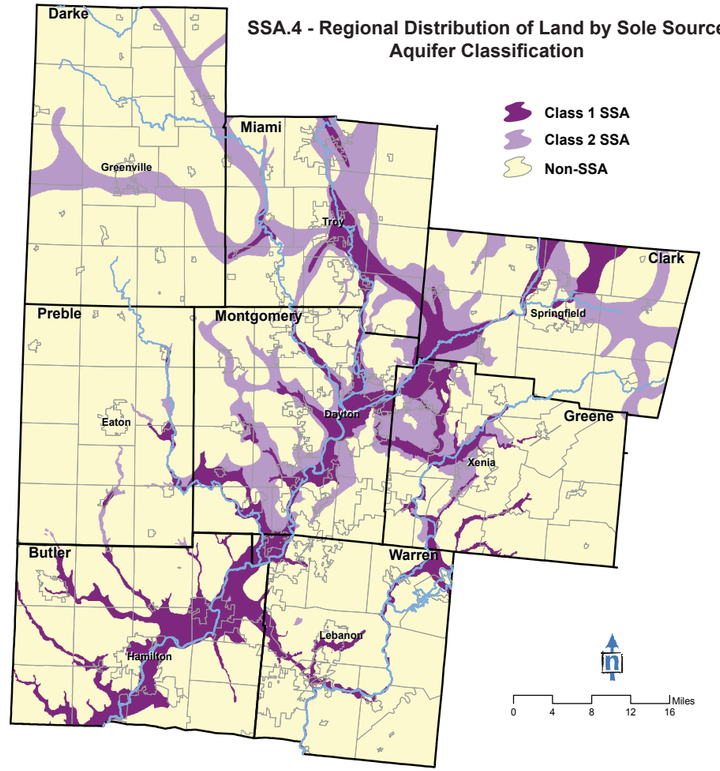
County	Class 1 SSA		Class 2 SSA		Non-SSA		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	72,559.3	31.3%	195.7	0.1%	228,055.3	12.7%	300,810.3
Clark	27,823.9	12.0%	59,611.3	21.6%	169,456.9	9.5%	256,892.1
Darke	0.0	0.0%	48,765.5	17.6%	335,062.3	18.7%	383,827.7
Greene	29,855.4	12.9%	31,364.1	11.3%	204,969.5	11.4%	266,189.0
Miami	24,632.7	10.6%	67,812.5	24.5%	169,919.6	9.5%	262,364.8
Montgomery	47,439.5	20.4%	61,657.3	22.3%	188,124.8	10.5%	297,221.6
Preble	4,467.1	1.9%	6,748.7	2.4%	261,671.4	14.6%	272,887.2
Warren	25,213.6	10.9%	358.4	0.1%	235,155.7	13.1%	260,727.8
Regional Total	231,991.6	100.0%	276,513.4	100.0%	1792,415.5	100.0%	2,300,920.5

SSA.3 - County Land by Sole Source Aquifer Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Class 1	24.1%	10.8%	0.0%	11.2%	9.4%	16.0%	1.6%	9.7%
Class 2	0.1%	23.2%	12.7%	11.8%	25.8%	20.7%	2.5%	0.1%
Non-SSA	75.8%	66.0%	87.3%	77.0%	64.8%	63.3%	95.9%	90.2%

SSA.4 - Regional Distribution of Land by Sole Source Aquifer Classification



Surface Water

Miami Valley Land Suitability Assessment - Natural Environment Factors

What is Surface Water?

Surface water is water found on the earth's surface such as a stream, river, lake or reservoir.

Why is it Important?

Areas with surface water are less suited or not suited at all for development because removing the water is costly and labor intensive.

How was the Data Developed?

The Statewide Hydrography data was obtained from the Ohio Department of Natural Resources (ODNR) through the Geographic Information Management Systems (GIMS) to identify areas with surface water. According to the metadata, the Statewide Hydrography data was developed from the Digital Line Graphy - Hydrography Layer provided by the U.S. Geological Survey (USGS).

Data Source

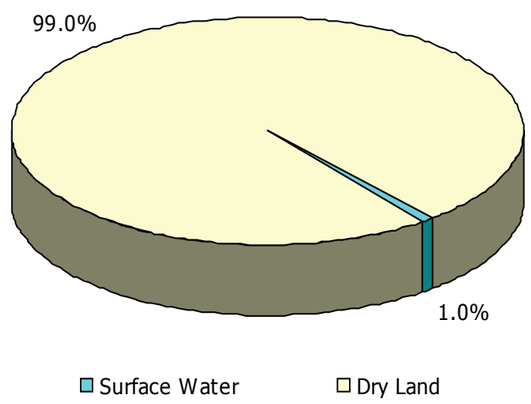
Statewide Hydrography Shapefile, ODNR, available at www.ohiodnr.com/gims.

Data Findings

Only 1% of the Region, as illustrated in figure SFW.1, consists of surface water. Table SFW.2 shows each county's share and acreage of the regioanl land that is either dry land or surface water. Warren and Clark counties have the largest shares and acreage of the Region's surface water with 24.9% and 19.4%, respectively (see table SFW.2).

Figure SFW.3 shows each county's surface water area as a percent of total area. Only 0.2% of Darke County land is surface water while 2% of Warren County is surface water. Figure SFW.4 shows where the Region's surface water is located.

