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South Covington, Kentucky Park Location: Adapting Christaller's Central Place Theory to a Land Suitability Analysis

By

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Abstract

Public facility location is always under intense scrutiny due to issues of equitability and efficiency. Being public spaces, parks are not immune to being under controversy. At the basic level, municipalities strive to locate these public spaces as fairly as possible, but this becomes increasingly difficult as populations and residential areas shift with new development. This problem is even more compounded due to incentives that promote rapid development.

Recently, public park location and amenities have become an issue in the City of Covington, Kentucky because of rapid and intense residential development in the southern half of the City. In order for the City to maintain the appropriate amount of public parks for the growing and shifting populations, a structure is needed that facilitates equitable and efficient park placement. Currently, while there are established guidelines that assist in locating parks, a model that is rigid enough to provide simplicity in use but retains some inherent flexibility to deal with shifting populations does not exist. This study explores the real problem of locating new parks within an existing densely populated residential area through a land suitability analysis while also undertaking the development of a park location model that draws upon a classic geographic theory of placement.

V

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Preface

This study was undertaken while I was an employee for the City of Covington, Kentucky in the summer of 2001. I was hired by former Commissioner J.T. Spence for the explicit purpose of conducting a comprehensive analysis of parks, recreation, and conservation in the newly developed residential areas of South Covington. A set of recommendations of how to generally improve the parks situation was developed for the City of Covington as a final product for the summer long project. As the project matured, however, it was increasingly evident that City' parks system plan necessitated a geographic approach because of its spatial nature. Conceptualizing the problem from a geographical perspective raises some interesting questions concerning the pattern of park location. This study subsequently evolved in order to geographically explore the general problem of efficiently and equitably locating parks in spatially comprehensive network.

Introduction

South Covington, in recent years, has experienced rapid and dense residential development. The most recent development has occurred on a parcel-by-parcel basis with no consideration for internal recreational parks. Although green space exists outside the residential areas, the internal neighborhood atmosphere of these most recent subdivisions is, for the most part, void of playgrounds and parks. Further, the current existing 'system' of recreational parks in the area is inadequate at best. Residents, generally, cannot walk to a local park with their children or even allow older children to venture out to "the local park," since there are virtually no easily accessible options. The goal of the City of Covington, Kentucky is to develop accessible recreational parks for its residents; therefore, it is now necessary for retroactive planning. The City must identify potential recreational parkland and make appropriate changes to benefit the surrounding communities. This study undertakes the task by identifying suitable land and then applying a new model of park location to identify the best-fit locations for the area.

Background

The City of Covington, Kentucky is located in the northeastern portion of Kenton County on a relatively large meander of the Ohio River (Covington, KY Virtual Internet Tour). Overall, the city has a population of 43,370 (2000 Census). The city is bordered on the north by the south bank of the Ohio River and is situated directly south of the city of Cincinnati, Ohio. Covington spreads out with one large extension directly to the south, making the city limits resemble the profile of a "sea horse" with its head facing west and tail facing east. The area being studied, South Covington, is the bottom half, or body, of this seahorse.

The City of Covington has a varied topography with "rolling" peaks and valleys. Elevations range from 478 to 908 feet above sea level. Most of the most easily developed land is built upon while there are large undeveloped forested areas that a steeply sloped. Other undeveloped land consists of single neighborhood land parcels designated for residential use or land that was previously agricultural.

Population Profile

Pressures resulting from population concerns have spurred the need for this study. In the mid nineties, the overall population of the City of Covington fell below 43,000. This was a concern because this is the threshold that determines the amount of federal funds a city will receive. Covington was 'grand fathered' in as a city with a population over the 43,000 threshold. However, there was concern during the period of population decline that the federal government would revoke this status, so population had to be increased and maintained. In order to accomplish this, the City actively promoted the South Covington area for relatively dense residential development. In fact, developers were permitted to build more concentrated housing because of the difficulty of building on some of the steeper slopes. Residential development was pursued to such an extent that the City allowed these developers build with absolutely no concern for park space for these new neighborhoods.

