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Miami Valley Land Use Demand Assessment

2009

Miami Valley Regional Planning Commission

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MIAMI VALLEY REGIONAL PLANNING COMMISSION
ONE REGION... ONE VISION... ONE FUTURE

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Please visit www.mvrpc.org for a copy of this report. Questions or comments should be directed to Katy Bowman, Research Associate at kbowman@mvrpc.org

Miami Valley Regional Planning Commission (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 Use Demand Assessment

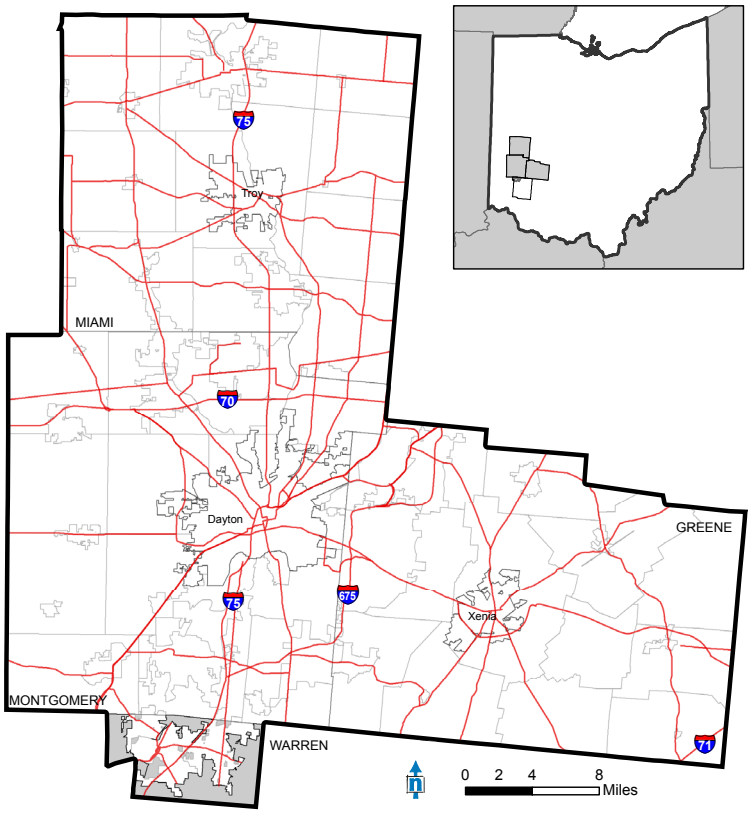
Purpose

The Miami Valley Regional Planning Commission (MVRPC) conducted the Miami Valley Land Use Demand Assessment as the culmination of the non-physical existing conditions evaluation of "Going Places - An Integrated Land Use Vision for the Miami Valley Region." The main purpose of this assessment is to project future land use demand based on the continuation of existing demographic, economic, and development trends.

Study Area

The study area covers a three county Region in the Dayton Metropolitan area, along with three cities in northern Warren County, located in southwest Ohio (Figure 1). It includes Greene, Miami, and Montgomery counties along with the cities of Carlisle, Franklin, and Springboro in Warren County, covering approximately 1,313 square miles with three interstates, I-70, I-75, and I-675.

Figure 1. Study Area



Report Structure

This report begins with descriptions of the sources and general methodology used, including a summary of the transformation of existing data into projections. In the following section, the results from the socio-economic forecasts that form the base of this assessment are presented. Next, the base data and assumptions employed to translate the socio-economic projections into future land use demands are reviewed. It concludes by presenting the results of the land use demand projections in terms of how much land development could be needed in the future if existing trends continue.

Acknowledgements

This study was made possible by datasets that were made available from various sources listed throughout this report. MVRPC is grateful for this data and would like to thank those organizations for making the data available.

The projections presented in this report were calculated in two stages. First, population and employment projections were developed for the Region. Second, these two sets of projections were used to calculate land use needs for the Region. For both the socio-economic and the land use demand projections, the year 2040 was the planning horizon year.

Population and Employment Projections

The population projections to 2030 were taken directly from the Ohio Department of Development's (ODOD) population projections for Greene, Miami, and Montgomery counties. These projections were then extended to 2040 in order to meet the horizon year. For Warren County, since only the cities of Carlisle, Franklin, and Springboro are included in the planning boundaries, an average percentage of the population in these three cities in comparison to the county was developed based on historic population data. This percentage was then applied to the ODOD county-level population projections in order to calculate the future population for those three cities to 2030. This projection was then extended to 2040.

Two different employment projections were developed, one high and one low, in order to provide a forecasted employment range. Both are based on data gathered from ODOD, the Ohio Department of Jobs and Family Services (ODJFS), and data purchased from Woods & Poole. The projections were, for Greene, Miami, and Montgomery counties, made at the county level. County employment totals were calculated first, and then these totals were broken down into ten Standard Industrial Classification (SIC) categories based on data purchased from Woods & Poole.

The only exception to this method is the Warren County employment projection. Projections for the cities of Carlisle, Franklin, and Springboro to 2030 were provided by the Ohio, Kentucky, Indiana Regional Council of Governments (OKI). MVRPC staff then extended these forecasts to 2040. Because of this, there is only one projection for Warren County.

The lower level projection is the projection that has been used in MVRPC's 2030 Long Range Transportation Plan, although for this assessment it was extended to 2040 and a new division among SIC categories, based on data from Woods & Poole, was applied.

The upper level projection was calculated in two stages. First, a short term projection to 2010 was calculated using both adjusted historical data from the Quarterly Census of Employment and Wages and the ODJFS 2014 employment projection (including the 2004 employment number on which it is based). Second, using this same data, a linear projection to 2040 was calculated and the 2020 and 2030 numbers were placed on a line that extended from the 2010 projection to the 2040 projection. The total employment projections by county were divided into SIC categories using the same method used for the lower level projections.

Land Use Demand Projections

The land use demand projections were calculated at the county level and then aggregated to the regional level based on the 2040 population and employment projections and the assumption that development in the Region would continue at the same densities and intensities that were represented in 2007. The method follows, with some modifications, the method outlined in Arthur C. Nelson's *Planner's*

Estimating Guide: Projecting Land-Use and Facility Needs. A base year of 2007 was used for most of the calculations, although in some cases 2007 data was not available and data from other years (most often 2008, 2006, or 2000) had to be substituted.

Nelson's approach divides the projections into five different categories, all of which are discussed in more detail below:

- Residential
- Employment
- Public Facilities
- Education
- Water and Wastewater Utilities

Data were obtained from a variety of different sources. The primary sources were the county Auditors' parcel-level data. Other sources include:

- U.S. Census Bureau
- Ohio Department of Development
- Ohio Department of Jobs and Family Services
- Ohio EPA, Division of Surface Water
- National Center for Education Statistics
- A variety of local sources, including water facilities superintendents and school districts

Residential Land Use – For this category, projections were calculated separately for single and multi-family housing units. For single family housing units, the projections were based on data from the 2007 parcel database. For multi-family housing units, 2007 American Community Survey (ACS) data from the Census Bureau was used to supplement the 2007 parcel data. For both types of housing units, data from the ACS were used in order to divide the 2007 population number among the housing types. All 2007 densities were held constant to 2040.