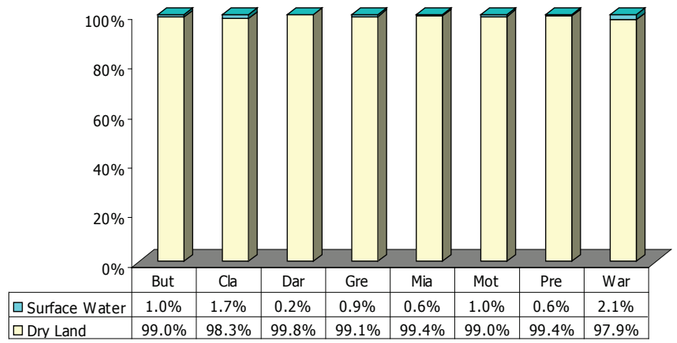
SFW.1 - Regional Land by Surface Water Classification



SFW.2 - County Share of Land by Surface Water Classification

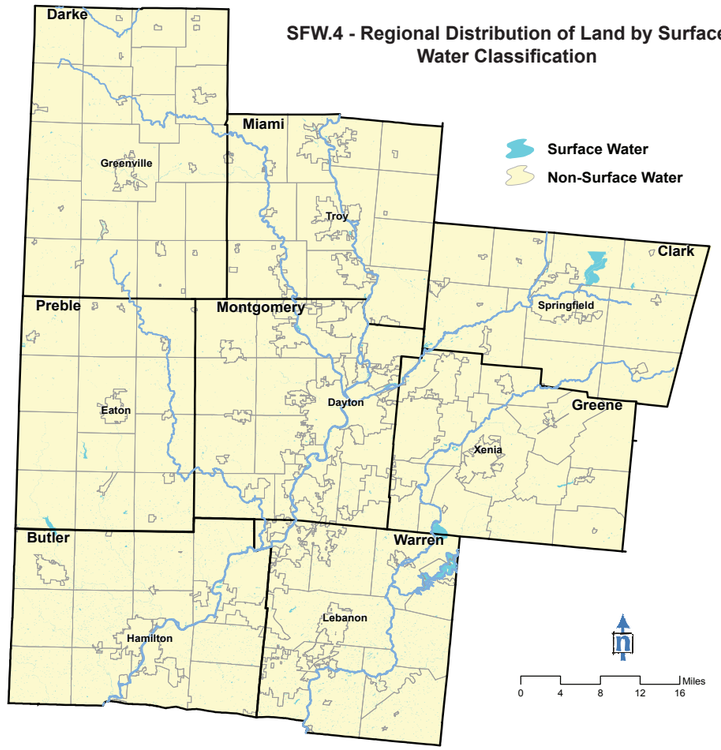
County	Surface Water		Non-Surface Water		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	3,077.0	13.8%	297,733.9	13.1%	300,810.9
Clark	4,327.3	19.4%	252,560.3	11.1%	256,887.5
Darke	862.0	3.9%	382,974.0	16.8%	383,836.0
Greene	2,488.8	11.1%	263,692.8	11.6%	266,181.6
Miami	1,558.1	7.0%	260,793.8	11.4%	262,352.0
Montgomery	2,824.4	12.6%	294,403.3	12.9%	297,227.8
Preble	1,652.5	7.4%	271,234.8	11.9%	272,887.3
Warren	5,572.4	24.9%	255,160.7	11.2%	260,733.1
Regional Total	22,362.6	100.0%	2,278,553.6	100.0%	2,300,916.2

SFW.3 - County Land by Surface Water Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Surface Water	1.0%	1.7%	0.2%	0.9%	0.6%	1.0%	0.6%	2.1%
Dry Land	99.0%	98.3%	99.8%	99.1%	99.4%	99.0%	99.4%	97.9%

SFW.4 - Regional Distribution of Land by Surface Water Classification



Well Field Protection Areas

Miami Valley Land Suitability Assessment - Natural Environment Factors

What are Well Field Protection Areas?

The Hamilton to New Baltimore Ground Water Consortium defines well field protection areas as "surface and subsurface areas which will contribute water to a well or well field over a specific time period (generally five years)." The well field protection designation is intended to protect the Region's valuable drinking water at the site where it is withdrawn from the aquifer.

The Ohio Environmental Protection Agency's (OEPA) Wellhead Protection Program specifies that two well field protection areas, inner management zone and outer management zone, be defined around each public water supply site or well field to establish different management strategies. The inner management zone is the protection area immediately surrounding a well field while the outer zone is beyond the inner management zone.

Similar to the U.S. Environmental Protection Agency's (USEPA) classification, the study classified the Region into three areas: inner ring well field protection area; outer ring well field protection area; and no protection area.

Why is it Important?

Developing within a well field protection area risks the quality of the Region's ground water resources and increases the cost of providing clean water to the Region's residents and industry. The areas designated as a well field protection areas, therefore, are less suitable for future development and special consideration is needed.

How was the Data Developed?

The Miami Valley Regional Planning Commission (MVRPC) developed the Well Field Protection Areas in the mid-1990s in accordance with the State of Ohio's Wellhead Protection Program. MVRPC used several methods to delineate inner and outer ring well field protection areas using the time-of-travel (TOT) criterion in addition to other hydrogeologic mapping criteria as appropriate.

The inner rings of protection are areas of intense protection because they surround a public drinking water source in which contaminants, if introduced into the ground, would take approximately one year to contaminate the drinking water. The areas within the outer ring of protection are areas that surround a public drinking water source in which contaminants, if introduced into the ground, would take approximately 3 to 10 years to contaminate the drinking water. The inner ring well field protection area is equivalent to one-year Inner Management Zone (IMZ) defined in the Ohio Wellhead protection program, while the outer ring well field protection area is equivalent to the State of Ohio's Wellhead Protection Area (WHPA).