Overall, City of Covington experienced about a 0.2% increase in population (Figure 1) in ten years, rising from 43,264 in 1990 to 43,370 in 2000, but, overall, has experienced a 12.5% drop in population (49,563 to 43,370) since 1980. In contrast, the residential neighborhoods of South Covington have continued to experience population growth with an approximate 92% increase of population since 1990 and a 128.5% increase in population since 1980. According to figures from the U.S. Census, the current population of the South Covington

study area is approximately 7,720, an increase of 3,701 from the population of 4,019 in 1990 and an increase of 4,341 from 3,379 in 1980. These numbers indicate a major population density shift from North Covington to South Covington. The current population of South Covington, 7,720, makes up the approximate 2,675 households in the area. This number of households is about a 110% increase from the 1,271 households in 1990 and a 138% increase from 1,124 in 1980.

Figure 1

	1980	1990	2000	2010 (projected)
Population				
Covington	49,563	43,264	43,370	46,000
S. Covington	3,379	4,019	7,720	10,000
Under 18	1,420	1,403	2,700	4,000
Households				
S. Covington	1,124	1,271	2,675	4,000

Source: U.S. Census

Currently, the approximate percentage of population under 19 years of age is about 35% of the total South Covington population, which is proportionally down from the 62% in 1980. However, the total population under 19 years of age has almost doubled from 1,420 in 1980 to 2,700 in 2000. It is not an unreasonable assumption that persons under 19 years of age are mostly children living at home with parents. Most of this younger population, especially those under 16 years of age, does not have the ability of self-transportation by automobile and rely on adults for trips of any significant distance.

The population projections for 2010 are based upon the assumption that the trends of the last decade will continue. New subdivisions continue to develop; therefore, an influx of population from inside and outside the City will accompany this development. Since these are suburban residential neighborhoods, the proportion of children under 19 years of age in South Covington will also continue to increase as new families are created and existing families grow. By extending the current population and development trends, it is estimated that the percentage of population under 19 years of age will increase from 35% of the current population in South Covington population to 40% of the future population, due to the attraction of new residential housing to families. The changing demographics of South Covington presented and the estimated future projections illustrate the need for a new park location model.

The City of Covington Recreation

Currently, Covington does not have a comprehensive citywide plan for parks and recreation, and neither does Kenton County (one is in development). Kenton County has created a 12-person Parks & Recreation Commission to plan and oversee improvements in the County park system. Further, many cities throughout the nation have more specific park and recreation plans to compensate for any deficiencies in the counties' plans, however, once again, Covington does not possess such a plan. For instance, Pioneer Park, a county park, does not provide easily accessible recreation for South Covington, so a separate City plan for South Covington could compensate for the deficiency.

The Covington Recreation Department does have a Recovery Action Plan, revised in January 2001, which is submitted to the National Parks Service in order to acquire additional funding. This plan lists location, size, and amenities of current parks maintained by Covington, however, it does not have provisions for future development. This does not mean that future planning is nonexistent within the Recreation Department. It has been conveyed by the current Recreation Director that the City desires to develop more parks in South Covington. This desire was illustrated in the development of the relatively new Hands Pike Park.

While existing parks in South Covington meet recreation standards recommended by the National Recreation and Parks Association (NRPA), these locations are insufficient in providing accessible parks, which are essential for an agreeable living habitat, to the densely populated residential neighborhoods. Further, Pioneer Park, which provides most abundant options for recreation in the area, is only accessible by automobile. Therefore, South Covington needs recreation space in the form of parks that are located to provide easily access for residents, especially children.

Problem Statement

The purpose of this study was to examine the current recreational park condition, to identify suitable recreational parkland, and to propose recommendations to improve the recreational park structure in South Covington, Kentucky. Overall, the question answered in this study is:

- ***Are the locations of South Covington parks situated to provide accessibility to all residents?***
- ***What locations for South Covington parks would provide access to all residents?***

In order to thoroughly answer the general research question, four sub-questions must be answered:

- Are there areas not served by existing recreational parks?
- What are the criteria for park location and using these, what land is suitable?
- Of the suitable land, what are the best locations for park development?
- What should the ideal recreation network look like?