In order to calculate the residential land use needs, the first step was to inventory the existing residential land use using the 2007 parcel database. Second, numbers of occupied units and residents were estimated using both information from the 2007 parcel database and the ACS. Third, residential acreage was determined using the 2007 parcel database. Fourth, the projected number of residential units needed for 2040 was calculated based on the 2040 population projections and the calculated persons per household, held constant from 2007. Fifth, future residential land use needs were determined based on the projected number of housing units needed and average densities held constant from 2007.

Employment-Related Land Use – Because two employment projections were calculated, two land use projections for land related to employment were calculated as well. The 2007 parcel database was the primary source of data for the projection of this category.

As with the residential land use needs projection, the first step was to inventory existing employment-based land use from the 2007 parcel database. Second, gross square footage per employee and floor area ratios (FARs) were then calculated for 2007 by SIC category. These ratios were applied to the 2040 employment projections in order to calculate the land use needs for this category.

For Greene and Montgomery counties, the employment-related land use projections had to be adjusted so that land for Wright Patterson Air Force Base (WPAFB) was not projected along with everything else. In order to accomplish this, neither land nor employment for 2007 and 2040 for WPAFB were included in the projections. The acreage was added back into both counties' total developed acreage for 2007 and the total acreage needed for 2040 after the projections were calculated.

Public Facility Land Use – Future land use demands for basic services — fire/emergency medical services and police facilities — were based on population projections and current levels of service. Land for all other public facilities, including jails, leisure facilities, major community facilities, parks and open space, miscellaneous support, and religious facilities, were not projected. These facilities are regarded as non-basic services that exist at the will of the public.

For the projections of both fire/emergency medical services and police facilities, the acreages for each type of facility were obtained from the 2007 parcel database and then divided by the 24/7 functional population for 2007. This ratio was then applied to the projected 24/7 functional population for 2040 in order to calculate the future acreage needed for these types of facilities.

Educational Land Use – Only the acreage needed for public primary and secondary schools was projected to 2040. The 2007 acreage for private primary and secondary schools, public and private post-secondary schools, and for auxiliary facilities were all held constant to 2040.

Future land use projections for public primary and secondary schools were based on enrollment projections, which were based largely on population projections. Levels of service for school facility space were taken from the Ohio School Facilities Commission's (OSFC) standards for school design.

The method for the educational land use demand projections is based on school planning guidelines from the OSFC. The floor area ratio (FAR) was calculated for each school category, i.e., elementary (kindergarten through 5th grade), middle (grades 6 through 8), and high (grades 9 through 12), for each county and for the Region as a whole. Not all schools in the Region fit neatly into these categories. Therefore, for some schools, estimates had to be calculated based the percentage divisions between grades from the 2007 enrollment numbers. The following standards were then applied in order to estimate future facility space needs:

- For elementary schools, the OSFC allocates 115.6-125 square feet per student (115.6 was used)
- For middle schools, the standard is 141-151 square feet per student (141 was used)
- For high schools, the standard is 156-180 square feet student (156 was used)

The facility space needed, along with the FAR, was used to determine the total land needed in 2040. Note that this calculation assumes each school is currently at full capacity.

Water and Wastewater Utility Land Use – Data regarding water and wastewater utilities' capacities and demands was acquired from local water facility operators and from the Ohio EPA, respectively. Capacities for water and wastewater at the county level were determined to be sufficient for future demand; therefore additional land for these types of facilities was not allocated in projections for 2040. However, local needs may differ from those projected at the county or regional level, and so future expansions may be necessary to meet local demands.

Population Forecasts

On a regional level, between 2000 and 2040, the Region's population is expected to grow by less than 3%. All counties but Montgomery are projected to gain population, with the three cities in Warren County expected to nearly double in population between 2010 and 2040 (Table 1).

Table 1. Regional Population Projections: 2000-2040

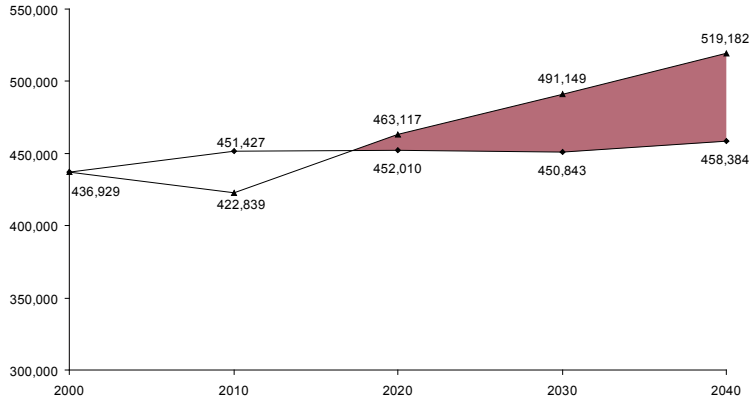
	2000	2010	2020	2030	2040**	Percent change 2000-2040
Region	834,717	836,494	844,648	855,137	859,063	2.9%
Greene	147,890	151,760	156,590	158,860	163,330	10.4%
Miami	98,870	103,460	106,770	107,930	111,936	13.2%
Montgomery	559,060	540,420	528,800	524,060	508,514	-9.0%
Warren*	28,897	40,854	52,488	64,287	75,282	160.5%

Source: Ohio Department of Development, 2003; MVPRC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro
**MVRPC projected

Employment Forecasts

As mentioned in the methodology, two employment projections were developed, one upper and one lower. Figure 2 shows the regional total employment projections from 2000 to 2040, highlighting the range between the two projections. At the upper end of the range, regional employment could reach 519,182 by 2040, an increase of almost 19% from 2000. Alternatively, at the lower end of the range, employment could reach 458,384 by 2040, an increase of only 5%.

Figure 2. Regional Employment Projections: 2000-2040



Source: MVRPC; OKI

Tables 2 and 3 present the employment projections by county. The lower level projection has Montgomery County actually decreasing in employment (-4.6%). For the upper level projection, all counties are projected to have increases in total employment, with the three cities in Warren County growing by the largest percentage (76%) and Montgomery County growing by the smallest percentage (8%).

Table 2. Lower Level Employment Projections by County: 2000-2040

	2000	2010	2020	2030	2040	Percent change 2000-2040
Greene	77,173	89,424	95,053	98,815	107,623	39.5%
Miami	51,313	53,976	54,678	54,673	56,513	10.1%
Montgomery	308,434	308,027	302,279	297,355	294,248	-4.6%
Warren*	11,041	13,693	15,761	17,491	19,442	76.1%

Source: MVRPC; OKI
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Tables 4 and 5 break down the regional employment projection totals by SIC category. In both the upper and lower level projections, employment in Manufacturing and Agriculture are expected to decrease. Employment in Services, Transpor-

Table 3. Upper Level Employment Projections by County: 2000-2040

	2000	2010	2020	2030	2040	Percent change 2000-2040
Greene	77,173	83,761	97,389	107,649	121,897	58.0%
Miami	51,313	50,557	56,022	59,560	64,009	24.7%
Montgomery	308,434	288,520	309,706	323,939	333,276	8.1%
Warren*	11,041	13,693	15,761	17,491	19,442	76.1%

Source: MVRPC; OKI
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

tation, and Construction sectors are anticipated to grow the most in both sets of projections. County-level break-downs of the employment projections by SIC category can be found in the appendix.