Data Source

Well Field Protection Areas, MVRPC, 1997

Data Findings

Approximately 4.3% of the Region's land is designated as a well field protection area (see figure WFP.1). Table WFP.2 shows each county's share and acreage of regional land by well field protection classification. Preble County contains the largest portion of inner ring well field protection areas with 5,305 acres, followed by Clark and Butler counties (15% and 14.7% respectively).

WFP.1 - Regional Land by Well Field Protection Classification

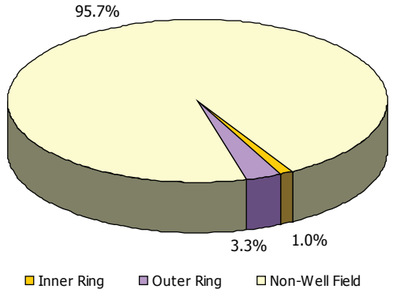
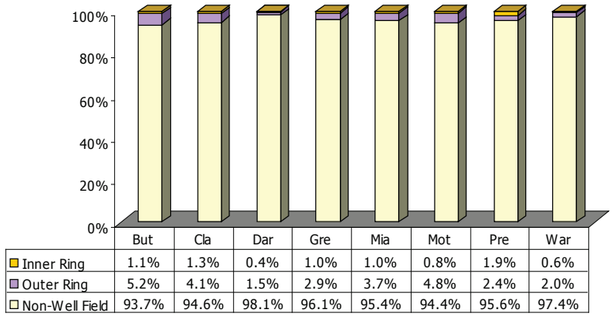


Figure WFP.3 shows the percentage distribution of each county's land according to well field protecion classification. Over 6% of Butler County's land is within either inner or outer ring well field protection areas, while only 1.9% of Darke County's land is within inner or outer ring well field protection areas. The map presented in figure WFP.4 shows the spatial distribution of well field protection areas.

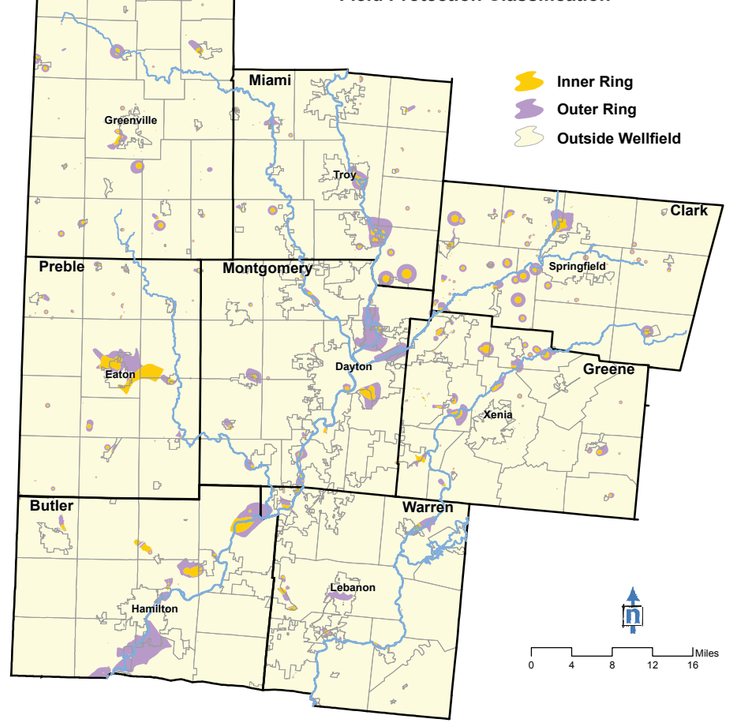
WFP.2 - County Share of Land by Well Field Protection Classification

County	Inner Ring		Outer Ring		Non-Well Field		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	3,357.2	14.7%	15,686.0	20.8%	281,771.7	12.8%	300,814.9
Clark	3,407.3	15.0%	10,575.0	14.0%	242,905.3	11.0%	256,887.5
Darke	1,600.5	7.0%	5,567.4	7.4%	376,659.9	17.1%	383,827.7
Greene	2,690.8	11.8%	7,706.5	10.2%	255,791.5	11.6%	266,188.8
Miami	2,558.1	11.2%	9,612.4	12.7%	250,192.5	11.4%	262,363.0
Montgomery	2,388.6	10.5%	14,383.2	19.1%	280,448.2	12.7%	297,220.0
Preble	5,305.0	23.3%	6,645.9	8.8%	260,936.3	11.8%	272,887.2
Warren	1,459.1	6.4%	5,219.1	6.9%	254,054.6	11.5%	260,732.7
Regional Total	22,766.5	100.0%	75,395.4	100.0%	2,202,759.9	100.0%	2,300,921.8

WFP.3 - County Land by Well Field Protection Classification



WFP.4 - Regional Distribution of Land by Well Field Protection Classification



Wetlands

Miami Valley Land Suitability Assessment - Natural Environment Factors

What are Wetlands?

Wetlands, according to the U.S. Environmental Protection Agency (USEPA), are "areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions." Additionally, the USEPA states that "wetlands are the link between the land and the water. They are transition zones where the flow of water, the cycling of nutrients, and the energy of the sun meet to produce a unique ecosystem characterized by hydrology, soils, and vegetation."

Why are they Important?

