Introduction

Miami Valley Land Suitability Assessment - Built Environment Factors

Purpose

The Miami Valley Regional Planning Commission (MVRPC) conducted the Miami Valley Land Suitability Assessment - Built 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 built environment 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 Built Environment Factors Composite Map.

The built environment factors analyzed in this assessment, such as public water and wastewater service, airport noise, restricted development areas, potential environmental hazards, and employment clusters 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 is an accompanying study to the Miami Valley Land Suitability Assessment - Natural Environment Factors completed in 2007 and it provides geographically referenced information about opportunities and constraints for future land development. The Built 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 built environment factors. The Region's development suitability must be considered in the context of both the natural environment and built environment factors to have a complete understanding of the Region's physical landscape.

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 (see 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.

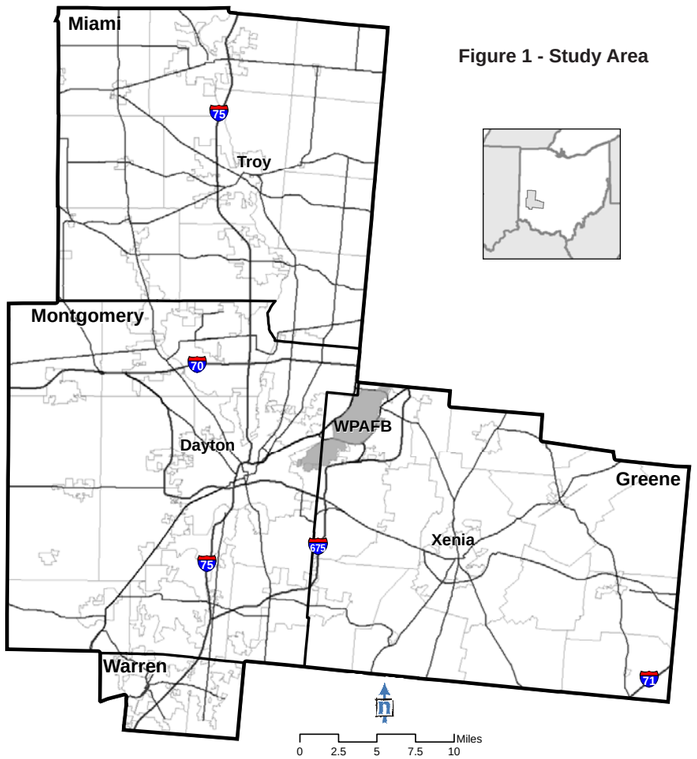


Figure 1 - Study Area

Built Environment Factors Considered

The 15 built environment factors analyzed in this study are:

- Airport Noise
- Educational Amenities
- Fire Protection Services
- Industrial Clusters
- Job Clusters
- Major Thoroughfare Access
- Other Amenities
- Potential Environmental Hazards
- Public Transportation Services
- Public Wastewater Services
- Public Water Services
- Recreational Amenities
- Restricted Development Lands
- Retail Clusters
- Transportation Network Connectivity

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 report structure.

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 built environment factors.

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

4. The fourth section presents the Built Environment Factors Composite Maps and a summary of the findings based on the land suitability score from all 15 factors. This section also presents findings from the comparative analysis of the composite map along with other land use data.

5. The Conclusion section provides a summary of the findings from the factor analyses and the analysis of the Built 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 - Built Environment Factors

This assessment was carried out in four phases. In the first phase the built environment factors were identified and a regional dataset was developed. The second phase focused on the development of a suitability score for each factor. In the third phase of the assessment a land suitability composite map was developed based on the aggregated total suitability score. The last phase includes a technical analysis of the 15 built environment factors, a summary of data findings from the composite map, and a comparative analysis.

A Geographic Information System (GIS) was used to conduct the assessment due to its unique capacity of spatial database management and analysis. The data developed and acquired for individual built environment 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 built 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 built environment factors that are commonly used in land suitability assessments. The 15 factors selected for this assessment encompass 4 dimensions of the built environment considerations: Public Infrastructure Provision, Accessibility, Existing Land Use, and Limitations.

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

<u>Public Infrastructure Provision</u>
- Fire Protection Services
- Public Wastewater Services
- Public Water Services
- Transportation Network Connectivity

<u>Accessibility</u>
- Educational Amenities
- Major Thoroughfare Access
- Other Amenities
- Public Transportation Services
- Recreational Amenities
- Retail Clusters

<u>Existing Land Use</u>
- Industrial Clusters
- Job Clusters

<u>Limitations</u>
- Airport Noise
- Potential Environmental Hazards
- Restricted Development Lands

Two considerations were prominent during the search for reliable data sources - the availability of consistent data throughout the study area and the availability of data in a GIS format.

Individual county data was aggregated into a single 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 tables). Also, separate residential and non-residential suitability scores were developed for each factor. This additional step was necessary because factors in the built environment affect residential and non-residential land uses differently. Therefore, the suitability scoring and resulting Residential and Non-Residential Development Suitability Composite Maps reflect these differences.

The *Suitability Measures* indicate whether certain data attributes are more or less suited to accommodate land development. The data attributes were classified into one of three general Suitability Measures: Suitable, Somewhat Suitable, or Not Suitable. In addition, when necessary, only two Suitability Measure categories were used. For example, the data attributes for the Fire Protection Services factor was classified simply as Suitable or Not Suitable.

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.

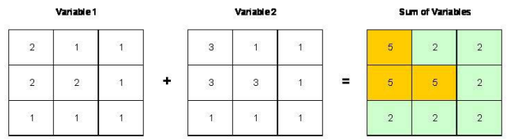
The purpose of the *Weight Factor* is to weight the 15 factors against one another according to their importance in determining development potential. The Weight Factor ranges from one to four, with four indicating the highest degree of importance and is different between residential and non-residential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

The *Suitability Score* 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 Public Water Services factor classified as Suitable, the Attribute Score would be five. Multiply that by a Weight Factor of three and the Suitability Score would be 15.

Built Environment Suitability Measure Development

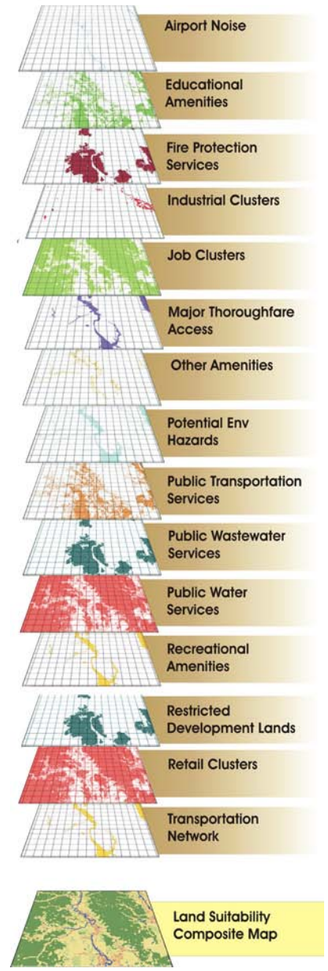
Conceptually, the Built Environment Suitability Measure was generated by overlaying spatial data representing the Suitability Scores of all 15 factors, as illustrated in figure 2.

Figure 2 - Summing Suitability Scores



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 Built Environment Suitability Measure, as illustrated in Figure 3.

Figure 3 - Built Environment Factors



Technical Analysis

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