Table 4. Lower Level Regional Employment Projections by SIC Category: 2000-2040

	2000	2010	2020	2030	2040	Percent change 2000-2040
Agriculture	6,664	6,567	5,675	5,012	4,509	-32.3%
Construction	19,231	21,701	22,330	22,845	23,695	23.2%
FIRE	22,190	26,573	26,654	26,615	27,026	21.8%
Manufacturing	83,118	63,448	58,046	54,193	50,027	-39.8%
Mining	151	141	145	147	153	1.6%
Public Service	37,024	39,512	38,232	37,516	37,563	1.5%
Retail	82,419	85,915	86,740	86,843	89,498	8.6%
Services	151,941	179,340	186,110	190,197	198,269	30.5%
Trans, Comm, Util	21,758	20,378	21,141	21,703	22,606	3.9%
Wholesale	23,465	21,546	22,694	23,262	24,478	4.3%

Source: MVRPC

Table 5. Upper Level Regional Employment Projections by SIC Category: 2000-2040

	2000	2010	2020	2030	2040	Percent change 2000-2040
Agriculture	6,664	6,157	5,811	5,449	5,089	-23.6%
Construction	19,231	20,352	22,869	24,850	26,784	39.3%
FIRE	22,190	24,916	27,298	28,952	30,544	37.6%
Manufacturing	83,118	59,667	59,363	58,562	55,854	-32.8%
Mining	151	133	148	159	171	13.6%
Public Service	37,024	37,025	39,162	40,835	42,480	14.7%
Retail	82,419	80,680	88,781	94,254	100,795	22.3%
Services	151,941	168,207	190,597	206,879	224,089	47.5%
Trans, Comm, Util	21,758	19,112	21,649	23,595	25,522	17.3%
Wholesale	23,465	20,284	23,195	25,104	27,296	16.3%

Source: MVRPC

Base Data and Assumptions

Miami Valley Land Use Demand Assessment

Before presenting the land use demand projection results, it is necessary to take a more detailed look at some of the base data that was used and some of the assumptions that were made in the course of the calculations. The sections that follow present examinations of the base data and assumptions at both the regional and county levels.

Residential Land Use

Tables 6 through 10 show the base data and assumptions for the residential projections. In order to project the residential land needed in 2040, single family housing units were divided into four density categories. All multi-family housing units were considered in the same category.

For single family housing units, the number of units was derived from the 2007 parcel database. The number of multi-family units, however, was not included in the parcel database and had to be obtained from the 2005-2007 American Community Survey 3-Year Estimates (ACS). For both single and multi-family housing units, the acreage was determined using the 2007 parcel database.

Vacancy rates were calculated based on data from the ACS and were held constant to 2040. The estimated household sizes were calculated based on population data from the ACS and the number of units from the 2007 parcel database. These were also held constant to 2040.

Table 6 shows that almost 82% of the housing units in the Region are single

Table 6. Regional Residential Land Use Data: 2007

	Housing Units	Acres	Vacancy Rate	Estimated Household Size
Single Family				
<1 Units Per Net Acre	36,116 (10.7%)	80,740	6.61%	2.65
1-2 Units Per Net Acre	86,769 (25.8%)	46,140	6.61%	2.66
3-5 Units Per Net Acre	92,659 (27.6%)	23,756	6.61%	2.58
6+ Units Per Net Acre	59,666 (17.7%)	8,344	6.61%	2.55
Subtotal Single Family	275,210 (81.9%)	158,979	6.61%	2.61
Multi-Family				
Total Multi-Family	61,026 (18.1%)	8,466	18.96%	2.81
Total Residential	336,236 (100%)	167,446	9.36%	2.64

Source: MVRPC; U.S. Census Bureau, 2008

Table 7. Greene County Residential Land Use Data: 2007

	Housing Units	Acres	Vacancy Rate	Estimated Household Size
Single Family				
<1 Units Per Net Acre	11,713 (18.4%)	23,148	5.83%	2.71
1-2 Units Per Net Acre	22,411 (35.1%)	11,916	5.83%	2.71
3-5 Units Per Net Acre	11,495 (18.0%)	2,680	5.83%	2.71
6+ Units Per Net Acre	4,097 (6.4%)	584	5.83%	2.71
Subtotal Single Family	49,716 (78.0%)	38,328	5.83%	2.71
Multi-Family				
Total Multi-Family	14,047 (22.0%)	1,445	13.21%	1.62
Total Residential	63,763 (100.0%)	39,772	7.48%	2.48

Source: MVRPC; U.S. Census Bureau, 2008

Table 8. Miami County Residential Land Use Data: 2007

	Housing Units	Acres	Vacancy Rate	Estimated Household Size
Single Family				
<1 Units Per Net Acre	13,675 (36.0%)	35,503	4.88%	2.61
1-2 Units Per Net Acre	11,142 (29.4%)	6,966	4.88%	2.61
3-5 Units Per Net Acre	6,213 (16.4%)	1,449	4.88%	2.61
6+ Units Per Net Acre	3,998 (10.5%)	576	4.88%	2.61
Subtotal Single Family	35,028 (92.3%)	44,493	4.88%	2.61
Multi-Family				
Total Multi-Family	2,925 (7.7%)	935	14.03%	5.31
Total Residential	37,953 (100.0%)	45,428	5.58%	2.79

Source: MVRPC; U.S. Census Bureau, 2008

family. In terms of acreage, those single family housing units with more than one acre per unit (<1 Units per Net Acre) occupy the largest amount of land, while single family housing units with 6 units or more per acre occupy the smallest amount of land. Not surprisingly, vacancy rates for single family housing units are much lower than those for multi-family units. Household sizes for single family units are lower as well.

Table 9. Montgomery County Residential Land Use Data: 2007

	Housing Units	Acres	Vacancy Rate	Estimated Household Size
Single Family				
<1 Units Per Net Acre	11,401 (4.8%)	21,853	7.87%	2.54
1-2 Units Per Net Acre	50,012 (21.0%)	24,795	7.87%	2.54
3-5 Units Per Net Acre	74,357 (31.3%)	18,411	7.87%	2.54
6+ Units Per Net Acre	60,667 (25.5%)	7,153	7.87%	2.54
Subtotal Single Family	196,437 (82.6%)	72,212	7.87%	2.54
Multi-Family				
Total Multi-Family	41,481 (17.4%)	5,891	21.60%	3.08
Total Residential	237,918 (100.0%)	78,103	10.43%	2.63

Source: MVRPC; U.S. Census Bureau, 2008

Employment-Related Land Use

The base data for the employment-based land use projections came mostly from the 2007 parcel database (Tables 11 through 15). For this projection, employment was categorized into one of two major classifications: Industrial or Commercial. Industrial employment includes the SIC categories for Manufacturing and Transportation, Communications, and Utilities (listed as 'Trans, Comm, Util' in the employment tables). Commercial employment includes Construction, FIRE, Public Service, Retail, Services, and Wholesale. Land use needs for Agriculture and Mining were not projected.