Wetlands are a valuable resource because they protect and improve water quality, recharge water supplies, reduce flood risks, and provide fish and wildlife habitat. Therefore, wetlands are less suitable for land development and special attention is needed before development is considered.

How was the Data Developed?

The Ohio Wetland Inventory data was obtained from the Ohio Department of Natural Resources (ODNR) through Geographic Information Management Systems (GIMS). According to its metadata, the statewide inventory of wetlands was developed based on satellite data by the ODNR, Division of Wildlife, in cooperation with the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service.

Data Source

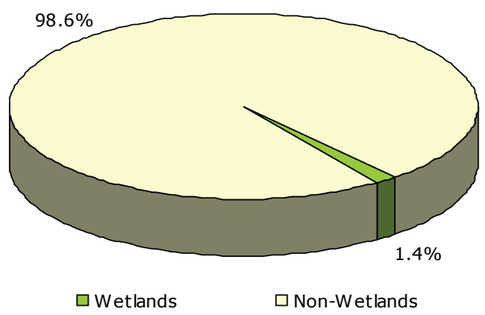
Ohio Wetlands Inventory, ODNR, Department of Wildlife, available at www.ohiodnr.com/gims.

Data Findings

A very small portion (1.4%) of the Region is classified as wetlands (see figure WTL.1). However, among areas that are identified as wetlands, Clark County includes the largest Regional portion with 19.1%, followed by Clark County with 17.3% (see table WTL.2). Table WTL.2 also shows that Warren (4.4%) and Butler (7.5%) counties have the smallest shares and acreage of wetlands in the Region.

Figure WTL.3 shows the percent of each county classified as wetlands. The differences between the counties in the Region in terms of wetland proportions are small. The largest proportion is seen in Clark County (2.2%) and the smallest in Warren County (0.5%; see figure WTL.3). Figure WTL.4 shows the spatial distribution of wetlands throughout the Region.

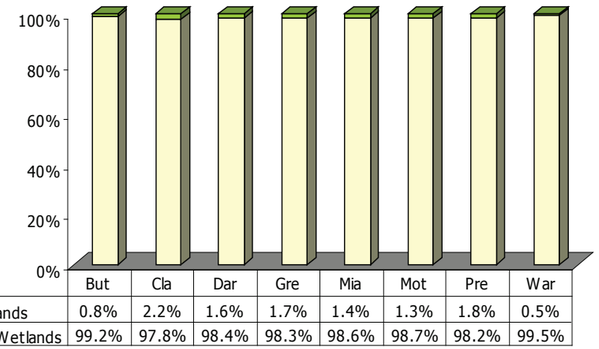
WTL.1 - Regional Land by Wetland Classification



WTL.2 - County Share of Land by Wetland Classification

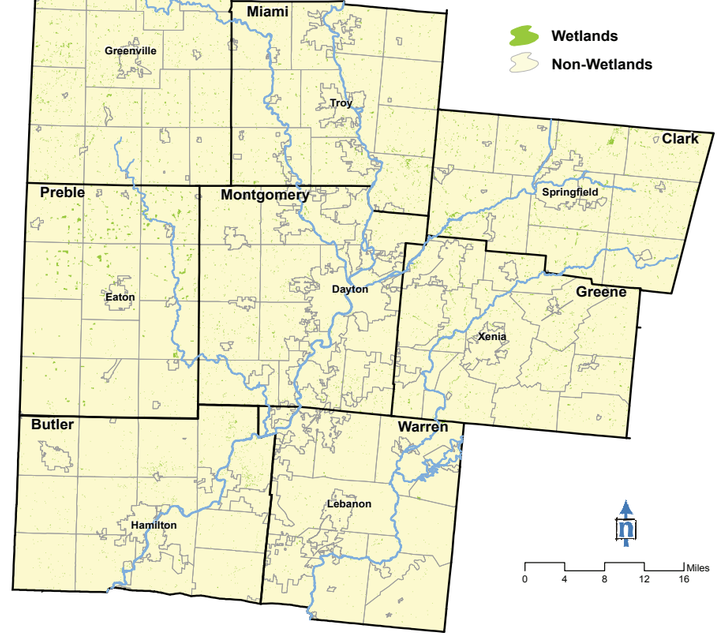
County	Wetlands		Non-Wetlands		Total
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	2,404.7	7.5%	298,406.8	13.2%	300,811.4
Clark	5,580.6	17.3%	251,311.7	11.1%	256,892.3
Darke	6,157.3	19.1%	377,681.6	16.6%	383,838.9
Greene	4,395.5	13.6%	261,786.9	11.5%	266,182.4
Miami	3,683.7	11.4%	258,668.4	11.4%	262,352.1
Montgomery	3,832.6	11.9%	293,395.9	12.9%	297,228.5
Preble	4,779.0	14.8%	268,108.3	11.8%	272,887.3
Warren	1,429.6	4.4%	259,302.9	11.4%	260,732.5
Regional Total	32,262.8	100.0%	2,268,662.6	100.0%	2,300,925.4

WTL.3 - County Land by Wetland Classification



	But	Cla	Dar	Gre	Mia	Mot	Pre	War
Wetlands	0.8%	2.2%	1.6%	1.7%	1.4%	1.3%	1.8%	0.5%
Non-Wetlands	99.2%	97.8%	98.4%	98.3%	98.6%	98.7%	98.2%	99.5%