Literature Review

The literature cited here follows this general structure; (1) a review of the various justifications for the existence of recreational parks, (2) a review of the approaches to park location, (3) and, finally, a review of Central Place Theory. Since park location is a continuing issue in society and recent development has seemed to forget the historical significance of parks, the first two sections contain historical perspectives. Next, the Approaches section concludes with a review of a series of park plans for London, England that just came short of adopting the basic tenants of Christaller's Central Place Theory as a model for park location. The final part reviews Christaller's Central Place Theory for the later adaptation of it in the development of a contemporary model of park location.

Justification for Parks

The need for a park network model is based on the assumption that parks have various beneficial qualities and, therefore, must be included in areas where people reside. Much of the current literature addressing urban/suburban parks focuses upon these various potential benefits, or justification, provided by these spaces, which can be designated into one of three general categories: (1) social, (2) economic, or (3) environmental (Young, 1996). Both social and economic benefits attract the majority of attention, while environmental receives relatively less consideration in the literature.

Justification: American Historical Perspective

In the late nineteenth and early twentieth centuries, the American Civic Association (ACA) implemented its environmentally deterministic social agenda of improving the moral character of urban areas (Young, 1996). While not a new concept (San Francisco had a similar movement as early as 1860) in American historical planning, this excerpt, from Terence Young, describing the main tenants of the association, is the origin for the structuring of socially beneficial green space in urban areas in the United States:

> The canon of the American Civic Association recognized cities as cluttered, crowded, trash-strewn, haphazardly arranged, and visually disagreeable; this made them America's ugliest places. Their ugliness, said the ACA, explained the moral failings of urban society...The organization held that an ugly environment logically produced a poor, disorderly society. To combat this effect, they asserted that beauty could

serve as the reformers tool. Therefore, they began a "Crusade Against Ugliness" in America's cities.

The ACA incorporated parks as the main agent in the crusade to create beauty and recognized various levels, or sizes, of parks in a system as being pivotal in their quest. It was thought that the beautiful scenery and recreation areas provided by parks eliminated social ills, such as disease, poverty, inequity, and crime. The social value of parks was expressed as "democratic equality" and "social coherence; and the material value was expressed in terms of "public health" and "prosperity (Young, 1996)."

Parks were believed to help create a non-hierarchical society, or maintaining democracy, because parks "are for all the people, high and low, rich and poor, without distinction, with equal rights and privileges for every class (as cited in Young, 1996; Walmsley, 1995)." It was argued that parks raised social standards and created equality by elevating lower classes to a "higher life," thus bringing the values of the majority to conformity with the park-advocating elite. Further social advantages were witnessed by the reduction of crime, in a sense, creating social coherence. An incoherent society needed to pay special attention to juveniles, and the attention that adolescent crime draws fit this criteria. Therefore, it was believed, a belief still currently held by a majority, that crime developed in the absence of recreation opportunities (Solecki, 1995).

While no direct relation between actual physical health and parks has ever been established, it was believed that parks improved health by "uplifting" the mind

and the body (Young, 1996). This adheres, in a sense, to the attributes of contemporary meditation and relaxation techniques. Further, parks became to serve as places for physical exercise (Solecki 1995). The idea that parks improved physical health directly related to the advantages to prosperity, or economic well-being. It was observed that workers were able to produce more goods or services after visits to parks, possibly because of the positive health effects of park beauty (Young, 1999). Further, more economic advantages were apparent, which coincide with contemporary views of the economic value of urban green space. It was observed that land values of surrounding properties increased.

The groundwork was laid by the ACA, and similar organizations, to institutionalize the notion that recreational parks possess value, which lead to various incarnations of park movements to materialize throughout the country's history. The most contemporary perspectives on parks and recreation are covered next.