Table 10. Warren County* Residential Land Use Data: 2007

	Housing Units	Acres	Vacancy Rate	Estimated Household Size
Single Family				
<1 Units Per Net Acre	145 (1.5%)	236	4.47%	3.17
1-2 Units Per Net Acre	5,501 (42.7%)	2,463	4.47%	3.17
3-5 Units Per Net Acre	4,469 (34.7%)	1,216	4.47%	3.17
6+ Units Per Net Acre	207 (1.6%)	31	4.47%	3.17
Subtotal Single Family	10,322 (80.0%)	3,947	4.47%	3.17
Multi-Family				
Total Multi-Family	2,573 (20.0%)	196	13.45%	2.38
Total Residential	12,895 (100.0%)	4,142	6.24%	3.02

Source: MVRPC; U.S. Census Bureau, 2008
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Square footage per employee was calculated using building square footage data obtained from the 2007 parcel database and the employment projections. Even though 2007 is the base year for this assessment, 2000 was the base year for the

Table 11. Regional Employment-Related Land Use Data: 2007

	Facility Sq. Ft.	Sq. Ft. Per Employee (Lower Projection)	Sq. Ft. Per Employee (Upper Projection)	Acres	Vacancy Rate	FAR
Total Industrial	80,045,176	958.9	1,029.8	10,712	19.3%	0.172
Manufacturing	79,007,280	1,250.5	1,341.8	9,990	19.3%	0.182
Total Commercial	147,116,302	397.8	426.4	24,596	14.6%	0.137
Retail	56,877,180	676.1	723.7	6,527	12.7%	0.200
Office*	32,560,782	149.0	160.0	3,169	18.2%	0.236
Total	227,161,478	501.2	537.4	42,969	16.8%	0.148

Source: MVRPC; Gem Real Estate Group, 2007
Note: *Includes FIRE, Services, and Government SIC categories

employment projections, and so the 2007 employment numbers had to be interpolated based on the 2000 and 2010 projections. For this reason, for all counties except Warren, there is a square footage per employee number for each end of the projection range.

The 2007 acreage data comes directly from the 2007 parcel database and the floor area ratios (FARs) were calculated using the square footage and acreage data. The vacancy rates, however, were adapted from the Gem Real Estate Group's 2007 market analyses for industrial, retail, and office development.

Overall, industrial development has a larger amount of square feet per employee than commercial development, and the vacancy rates are higher as well. The differences in the floor area ratios indicate that generally there is more building square footage per acre for retail and office development than for industrial development.

Table 12. Greene County Employment-Related Land Use Data: 2007

	Facility Sq. Ft.	Sq. Ft. Per Employee (Lower Projection)	Sq. Ft. Per Employee (Upper Projection)	Acres	Vacancy Rate	FAR
Total Industrial	5,572,936	996.5	1,041.4	876	22.0%	0.146
Manufacturing	5,416,045	1,246.3	1,302.4	615	22.0%	0.202
Total Commercial	20,618,669	379.1	396.2	3,770	10.2%	0.126
Retail	9,938,735	613.0	640.6	1,195	8.6%	0.191
Office*	4,210,685	128.4	134.2	484	16.6%	0.200
WPAFB	n/a	n/a	n/a	6,486	n/a	n/a
Total**	26,191,605	436.7	456.4	4,646	11.3%	0.129

Source: MVRPC; Gem Real Estate Group, 2007
Note: *Includes FIRE, Services, and Government SIC categories

Table 13. Miami County Employment-Related Land Use Data: 2007

	Facility Sq. Ft.	Sq. Ft. Per Employee (Lower Projection)	Sq. Ft. Per Employee (Upper Projection)	Acres	Vacancy Rate	FAR
Total Industrial	11,595,237	819.9	883.5	2,275	16.6%	0.117
Manufacturing	11,571,114	972.0	1,047.4	2,136	16.6%	0.124
Total Commercial	12,927,065	352.8	381.1	3,398	18.1%	0.087
Retail	6,326,337	653.5	704.2	893	14.1%	0.163
Office*	1,679,155	74.8	80.6	346	20.1%	0.111
Total	24,522,302	482.8	521.2	5,673	17.7%	0.099

Source: MVRPC; Gem Real Estate Group, 2007
Note: *Includes FIRE, Services, and Government SIC categories

Table 14. Montgomery County Employment-Related Land Use Data: 2007

	Facility Sq. Ft.	Sq. Ft. Per Employee (Lower Projection)	Sq. Ft. Per Employee (Upper Projection)	Acres	Vacancy Rate	FAR
Total Industrial	61,120,156	1,023.0	1,106.0	6,770	20.7%	0.207
Manufacturing	60,281,682	1,391.8	1,504.8	6,466	20.7%	0.214
Total Commercial	111,204,763	452.6	489.9	16,675	16.8%	0.153
Retail	39,584,302	718.0	776.3	4,173	14.9%	0.218
Office*	26,307,437	164.9	178.3	2,258	18.8%	0.267
WPAFB	n/a	n/a	n/a	1,175	n/a	n/a
Total**	172,324,919	564.2	610.5	24,620	18.3%	0.169

Source: MVRPC; Gem Real Estate Group, 2007
Note: *Includes FIRE, Services, and Government SIC categories

Table 15. Warren County* Employment-Related Land Use Data: 2007

	Facility Sq. Ft.	Sq. Ft. Per Employee	Acres	Vacancy Rate	FAR
Total Industrial	1,756,847	440.0	791	2.1%	0.051
Manufacturing	1,738,439	480.5	773	2.1%	0.052
Total Commercial	2,365,805	270.2	753	5.7%	0.072
Retail	1,027,806	331.5	267	1.2%	0.088
Office**	363,505	96.5	80	11.4%	0.104
Total	4,122,652	323.4	1,544	3.7%	0.061

Source: MVRPC; Gem Real Estate Group, 2007
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro
**Includes FIRE, Services, and Government SIC categories

Public Facility Land Use

In order to project land use needs for public facilities, it was necessary to determine the 24/7 functional population for each county (Table 16). This was calculated using the population and employment projections and journey-to-work data used in MVRPC's 2030 Long Range Transportation Plan.

The 2007 square footage and acreage for each of the public facility categories came mostly from the 2007 parcel database. In the case of libraries in Montgomery County, however, the library systems were contacted for the square footage data.

By far the largest portion of the land allocated to public facilities is classified as parks and open space. Outside of parks and open space, the most land-intensive uses are religious facilities and private golf courses.