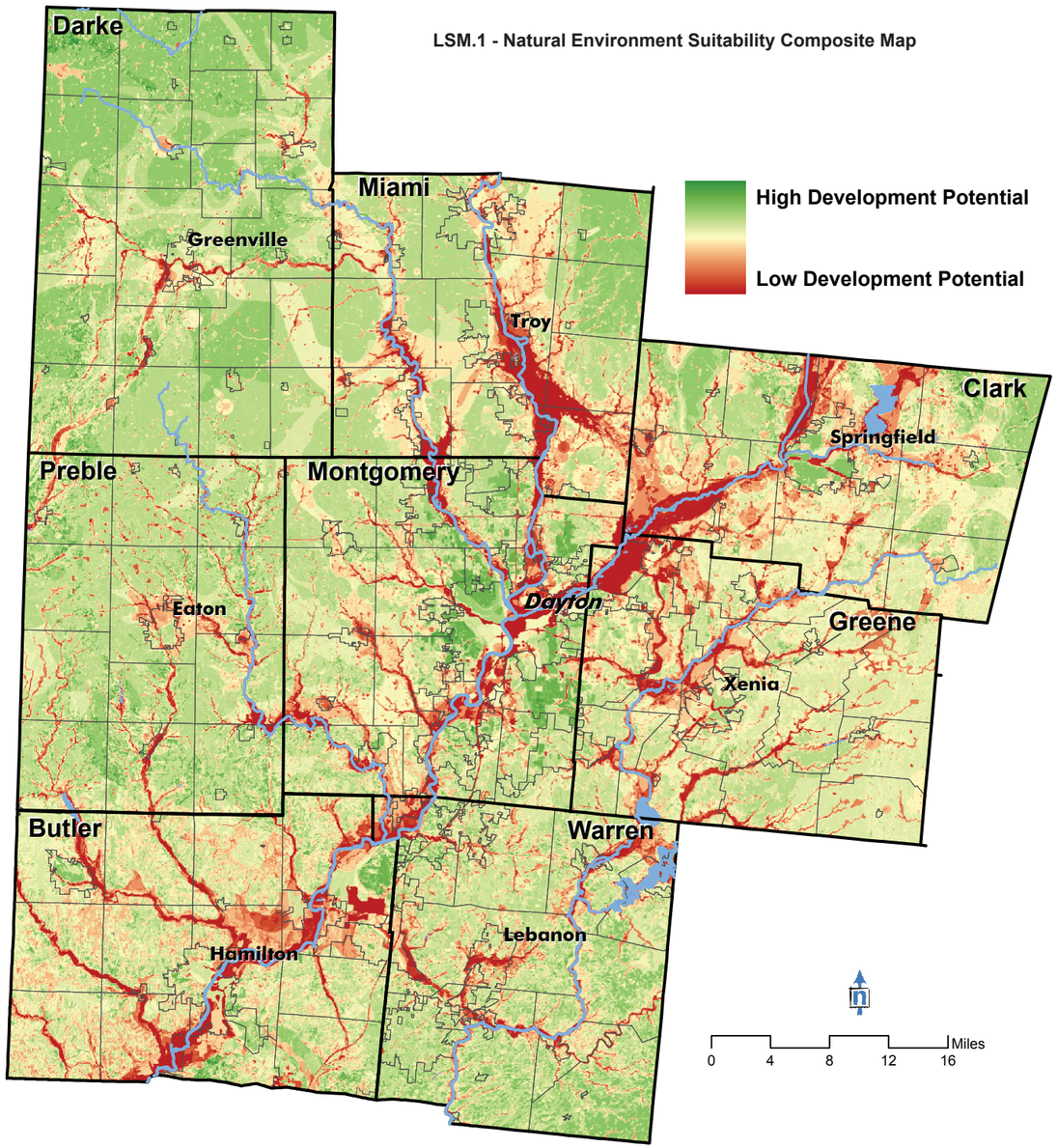
WTL.4 - Regional Distribution of Land by Wetland Classification



Natural Environment Suitability Measure

Miami Valley Land Suitability Assessment - Natural Environment Factors

LSM.1 - Natural Environment Suitability Composite Map



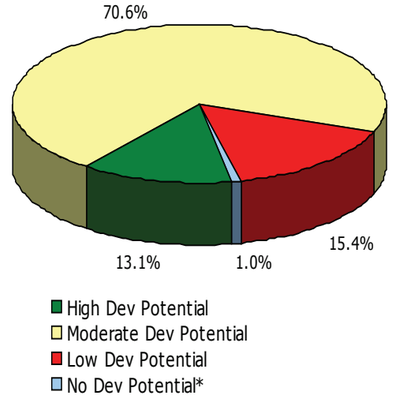
The Natural Environment Suitability Composite Map presents the result of a comprehensive land suitability measures from a natural environmental perspective at the regional level. It takes all 15 environmental factors into consideration, as described in the methodology section, and provides spatial information as to where opportunities and constraints exist by identifying areas that are better suited for physical development than others throughout the Miami Valley Region (see figure LSM.1).

In general, land with high development potential is characterized as:

- Having soils that are well drained, adequate depth to bedrock, adequate load bearing strength, and no mineral resources
- Having high ground water yields
- Having flat or gently rolling slopes
- Outside floodplains, inundation areas, surface waters, sole source aquifers, wetlands, and well field protection areas
- Outside forested areas and prime farmland

At the regional level, the majority (83.7%) of the land has a medium or high development potential (see figure LSM.2). Only 15.4% of the Region's land is identified to be of a low potential to accommodate future development. Darke County (127,090.7 acres) has the largest number of acres and the highest share of regional land with high development potential. Butler County (66,081.2 acres) has the largest number of acres and highest share of land with low and no development potential (see table LSM.3).