Justification: Contemporary Social Perspective

In the current literature, there are numerous agreed upon social advantages of urban green space. First, parks provide the only access to the natural environment to many residents (Solecki, 1995; Walmsley, 1995; Brown, 1998; Hoagland, 2000). Girling and Helphand present that currently urban green space

is required to meet the recreational needs of increasingly diverse populations (Girling, 1997). Next, the quality of a community's park system is viewed as one of the major indicators of the overall quality of life in the corresponding community (Brown, 1998; Hoagland, 2000). Further, parks act as a mechanism for social control (Solecki, 1995). As seen in the historical perspective, with the increase of various social ills, such as drugs and prostitution, access to parks is seen as a healthy alternative. Finally, parks preserve important cultural and natural features for future generations to enjoy (Brown, 1998; Hoagland, 2000; Russo, 2000). It must be remembered that parks are not active agents; they are an element of the urban landscape which use is defined by local social forces (Solecki, 1995; Gobster, 1998; Shafer, 2000).

While there are these agreed upon social advantages of parks, a major debate on the perceived social value of parks revolves around whether parks act as "green walls" or "green magnets," meaning neighborhood barriers or connecters. The notion that urban parks function as boundaries was first presented by Jacobs in 1961, then by Hecksher in 1974, and explored more adamantly by Solecki and Welch in 1995. Parks, and other distinctive urban features, are commonly used by city planners to delineate police precincts and community boundaries, which creates the foundation for parks to be seen as neighborhood barriers. As further consideration, gangs routinely use these types of features to define territories (Solecki, 1995). When the same park borders socio-economic different neighborhoods, the "higher" status neighborhood tends to deem the

park as unsafe and abandon use (Solecki, 1995). Solecki and Hecksher cited indications that urban green space functions as barriers between neighborhoods: low rate of use, minimal through traffic, and little maintenance as evidenced by weed overgrowth, trash problems, and the poor conditions of trees (Solecki, 1995; Gobster, 1998). The matter of debate is that Solecki and Welch utilized tree conditions within parks as a surrogate measure of abandonment, and therefore the classification as barrier.

In 1998, Gobster submitted his critique of Solecki and Welch's argument that urban green space function as barriers. Gobster agreed, as does the majority, that urban parks *can* function as barriers, but disagreed with how Solecki and Welch measured a park's tendency to be a barrier. He argued that the measure used indicated an inflated figure of parks acting as barriers (Gobster, 1998). Gobster outlined the general three-step process by which a park loses amenity value and becomes a barrier (Solecki, 1996; Gobster, 1998):

> Formation of a boundary – Social and political forces shape the urban landscape. Large single use areas, such as parks, become boundaries in directing adjacent development.
>
> Perception/experience of a barrier – When parks act as boundaries, separating highly segregated communities, this perception becomes a reality. The park ceases to be part of either community and acts as a wall, discouraging use and passage through it. As it is not seen as owned by either community, maintenance of the park diminishes.
>
> Reduction in amenity value – Persistent beliefs that the park is a barrier further diminishes use, through traffic, and maintenance. Because of aesthetic conditions actual amenity and even economic value reduce.

Gobster argued that this is not a natural progression and provided numerous reassessments of parks studied by Solecki and Welch to support his notion.

Further, he indicates that parks are not necessarily passive spaces in the traditional sense. In fact, active park designs can provide a 'multi-use intricacy' that may serve to counteract boundary effects (Gobster, 1998).

Justification: Contemporary Economic Perspectives

Most of the literature, at least in the most general sense, acknowledges that there are definite economic advantages to urban and suburban green space. Bolitzer and Netusil presented, in their study of Portland, Oregon property values, strong evidence that urban parks increase the proximate residential land value (Bolitzer, 2000; Russo, 2000). They state that beside recreation amenities economic amenities may be realized. Their results "indicate that distance form a home to an open space and the type of open space can have a statistically significant effect on a home's sale price (Bolitzer, 2000)." The study established a model where the price of a home was a function of structural characteristics, environmental characteristics, and neighborhood characteristics. In the model, neighborhood characteristics are divided into open space characteristics and other neighborhood characteristics (Bolitzer, 2000).