Educational Land Use

Tables 17 and 18 present the base data and assumptions for primary and secondary schools and post-secondary schools in the Region, respectively. For all schools, the number of students was obtained from the National Center for Education Statistics and the acreage came from the 2007 parcel database. For primary and secondary schools, square footage data was obtained directly from the school districts. The Level of Service (LOS) facility space per student comes from the lower range given by the Ohio School Facilities Commission's *Ohio School Design Manual*.

In terms of primary and secondary schools, the largest number of students and facility square footage are found in the elementary schools. The largest acreage, however, occurs at the high school level.

Table 16. Public Facility Land Use Data: 2007

2007 24/7 Functional Population	Region 700,083		Greene 129,007		Miami 82,504		Montgomery 460,167		Warren* 28,405	
	sq ft	acres	sq ft	acres	sq ft	acres	sq ft	acres	sq ft	acres
Public Safety Facilities										
Fire/EMS Facilities	674,108	127.8	140,524	21.4	45,579	23.5	460,438	78.6	27,567	4.3
Police Facilities	518,177	122.9	62,293	6.8	113,377	3.3	331,058	103.4	11,449	9.3
Jail and Detention Facilities	n/a	244.2	n/a	16.2	n/a	15.6	n/a	212.4	n/a	0.0
Government and Leisure Facilities										
Community Centers	1,582,037	210.1	317,989	35.3	176,558	34.7	1,073,844	132.1	13,646	7.9
Library Facilities	602,460	43.7	94,231	8.2	70,384	4.5	406,795	28.0	31,050	3.0
Recreation Centers	1,582,037	280.9	317,989	7.0	176,558	41.9	1,073,844	217.7	13,646	14.3
Major Community Facilities										
Convention Centers	200,000	3.7	0	0.0	0	0.0	200,000	3.7	0	0.0
Public Assembly Halls	409,239	6.1	0	0.0	0	0.0	409,239	6.1	0	0.0
Other Major Facilities	577,067	376.8	99,589	141.8	50,929	119.9	422,530	114.3	4,019	0.8
Parks and Open Space										
Parks	n/a	15,092.7	n/a	3,412.3	n/a	1,247.6	n/a	10,185.7	n/a	247.1
Public Golf Courses	n/a	4,122.5	n/a	526.3	n/a	1,002.1	n/a	2,286.4	n/a	307.6
Special Use	n/a	1,223.7	n/a	414.7	n/a	320.0	n/a	458.2	n/a	30.8
Conservancy/Greenbelt	n/a	16,601.0	n/a	5,116.3	n/a	3,005.9	n/a	8,369.0	n/a	109.9
Private Land-Extensive Land Uses										
Private Golf Courses	n/a	2,030.7	n/a	699.6	n/a	341.1	n/a	987.1	n/a	2.8
Cemeteries	n/a	1,982.9	n/a	370.3	n/a	360.5	n/a	1,245.2	n/a	6.9
Other Private Land-Related	n/a	768.1	n/a	354.6	n/a	138.5	n/a	275.0	n/a	0.0
Miscellaneous Support										
Public Works Equipment, Storage Yards	n/a	194.6	n/a	66.7	n/a	17.0	n/a	101.7	n/a	9.2
Publicly Owned Drainage Ponds	n/a	73.2	n/a	36.8	n/a	4.0	n/a	24.9	n/a	7.6
Sand, Gravel, Soil Storage Yards	n/a	110.3	n/a	9.4	n/a	0.0	n/a	96.7	n/a	4.2
Landfills	n/a	902.2	n/a	175.7	n/a	41.1	n/a	682.3	n/a	3.2
Other Public Land in Inventory	n/a	513.6	n/a	289.7	n/a	48.6	n/a	139.7	n/a	35.6
Religious										
Religious Facilities	n/a	3,464.4	n/a	1,041.7	n/a	562.7	n/a	1,765.3	n/a	94.7
Total	6,145,124	48,496.1	1,032,615	12,750.9	633,385	7,332.5	4,377,747	27,513.5	101,377	899.2

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Table 17. Primary and Secondary School Data: 2007

	Region	Greene	Miami	Montgomery	Warren*
Public Primary & Secondary Schools					
Grades K-5 (Elementary School)					
Number of students	58,212	9,751	7,431	36,372	4,658
Facility square footage	6,854,499	794,465	966,918	4,447,412	645,704
Acreage	1,408	264	153	909	81
Average floor area ratio	0.108	0.069	0.145	0.112	0.111
LOS facility space per student (sq. ft.)			115.6		
Grades 6-8 (Middle School)					
Number of students	30,001	5,195	3,961	18,600	2,245
Facility square footage	4,501,305	578,505	605,483	2,946,285	371,033
Acreage	963	247	136	522	57
Average floor area ratio	0.107	0.054	0.102	0.130	0.151
LOS facility space per student (sq. ft.)			141.0		
Grades 9-12 (High School)					
Number of students	41,211	7,392	5,686	25,338	2,795
Facility square footage	6,420,978	851,218	880,666	4,175,088	514,005
Acreage	1,506	226	213	930	137
Average floor area ratio	0.098	0.087	0.095	0.103	0.086
LOS facility space per student (sq. ft.)			156.0		
Total Public Primary & Secondary School Acreage					
Acreage	3,877	737	503	2,361	275
Auxiliary Facilities					
Acreage	346	73	67	192	14
Private Primary & Secondary Schools					
Number of students	15,624	1,362	1,298	12,949	15
Acreage	400	69	41	289	1
Primary & Secondary Schools					
Total Acreage	4,622	880	611	2,842	289

Source: MVRPC; National Center for Education Statistics, 2007; Ohio School Facilities Commission, 2007
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Table 18. Post-Secondary School Data: 2007

	Region	Greene	Miami	Montgomery	Warren*
Public Post-secondary Education					
Number of students	42,771	20,096	3,658	19,017	0
Acreage	1,046	864	125	57	0
Private Post-secondary Education					
Number of students	22,307	5044	524	16072	667
Acreage	779	525	12	229	13
Post-secondary Education					
Total Acreage	1,825	1,389	137	286	13

Source: MVRPC; National Center for Education Statistics, 2007
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Water and Wastewater Utilities

Data for water and wastewater utilties came from three sources. For water supply facilities, capacity and demand data were collected from the facilities themselves. For wastewater facilities, capacity and demand data were obtained through the Ohio Environmental Protection Agency. Facility acreage came from the 2007 parcel database.

In terms of water supply, regional demand in 2008 was less than half of regional capacity. The demand for wastewater treatment was much closer to the Region's capacity, but still almost 50 million gallons per day (mgd) below capacity.