LSM.2 - Regional Land by Development Potential Classification



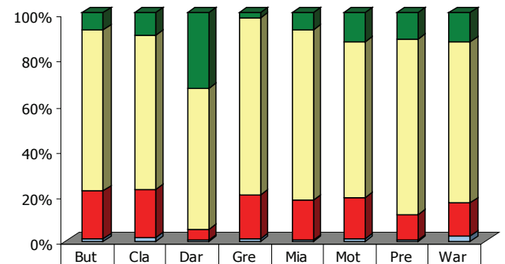
LSM.3 - County Share of Land by Development Potential Classification

County	High Potential		Moderate Potential		Low Potential		No Potential*		Totals
	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	Acreage	County Share of Regional Total	
Butler	21,966.1	7.3%	212,629.5	13.1%	63,046.0	17.9%	3,035.2	13.8%	300,676.8
Clark	24,829.1	8.3%	173,984.2	10.7%	53,618.6	15.2%	4,280.1	19.4%	256,711.9
Darke	127,090.71	42.3%	237,348.2	14.6%	18,257.4	5.2%	811.7	3.7%	383,508.1
Greene	6,082.9	2.0%	205,659.6	12.7%	51,953.6	14.7%	2,442.7	11.1%	266,138.8
Miami	19,465.1	6.5%	196,348.5	12.1%	44,704.2	12.7%	1,528.4	6.9%	262,046.2
Montgomery	37,004.5	12.3%	203,434.1	12.5%	54,015.0	15.3%	2,776.9	12.6%	297,230.6
Preble	31,534.7	10.5%	210,070.6	12.9%	29,506.4	8.4%	1,615.3	7.3%	272,727.0
Warren	32,641.3	10.9%	184,353.0	11.4%	37,936.1	10.7%	5,553.7	25.2%	260,484.0
Regional Total	300,614.4	100.0%	1,623,827.7	100.0%	353,037.4	100.0%	22,043.9	100.0%	2,299,523.4

*No potential for development due to surface water

Figure LSM.4 shows that Darke County, as well as having the largest proportion of regional land with high development potential, has the largest proportion of county land with high development potential (33.1%). Butler and Clark counties have the highest proportions of land with low or no development potential (22% and 22.6%, respectively). However, Greene County has the smallest proportion of land with high development potential, with only 2.3% of its land falling into this category.

LSM.4 - County Land by Development Potential Classification

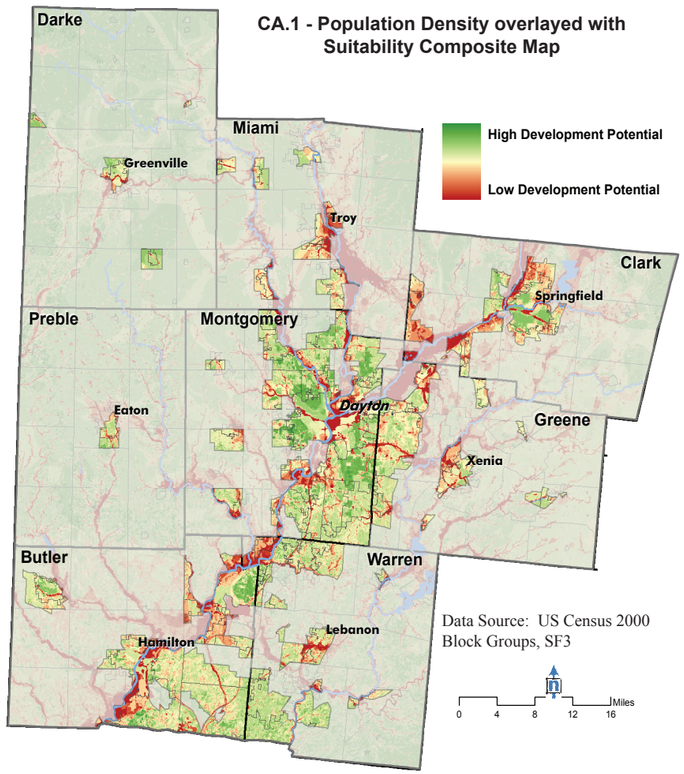


	But	Cla	Dar	Gre	Mia	Mot	Pre	War
High Dev Potential	7.3%	9.7%	33.1%	2.3%	7.4%	12.4%	11.6%	12.5%
Moderate Dev Potential	70.7%	67.8%	61.9%	77.3%	74.9%	68.4%	77.0%	70.8%
Low Dev Potential	21.0%	20.9%	4.8%	19.5%	17.1%	18.2%	10.8%	14.6%
No Dev Potential*	1.0%	1.7%	0.2%	0.9%	0.6%	0.9%	0.6%	2.1%

Natural Environment Suitability Comparative Analysis

Miami Valley Land Suitability Assessment - Natural Environment Factors

CA.1 - Population Density overlayed with Suitability Composite Map



In figure CA.1, Census block groups which contain a population density above the regional average of 430 persons per square mile are highlighted on the composite map.