In 2000, in a publication for The Hillside Trust (a non-profit land conservancy based in Cincinnati, Ohio), Director Eric Russo outlined various economic benefits also indicating property value as a benefit (Russo, 2000). Further, the publication cited other economic benefits of urban green space. First, green

space stimulates local economies by supporting recreation oriented businesses and patronage to surrounding businesses. Second, green space increases the quality of life in a community, which is a major factor in corporate relocation decisions. Third, communities with notable green space generate income through tourism and supporting activities, while these same green spaces help public agencies reduce costs from flooding and other natural hazards. Finally, new evidence indicates that development is not self-supporting as had been assumed; so conserving green spaces prevents the unforeseen cost of over development (Russo, 2000).

Justification: Contemporary Environmental Perspective

While all types of benefits of urban green space are linked to each other, in the literature, environmental benefits have some strong relations to social benefits. Much of the discussions for social and economic benefits occur simultaneously, except in the conservation literature. The primary general benefit is that open vegetated parks act as 'lungs' for urban areas, assisting airflow through the city (Solecki, 1995).

The major theme in the conservation literature is that parks space, especially forest patches, provide stepping stones of animal habitats and migration corridors connecting adjacent forested landscapes, (Johnson, 1994; Walmsley, 1995; Lev, 1998; Pirnat, 2000). In this regard, parks may maintain and even

increase biodiversity of local flora and fauna (Walmsley, 1995; Lev, 1998). Further, parks with green spaces, especially in the suburban landscape, function as environmental barriers from undesirable land use, such as business and industry. The barriers absorb noise and dust, and screen eyesores (Pirnat, 2000).

Approaches to Park Location

While there is literature that addresses the subject of park location in general, most of this is ambiguous, lacking clearly defined methods, or tangible models. Moreover, much of this literature focuses on explaining and critiquing historical approaches without ever advancing new methods. There is, however, an examination of a series of park plans for London, England spanning the latter half of the 20th Century that just fell short of forming a model for park location, and, in fact, very much resembled some of the basic principles contained in Christaller's Central Place Theory. A review of this series of plans concludes this section of the literature.

Approaches: Traditional Historical Perspective

At the macro scale, urban theorists saw green space as the necessary, counterform to the built environment (Walmsley, 1995). Walmsley cites Lynch, greenbelts, wedges and networks could "give form" to the city but needed to be "concentrated and continuous" or the definition would be ineffective or "fuzzy-edged (Walmsley, 1995)." In traditional urban planning, transportation and open space systems were the basic organizing structure at any scale. Two views of green space developed in concordance with this view.

In one of these views, new housing was planned around existing roads and then the roads were converted into park-like pedestrian streets including a public transit system. In the other view, housing was planned around a 50-acre multi-use park, that maintained major features of the exiting landscape (Walmsley, 1995). Major thoroughfares bordered this large green space. The major critique of these planning approaches is that they adhered to the notion that the city is a hierarchical structure, which fails to created small-scale neighborhood green space and parks (Turner, 1995). This represents the crux of the problem explored in this study, the lack of parks on a small scale in residential neighborhoods.

In contrast, urban designers with better understandings of natural processes proposed more environmentally sustainable plans (Walmsley, 1995). This manifested by allowing 'natural determinants' to guide design of urban green space.

The traditional location methods, which are not dead, are not reactionary or inherently dynamic; and planners need to constantly proactively plan for urban growth (Walmsley, 1995; Turner, 1995). In his 1995 study of urban green space, Turner concluded that traditional 'greenway' planning had been static and unable to adhere to the changing needs of urban life. Thus 'greenway' is a good marketing term, but green space diversification and differentiation must occur (Turner, 1995).