Table 19. Water and Wastewater Utility Data: 2007

	Water Supply		Wastewater		Facility Acres, 2007
	Capacity, mgd*, 2008	Demand, mgd*, 2008	Capacity, mgd*, 2007	Demand, mgd*, 2007	
Region	238.04	101.93	182.87	132.95	2,201
Greene	33.61	14.80	33.19	23.47	484
Miami	19.93	7.89	13.95	10.26	377
Montgomery	172.50	74.95	127.23	93.01	1,055
Warren**	12.00	4.30	8.50	6.20	285

Source: MVRPC; Ohio Environmental Protection Agency, 2007
Note: *million gallons per day
**Warren County includes only the cities of Carlisle, Franklin, and Springboro

Regional Land Use Projection Results

As mentioned above, two projections, lower and upper, were used to account for a range in employment projections. These figures therefore resulted in two sets of projections for the employment and facilities categories.

Table 20. Regional Land Use Projection Results by County

	Total Developed Acreage 2007	Lower Level Total Acreage Needed 2040	Percent Change 2007-2040	Upper Level Total Acreage Needed 2040	Percent Change 2007-2040
Region	275,709	283,253	2.7%	292,121	6.0%
Greene	73,696	77,799	5.6%	78,958	7.1%
Miami	63,512	67,080	5.6%	68,394	7.7%
Montgomery	130,715	130,956	0.2%	134,593	3.0%
Warren*	7,786	13,038	67.5%	13,038	67.5%

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

As a whole, the Region can expect to need between 2.7% and 6.0% more developed land by the year 2040 (Table 20). Warren County is expected to see the largest increase in need, with 67.5%, but land use demand in Montgomery County is expected to increase only by between 0.2% and 3.0%.

Table 21. Regional Land Use Projection Results by Land Use Category

	Lower Level Additional Acreage Needed 2040	Upper Level Additional Acreage Needed 2040
Residential	6,421.1	
Employment	0.0	8,859.2
Facilities	11.5	20.6
Education	1,111.3	
Water and Wastewater	0.0	
Total	7,543.9	16,412.1

Source: MVRPC

Examining the projections by land use category shows that for the lower level projection, the land use category with the largest absolute increase is residential (Table 21). For the upper level projection, the largest absolute increase belongs to the employment-related land use category. It is important to note that not all elements of the five land use categories were projected. For example, only two categories of facilities were projected and no projections were made for Water and Wastewater facilities.

Residential Land Use Projection Results

Table 22 is a summary of the residential acreage need in 2040 and the percent changes between 2007 and 2040 by county. Overall, the Region is expected to need 3.8% more residential land in 2040. The three cities in Warren County are expected to need the largest increase in residential land (101.6%). On the other hand, the amount of residential land needed in Montgomery County is expected to decrease by -3.4%.

Table 22. Residential Land Use Projection Results by County

	Developed Residential Acreage 2007	Residential Acreage Needed 2040	Additional Acreage Needed	Percent Change 2007-2040
Region	167,446	173,867	6,421	3.8%
Greene	39,772	41,457	1,685	4.2%
Miami	45,428	48,601	3,173	7.0%
Montgomery	78,103	75,458	-2,645	-3.4%
Warren*	4,142	8,351	4,209	101.6%

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Table 23. 2040 Residential Unit Projection Results by Residential Category

	Region	Greene	Miami	Montgomery	Warren*
Single Family					
<1 Units Per Net Acre	38,146	12,209	14,630	11,015	292
1-2 Units Per Net Acre	94,689	23,360	11,920	48,318	11,090
3-5 Units Per Net Acre	99,477	11,982	6,647	71,839	9,010
6+ Units Per Net Acre	67,577	4,271	4,277	58,612	417
Subtotal Single Family	299,890	51,822	37,474	189,784	20,810
Multi-Family					
Total Multi-Family	63,034	14,642	3,129	40,076	5,187
Total Housing Units	362,924	66,464	40,604	229,861	25,996

Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Table 24. 2040 Residential Land Use Projection Results by Residential Category

	Region	Greene	Miami	Montgomery	Warren*
Single Family					
<1 Units Per Net Acre	83,700	24,128	37,982	21,113	477
1-2 Units Per Net Acre	48,794	12,421	7,453	23,955	4,966
3-5 Units Per Net Acre	24,583	2,794	1,550	17,787	2,452
6+ Units Per Net Acre	8,198	608	616	6,911	63
Subtotal Single Family	165,275	39,951	47,601	69,766	7,957
Multi-Family					
Total Multi-Family	8,592	1,506	1,000	5,692	394
Total Acreage	173,867	41,457	48,601	75,458	8,351

Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Table 23 details the number of housing units that will be needed in 2040 in order to accommodate the future population. Table 24 translates this into the number of acres that will be needed in order to accommodate these units.

Employment-Related Land Use Projection Results

Total employment in the Region is projected to increase by 1.5% to 23% from 2010 to 2040. This represents an addition of between 6,957 and 96,343 jobs. Manufacturing and agriculture, and possibly public service are expected to lose jobs over this period; services, transportation, and construction sectors are anticipated to grow the most. Note, however, that because different job sectors have different space requirements, the amount of land used for employment changes not only in response to changes in the total number of jobs, but in response to the change in percentage of the types of jobs. Specifically, industrial jobs in the Region take about 959 square feet per employee whereas commercial employees take about 398. Therefore, the decrease in industrial employment results in a lower overall demand for space.

Table 25 is a summary of the land that will be needed to accommodate the changes in employment numbers for the Region as a whole and by county. The Region will experience a demand between -3.3% and 25.1% for more land for employment-related land use in 2040. In the lower level projections, Montgomery County is projected to need less land for employment-related land use than it had in 2007. The three cities in Warren County will see the highest percent increase in land demand. In the upper level projections, all of the counties show an increase in the land needed, although Miami and Montgomery

Table 25. Employment-Related Land Use Projection Results by County

	Developed Employment-Related Acreage 2007	Lower Level Employment-Related Acreage Needed 2040	Percent Change 2007-2040	Upper Level Employment-Related Acreage Needed 2040	Percent Change 2007-2040
Region	35,308	34,151	-3.3%	44,167	25.1%
Greene	4,646	6,306	35.7%	7,464	60.6%
Miami	5,673	5,898	4.0%	7,211	27.1%
Montgomery	23,445	19,535	-16.7%	27,081	15.5%
Warren*	1,544	2,412	56.2%	2,412	56.2%

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

counties have the smallest percent increases, with 27.1% and 15.5%, respectively. The largest percent increase is projected to occur in Greene County.

Table 26 shows the land needed to accommodate the 2040 employment projections by employment category and by county. Table 27 provides the percent changes in the land needed for employment-related land uses betweem 2007 and 2040.

Regionally, for the lower projection, industrial employment-related land uses are projected to decrease by more than 10% between 2007 and 2040; commercial employment-related land uses are expected to decrease by 0.3%. For the upper projection, industrial employment-related land uses are projected to increase by 6.5% and commercial employment-related land uses are expected to increase by over 33%.