CA.2 - Population Change overlayed with Suitability Composite Map

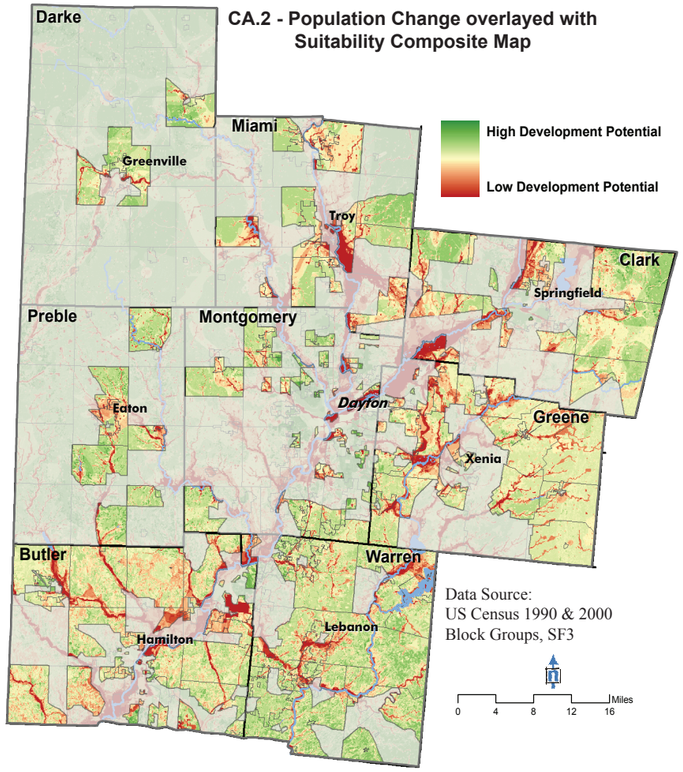
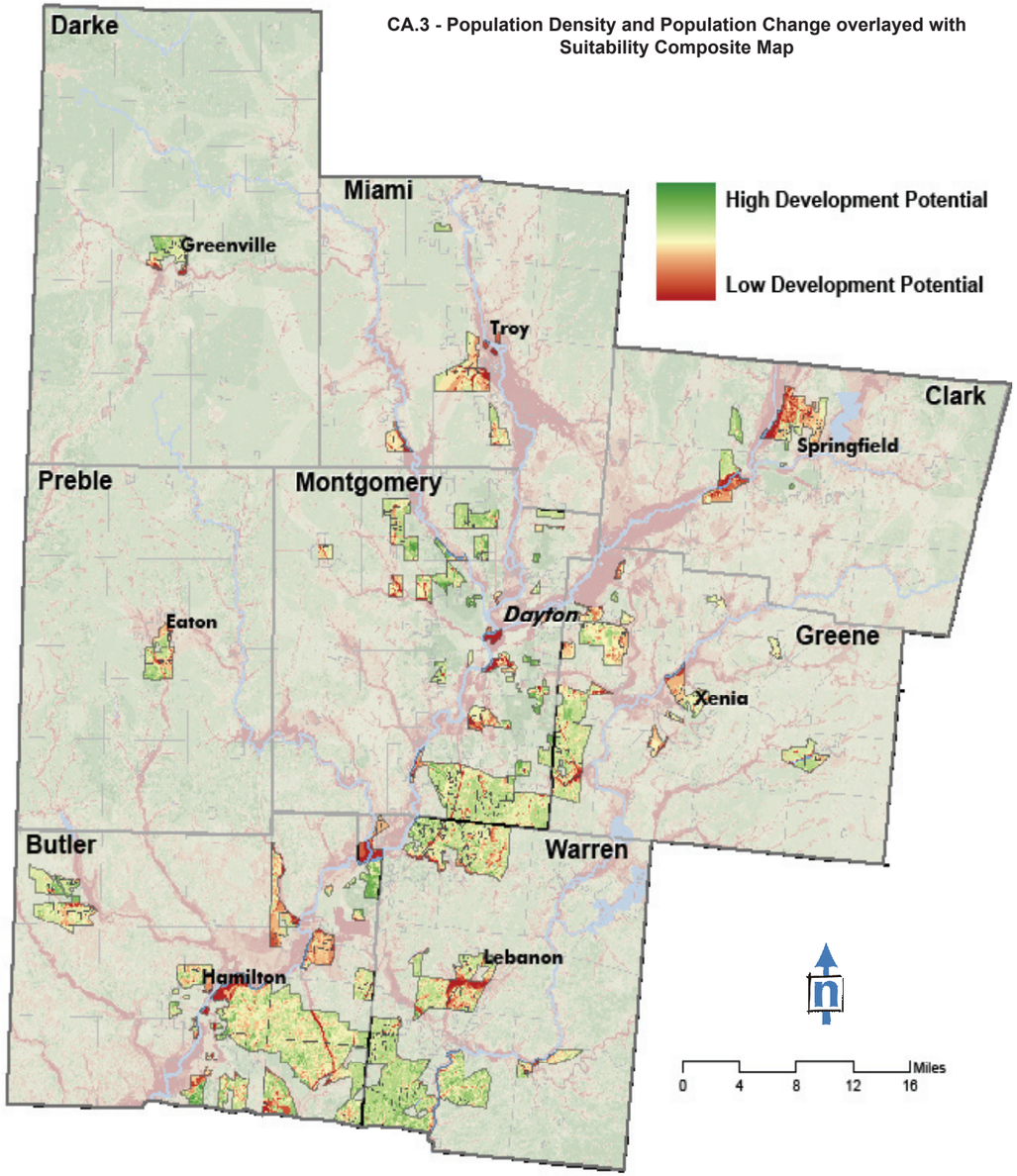


Figure CA.2 highlights the areas that experienced population growth that was above the regional average of 6% for Census block groups from 1990 to 2000.