Approaches: Human Ecosystem Perspective

Concern for the environmental quality and the long-term livability of urban areas is a driving concern for the planning community. Flores, Pickett, Zipperer, Pouyat, and Pirani describe that while a modern ecological framework exists, inappropriate and outdated concepts, such as the static traditional approaches, continue to be applied in land use decision making (Flores, 1998). The modern ecological framework needs to be incorporated into the decision making process of urban/suburban development (Flores, 1998; Shafer, 2000).

Public perception of the value of green space, in terms of the "quality of life," is a key concept surfacing in related new urbanism literature based on the human ecosystem perspective (Shafer, 2000). This perspective derives from a general ecological model in which organisms are perceived as interacting with each other. The human ecosystem consists of biophysical and social factors, such as "individual, family, community, social institutions, social order, culture, built environment, and natural environment (Shafer, 2000)." The perspective maintains that a sustainable community must achieve some equilibrium among factors, which is achieved by community involvement in decisions on development, including green space (Flores 1997). An underlying principal is that a sustainable community cannot be accomplished by focusing on just one of the three (economic, social, or environmental) aspects of place (Gobster, Shafer 2000).

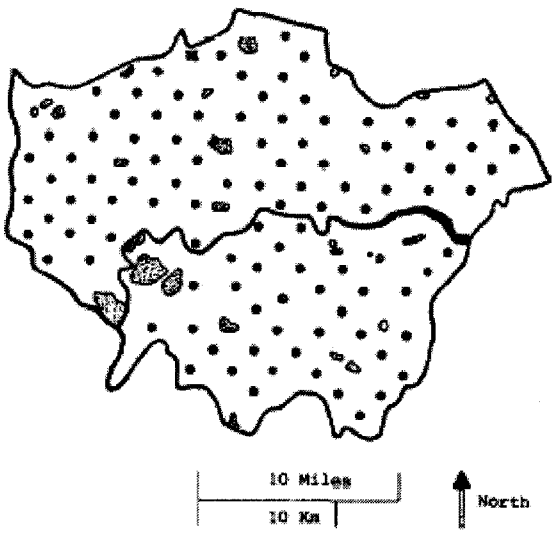
Flores et al. summarize a framework of five ecological principles, which emphasizes a dynamic view of a biologically rich urban environment with a focus on interactions among multiple sites across temporal scales (Flores, 1998). These principles are: ecological content, ecological context, ecological dynamics, ecological heterogeneity, and ecological hierarchies (Flores, 1998). The basic proponent for operationalizing these principles is that all aspects of an ecosystem need to be addressed in green space planning and design (Flores, 1998; Brown, 1998; Shafer, 2000).

Approaches: Early Development of a Network Model

A series of parks and green space plans for London began the process of creating a tangible network model for park location. In 1943 Patrick Abercrombie conceived a park system inspired by Frederick Law Olmsted that "introduced a visionary proposal for creating an immense network of greenways to interlink open spaces in central areas with those on the periphery..." (Turner, 1995). Abercrombie describes, "All forms of open space need to be considered as a whole, and to be coordinated into closely linked park system, with parkways along existing and new roads forming the links between the larger parks" (as quoted in Turner, 1995). Later, in 1951, the Administrative County of London Development Plan advanced Abercrombie's proposal into a much more structured network of evenly space parks that expressly aimed to increase the

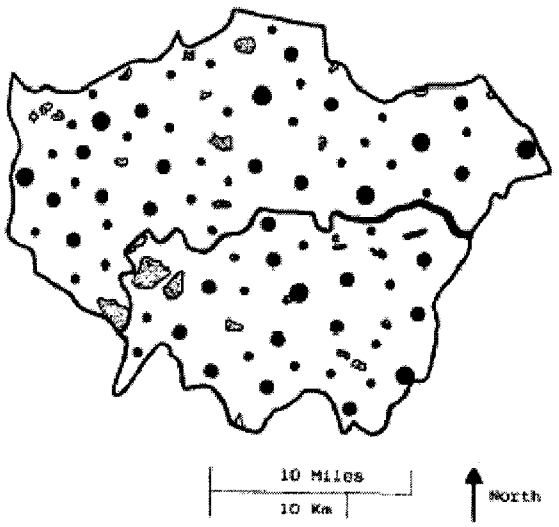
overall quantity of parks (Figure 2). Abercrombie's plan and extension were 'entirely neglected' and essentially forgotten (Turner, 1995).