Table 26. 2040 Employment-Related Land Use Projections by Employment Category

	Region		Greene		Miami		Montgomery		
	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Warren*
Total Industrial	9,628.4	11,408.1	815.4	965.1	1,898.7	2,317.5	5,583.2	6,794.4	1,331.0
Manufacturing	8,146.0	9,628.8	515.8	610.6	1,706.6	2,083.1	4,620.6	5,632.1	1,303.0
Total Commercial	24,522.7	32,758.7	5,490.4	6,498.6	3,999.5	4,893.3	13,952.0	20,286.1	1,080.8
Retail	6,918.4	8,297.3	2,082.3	2,464.7	888.9	1,084.9	3,575.1	4,375.6	372.1
Office**	3,509.6	4,245.7	650.1	769.5	400.3	488.6	2,361.0	2,889.4	98.3
Total Employment	34,151.0	44,166.9	6,305.8	7,463.7	5,898.2	7,210.8	19,535.2	27,080.5	2,411.8

Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro
**Includes FIRE, Services, and Government SIC categories

Table 27. Percent Change from 2007 to 2040 for Employment-Related Land Use Projection Results by Employment Category

	Region		Greene		Miami		Montgomery		
	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Warren*
Total Industrial	-10.1%	6.5%	-7.0%	10.1%	-16.5%	1.9%	-17.5%	0.4%	68.3%
Manufacturing	-18.5%	-3.6%	-16.2%	-0.8%	-20.1%	-2.5%	-28.5%	-12.9%	68.5%
Total Commercial	-0.3%	33.2%	45.6%	72.4%	17.7%	44.0%	-16.3%	21.7%	43.5%
Retail	6.0%	27.1%	74.3%	106.3%	-0.4%	21.6%	-14.3%	4.9%	39.3%
Office**	10.8%	34.0%	34.4%	59.1%	15.5%	41.0%	4.6%	28.0%	22.1%
Total Employment	-3.3%	25.1%	35.7%	60.6%	4.0%	27.1%	-16.7%	15.5%	56.2%

Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro
**Includes FIRE, Services, and Government SIC categories

Losses are seen in manufacturing employment-related land use for both the lower and upper level projections in all counties except Warren, for which manufacturing employment-related land use is projected to increase by over 68%. The lower level projection also shows decreases in retail employment-related land use for Miami and Montgomery counties. Overall, the largest percent increases in employment-related land use for all categories are projected for Greene County's upper level projection, and Warren County's projection.

Public Facilities Land Use Projection Results

As Table 28 shows, acreage used for facilities is substantial, but additional land needed in 2040 is not, due to the fact that only fire/EMS and police facilities – a small proportion of the land in the facilities category – were projected.

Table 28. Public Facility Land Use Projection Results

	Region		Greene		Miami		Montgomery		
	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Lower proj.	Upper proj.	Warren*
Fire/EMS Facilities Acreage	133.2	137.9	23.7	24.5	25.3	26.2	75.9	78.9	8.3
Police Facilities Acreage	129.0	133.4	7.6	7.8	3.5	3.7	99.8	103.8	18.1
Total Facility Acreage 2040	48,507.6	48,516.6	12,753.9	12,754.9	7,334.5	7,335.5	27,507.2	27,514.2	912.0
Total Facility Acreage 2007	48,496.1		12,750.9		7,332.5		27,513.5		899.2
Percent Change 2007-2040	0.02%	0.04%	0.02%	0.03%	0.03%	0.04%	-0.02%	0.00%	1.42%

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

As a whole, the Region can expect to need between 0.02% and 0.04% more acreage for public facilities in 2040 as compared to 2007. The projections for both the upper and lower level projections for Greene and Miami counties fall within this range. Montgomery and Warren counties, however, do not. Montgomery County, due to a projected population decrease, is not projected to need any more land for public facilities in 2040. The three cities in Warren County, however, are projected to have a relatively large population increase, and therefore will need 1.42% more land for public facilities in 2040.

Educational Land Use Projection Results

Table 29 shows the change in enrollment for public primary and secondary schools between 2007 and 2040. Only public primary and secondary schools were projected; enrollment and land needed for other types of educational facilities were held constant from 2007. Table 30 shows the projections for land needed in 2040 for educational facilities.

Table 29. Percent Change between 2007 and 2040 for Public Primary and Secondary Enrollment

	Region	Greene	Miami	Montgomery	Warren*
Public Primary & Secondary Schools 2007	129,424	22,338	17,078	80,310	9,698
Public Primary & Secondary Schools 2040	167,771	33,540	24,059	94,811	15,360
Percent Change 2007-2040	29.63%	50.15%	40.88%	18.06%	58.39%

Source: MVRPC
Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

The total number of public elementary and secondary students in the Region is expected to rise by almost 30%, and acreage demand is expected to rise by 28.67%. This indicates that as a whole, the Region has slightly more facility space than students currently, and so can absorb some increase in students without needed the given demand for facility acreage.

Note that the OSFC's equation for gross square footage for a school building actually gives a range, on a sliding scale; for this report, we used the lowest number in that range in our calculations. However, the OSFC does note, "The sliding scale allows for the fact that larger buildings that must be provided for larger student populations are more space efficient and require fewer square feet per student." The variation in school sizes across the region can certainly affect acreage demand. Not all schools in the

region can support a larger, more space-efficient building, in which case the fundable square footage will rise, as will the acreage.

Table 30. Educational Land Use Projection Results

	Region	Greene	Miami	Montgomery	Warren*
Public Primary & Secondary Schools					
Grades K-5 (Elementary School)	1,860.5	563.0	191.8	1,014.7	176.4
Grades 6-8 (Middle School)	1,172.8	470.5	177.4	548.8	76.4
Grades 9-12 (High School)	1,954.5	458.9	302.8	1,039.2	184.3
Total Public Primary & Secondary School Acreage 2040	4,987.8	1,492.4	672.1	2,602.7	437.1
Total Public Primary & Secondary School Acreage 2007	3,876.5	737.4	503.2	2,361.1	274.8
Percent Change 2007-2040	28.7%	102.4%	33.6%	10.2%	59.1%
Auxiliary Facilities	346.0	73.0	67.3	191.6	14.1
Total Private Primary & Secondary Schools	399.7	69.4	40.5	289.4	0.5
Total Public Post-secondary Education	1,046.4	864.2	124.8	57.5	0.0
Total Private Post-secondary Education	778.9	524.8	12.0	228.8	13.3
Total Education Facility Acreage 2040	7,558.8	3,023.7	916.7	3,370.0	465.0

Note: *Warren County includes only the cities of Carlisle, Franklin, and Springboro

Conclusion

The Miami Valley Land Use Demand Assessment connects and completes the various investigations regarding non-physical conditions carried out as part of Phase I of "Going Places – An Integrated Land Use Vision for the Miami Valley Region." This report presents the assessment in three stages: the calculation of the socio-economic projections, the collection of the base land use data, and the calculation of the land use demand projections.

The land use demand projections were based on the assumption that the Region would continue to develop at the same densities and intensities that were present in 2007. For the Region as a whole, developed acreage may need to increase by between 2.7% and 6.0%, or between 7,544 and 16,412 acres. This is approximately equivalent to one to two times the size of Wright Patterson Air Force Base.