Figure CA.3 is a combination of the maps from figures CA.1 and CA.2, highlighting the parts of the Region that contained above average density and above average population growth from 1990 to 2000. As is evident in the map, most of the dense development between 1990 and 2000 occurred in areas which possess moderate to high development potential. However, there are some locations of high density and growth that lie within areas of low development potential and suitability.

CA.3 - Population Density and Population Change overlayed with Suitability Composite Map



Conclusion / References

Miami Valley Land Suitability Assessment - Natural Environment Factors

Conclusion

The Miami Valley Land Suitability Assessment – Natural Environment Factors provides a comprehensive overview of the Region's natural landscape. Fifteen natural environment factors were analyzed both individually and in combination with one another in order to identify locations within the Region that are better suited for further physical development than others. However, this assessment alone is not meant to be a comprehensive land suitability assessent, but rather focuses on the natural environment. An assessment of the built environment must be completed in order to complete a comprehensive assessment of the Region's physical landscape.

The entire Region will benefit if development is planned and exectued in a manner that takes advantage of our natural resources without threatening their quality. Each of the 15 factors were mapped and analyzed at both the regional and county levels to provide a broad scope that is often lacking when land use decisions are made at the local level. Each page in this assessment report graphically illustrates the geographic location of the factor and offers an analysis of its distribution throughout the Region and its counties.

This assessment revealed that the land in the Region generally exhibits the following characteristics:

- Mostly flat, dry land with adequate depth to bedrock and load bearing strength;
- Non-forested land with mineral resources not likely to be present;
- Medium ground water pollution potential;
- Not within floodplains or inundation areas;
- Significant amount of prime farmland with relatively good soil drainage and ground water yield capacity ;
- Containing quality sole source aquifers with portions of the Region designated as well-field protection areas.

The Natural Environment Suitability Composite Map provides a comprehensive spatial overview of environmentally sensitive areas in the Region. In general, the map showed that over 80% of regional land is highly or moderately suited to accommodate future land development and that the areas that are the least suited for future development are located adjacent to the major river corridors in the Region.

However, the final result of this assessment is not simply the Natural Environment Suitability Composite Map, but also includes the process used to assess land suitability. A summary of this method is provided in the Introduction and Methodology sections and will be adapted to perform the built environment assessment.

The Miami Valley Region is composed of a variety of different types of communities, from densely built core cities to newly developed suburban cities and townships to rural agricultural communities. These municipalities each have unique constraints and opportunities for improving the quality of life of their residents. The data in this report, however, does not focus on individual municipalities, but rather on the Region as a whole. This emphasis on the need for everyone to consider how their actions contribute to the quality of the Miami Valley is especially important when considering natural resources, which do not adhere to municipal boundaries.

With the variety of information presented in this report, it is MVRPC's hope that it raises the awareness of the presence and conditions of environmental factors in the planning process. Through examining the potential effects of development on these resources, the Region can achieve a balance between the need to grow and the need to preserve environmental quality.

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Appendix: Land Suitability Scoring System

Miami Valley Land Suitability Assessment - Natural Environment Factors

Environment Factors	Data Attributes	Suitability Measures	Attribute Score	Weight Factor	Suitability Score
Depth to Bedrock	Adequate Depth	Suitable	5	2	10
	Shallow Depth	Not Suitable	1		2
	Not Rated	NA	0		0
Flood Plain	Outside Floodplain	Suitable	5	4	20
	500 Year	Somewhat Suitable	2		8
	100 Year	Not Suitable	1		4
Forested Areas	Non-Forested	Suitable	5	2	10
	Forested	Not Suitable	1		2
Ground Water Pollution Potential	Low Potential	Suitable	5	2	10
	Medium Potential	Somewhat Suitable	3		6
	High Potential	Not Suitable	1		2
Ground Water Yield	High Yield	Suitable	5	2	10
	Medium Yield	Somewhat Suitable	3		6
	Low Yield	Not Suitable	1		2
Inundation Area	Non-Inundation Area	Suitable	5	4	20
	Inundation Area	Not Suitable	1		4
Load Bearing Strength	Adequate Strength	Suitable	5	3	15
	Low Strength	Not Suitable	1		3
	Not Rated	NA	0		0
Mineral Resources	Not Likely Present	Suitable	5	1	5
	Likely Present	Not Suitable	1		1
	Not Rated	NA	0		0
Prime Farmland	Not Prime	Suitable	5	3	15
	Prime with Conditions	Somewhat Suitable	3		9
	Naturally Prime	Not Suitable	1		3
Slope	Flat	Suitable	5	3	15
	Rolling	Somewhat Suitable	4		12
	Steep	Not Suitable	1		3
Soil Drainage	Well Drained	Suitable	5	1	5
	Somewhat Poorly	Somewhat Suitable	2		2
	Poorly / Very Poorly	Not Suitable	1		1
	Not Rated	NA	0		0
Sole Source Aquifer	Non-SSA	Suitable	5	3	15
	Class 2	Somewhat Suitable	3		9
	Class 1	Not Suitable	1		3
Surface Water	Not Present	Suitable	5	4	20
	Surface Water Present	Not Suitable	0		0
Well Field Protection Areas	Non-Wellfield	Suitable	5	3	15
	Outer Protection Area	Somewhat Suitable	2		6
	Inner Protection Area	Not Suitable	1		3
Wetlands	Non-Wetlands	Suitable	5	4	20
	Wetlands	Not Suitable	1		4