Figure 2



In the 1976 Greater London Development Plan, a strong step towards the development of a hierarchical park network was advanced through the use of careful and extensive social science research (Turner 1995). Through the extensive surveys of park use, it was determined that should be three different sizes (Figure 3). Further, these parks should be "arranged in a hierarchy of different sizes: Metropolitan Parks, District Parks, and Local Parks" (Turner, 1995). Finally, this plan realized that the 'catchment,' or service, area of a park was directly related to park size; "larger parks attract visitors from a greater distance" (Turner, 1995). A year later, Alexander proposed a non-hierarchical, the only difference, approach that urban planning should create nodes arranged in a semi-lattice network (Turner, 1995). The similarities to Christaller's Central Place Theory are obvious and will be discussed in the next section.

Figure 3



Today, suburban development typically occurs on a parcel-by-parcel basis, therefore neighborhood green space considerations are essentially nonexistent (Girling, 1997). As these developments mature, linkages with parks, or green space, is found to be missing (Girling, 1997; Turner, 1995). Even in developments that proactively plan green space, this planning is almost exclusively short term and focuses on individual sites (Flores, 1998). Further, suburban development often destroys the natural green space that attracted early residents (Girling, 1997). These sentiments basically call for the development of a park location model to alleviate these negative trends of current residential development.