Highlights of this assessment include:

- The Region's population is expected to increase by less than 3% between 2000 and 2040
- Two different employment projections were developed, one high and one low, in order to provide a forecasted employment range. At the lower end of the range, the increase could measure approximately 5%. At the upper end of the range, employment could increase by almost 19% between 2000 and 2040.
- Regionally, residential acreage is projected to increase by 3.8%.
- The dominant sectors of employment will change as the manufacturing sector continues to decline and the commercial sectors, particularly the services sector, continue to increase.
- Due to the different space requirements of the different employment sectors, even though at the lower projection level employment is expected to increase by 5%, no additional land is projected to be required. At the upper projection level, employment-related land use needs are expected to increase by 25%.
- The total number of public elementary and secondary school students is expected to rise by almost 30% and the land needed to accommodate those students is expected to increase by almost 29%.
- Only a selection of land use categories were projected. For those not projected, such as Water and Wastewater Utilities, it is acknowledged that even though at a regional level it is realistic to assume that no additional land will be needed, at a local level this may not be realistic and additional land for these types of development may be needed.

Due to the modest increases projected for the Region's population and employment, an equally modest amount of additional developed land is projected to be needed in 2040. This analysis, however, is meant to provide a base from which to move into Phase II: Future Land Use Scenario Development and Assessment. There are many ways in which these projections may change as the Going Places initiative moves into the scenario development process. Several elements of these projections, such as assumed vacancy rates, household sizes, and floor area ratios – all of which were held constant to their 2007 levels – could be altered, which would alter the projected land use demand.

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Appendix: County-Level Employment Projections by SIC Category

Miami Valley Land Use Demand Assessment

County-Level Employment Projections by SIC Category

Greene County Lower Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	1,404	1,440	1,268	1,144	1,054
Construction	2,776	3,232	3,266	3,265	3,381
FIRE	2,133	2,813	3,186	3,459	3,969
Manufacturing	5,343	4,329	4,057	3,845	3,642
Mining	41	29	30	30	32
Public Service	24,644	25,996	24,485	23,675	23,412
Retail	14,551	17,737	21,171	23,761	28,264
Services	23,187	30,139	33,370	35,037	38,576
Trans, Comm, Util	1,075	1,300	1,381	1,435	1,562
Wholesale	2,019	2,412	2,840	3,163	3,731
Total*	77,173	89,424	95,053	98,815	107,623

* May not total 100% due to rounding

Greene County Upper Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	1,404	1,349	1,299	1,247	1,194
Construction	2,776	3,027	3,346	3,557	3,830
FIRE	2,133	2,635	3,264	3,769	4,496
Manufacturing	5,343	4,055	4,157	4,189	4,125
Mining	41	27	30	33	36
Public Service	24,644	24,350	25,087	25,792	26,517
Retail	14,551	16,613	21,691	25,885	32,013
Services	23,187	28,230	34,189	38,169	43,693
Trans, Comm, Util	1,075	1,217	1,415	1,563	1,769
Wholesale	2,019	2,259	2,910	3,446	4,226
Total*	77,173	83,761	97,389	107,650	121,898

* May not total 100% due to rounding

Appendix: County-Level Employment Projections by SIC Category

Miami Valley Land Use Demand Assessment

Miami County Lower Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	2,320	2,359	2,058	1,839	1,675
Construction	2,107	2,486	2,626	2,717	2,914
FIRE	1,790	2,186	2,087	1,975	1,915
Manufacturing	15,323	12,084	11,095	10,228	9,484
Mining	60	66	67	67	69
Public Service	1,649	1,924	1,944	1,940	2,000
Retail	8,804	9,827	9,744	9,548	9,658
Services	15,246	18,665	19,774	20,434	21,947
Trans, Comm, Util	2,127	2,271	2,280	2,263	2,319
Wholesale	1,887	2,108	3,002	3,663	4,532
Total*	51,313	53,976	54,678	54,673	56,513

* May not total 100% due to rounding

Miami County Upper Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	2,320	2,210	2,109	2,003	1,898
Construction	2,107	2,329	2,691	2,960	3,300
FIRE	1,790	2,048	2,138	2,152	2,169
Manufacturing	15,323	11,318	11,368	11,142	10,742
Mining	60	62	69	73	78
Public Service	1,649	1,802	1,992	2,113	2,266
Retail	8,804	9,204	9,984	10,402	10,939
Services	15,246	17,483	20,260	22,261	24,858
Trans, Comm, Util	2,127	2,127	2,337	2,465	2,626
Wholesale	1,887	1,975	3,076	3,990	5,133
Total*	51,313	50,557	56,022	59,560	64,009

* May not total 100% due to rounding

Appendix: County-Level Employment Projections by SIC Category

Miami Valley Land Use Demand Assessment

Montgomery County Lower Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	2,723	2,672	2,238	1,907	1,644
Construction	14,134	15,583	16,053	16,451	16,990
FIRE	17,999	21,159	20,928	20,706	20,636
Manufacturing	59,165	43,295	38,446	34,789	30,804
Mining	42	36	36	36	36
Public Service	10,629	11,346	11,435	11,502	11,661
Retail	56,321	55,107	52,143	49,591	47,255
Services	111,049	126,988	129,465	131,125	134,144
Trans, Comm, Util	18,199	16,428	17,005	17,467	18,101
Wholesale	18,173	15,412	14,530	13,781	12,978
Total*	308,434	308,027	302,279	297,355	294,248

* May not total 100% due to rounding

Montgomery County Upper Level Employment Projections to 2040

	2000	2010	2020	2030	2040
Agriculture	2,723	2,503	2,293	2,077	1,862
Construction	14,134	14,597	16,448	17,921	19,243
FIRE	17,999	19,819	21,443	22,558	23,373
Manufacturing	59,165	40,553	39,390	37,900	34,890
Mining	42	34	37	39	40
Public Service	10,629	10,628	11,716	12,530	13,207
Retail	56,321	51,617	53,424	54,025	53,523
Services	111,049	118,946	132,646	142,848	151,936
Trans, Comm, Util	18,199	15,388	17,422	19,029	20,502
Wholesale	18,173	14,436	14,887	15,013	14,699
Total*	308,434	288,520	309,706	323,940	333,276

* May not total 100% due to rounding

Appendix: County-Level Employment Projections by SIC Category

Miami Valley Land Use Demand Assessment

Warren County Employment Projections to 2040**

	2000	2010	2020	2030	2040
Agriculture	217	96	111	122	136
Construction	214	400	384	412	411
FIRE	268	415	453	474	506
Manufacturing	3,287	3,741	4,449	5,331	6,097
Mining	8	10	12	15	17
Public Service	102	246	367	399	490
Retail	2,743	3,245	3,682	3,942	4,320
Services	2,459	3,549	3,502	3,601	3,603
Trans, Comm, Util	357	379	475	539	624
Wholesale	1,386	1,614	2,321	2,655	3,238
Total*	11,041	13,695	15,756	17,490	19,442

* May not total 100% due to rounding
** Warren County includes only the cities of Carlisle, Franklin, and Springboro