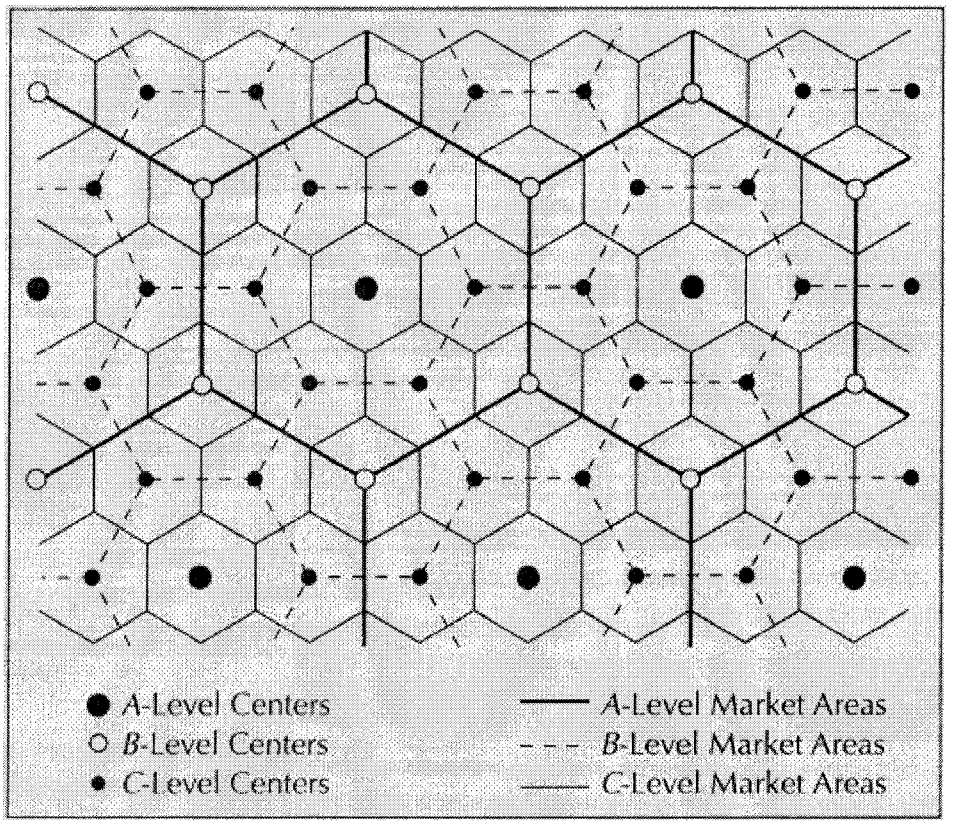
A Review Central Place Theory

As Christaller's theory assumes, producers will tend to cluster together in certain locations that he called central places, whose function is to provide its surrounding population with goods and services. "Christaller argued that central places would be arranged in a very precise manner both vertically (in terms of their relative importance or "pecking order") and horizontally (in terms of their relative location)" (Dicken, 1990). Goods and services are ranked according to their threshold values and this ranking, in turn, creates a hierarchy of central places (Christaller, 1966). The model is diagramed by different levels of markets, defined by hexagonal webs, organized around a hierarchy of central places (Figure 4). The market area for a good from a production point should not overlap with market areas for the same good from other production points, hence the hexagonal pattern. Within the central place hierarchy, the highest-order centers provide all goods with highest to lowest threshold values and each level in the hierarchy is characterized by equal distance between centers on that level (Christaller, 1966). This fixed relationship between each level is known as the k value, which "indicates that each center dominates a discrete number of lower-order centers and market areas in addition to its own" (Dicken, 1990).

Christaller furthered his theory by pointing out that the movement paths were awkward in connecting different levels of the hierarchy and suggested that central places could be organized by the traffic principle (Christaller, 1966). "The

traffic principle states that the distribution of central places is most favorable when as many important places as possible lie on one traffic route between two important towns, the route being established as straightly and as cheaply as possible" (Dicken, 1990). The Central Place Theory is a regular and rigid hierarchy of centers in which the relationship between levels is identical.

Figure 4



In a reaction to the structure of Christaller' s theory, Lösch criticized that there is no reason why market areas and their production centers should be arranged in such a rigid manner (Parr, 1978). In his approach, a production center is chosen arbitrarily and the hexagonal market webs are arranged so that this center is common for all of them; this center is the metropolis. The webs, called nets by

Lösch, are then adjusted so that twelve alternating 30-degree sectors radiate out from the metropolis. Lösch saw this arrangement as consistent with the "basic element in human organization: the principle of least effort (Parr, 1978). "He claimed that the total distances between production points are minimized, and therefore, both the volume of shipment and the length of transport routes needed to satisfy the demands of the systems are reduced" (Dicken, 1990). The number of firms operating within the market is maximized and the transportation costs are minimized. Also, this scheme allows the existence of "specialized" production centers; the skewed webs create centers that do not fall in a structurally rigid hierarchy as in Christaller's model.

While Lösch's version of the Central Place Theory presents a much more flexible structure to better explain the development of central places (cities, towns, etc.) in reality, his critiques are not valid or necessary in the adoption of Christaller's theory for the location of parks. A simplistic rigid park location network is adequate since parks are a single one-trip destination relative to each other. Further, a simple rigid model is much simpler to manipulate when focusing on smaller areas with uniform residential distributions.

Methodology

The methodology for this study consists of four general sections. The first section is the establishment of the study area, in which the boundaries are defined. The next section describes two aspects of the data used for this study; from where the data were acquired and what was done to prepare it for analysis. Then the general procedure for the analysis is identified and the criteria used for the analysis are justified. Finally, and explanation of the development of the model used for the analysis is provided.

Study Area

The study area of the project, referred to as South Covington, is all property within the City of Covington that lies south of Interstate 275. This area (Figure 5) is bordered on the west by Madison Pike, on the southwest by Fowler Creek Road, on the south by Senour and Lipscomb Roads, and on the east by Decoursey Pike. Hands Pike and Taylor Mill Road are other major roads that dissect the study area. Figure 6 illustrates the area of recent intense residential development described earlier.

Figure 5

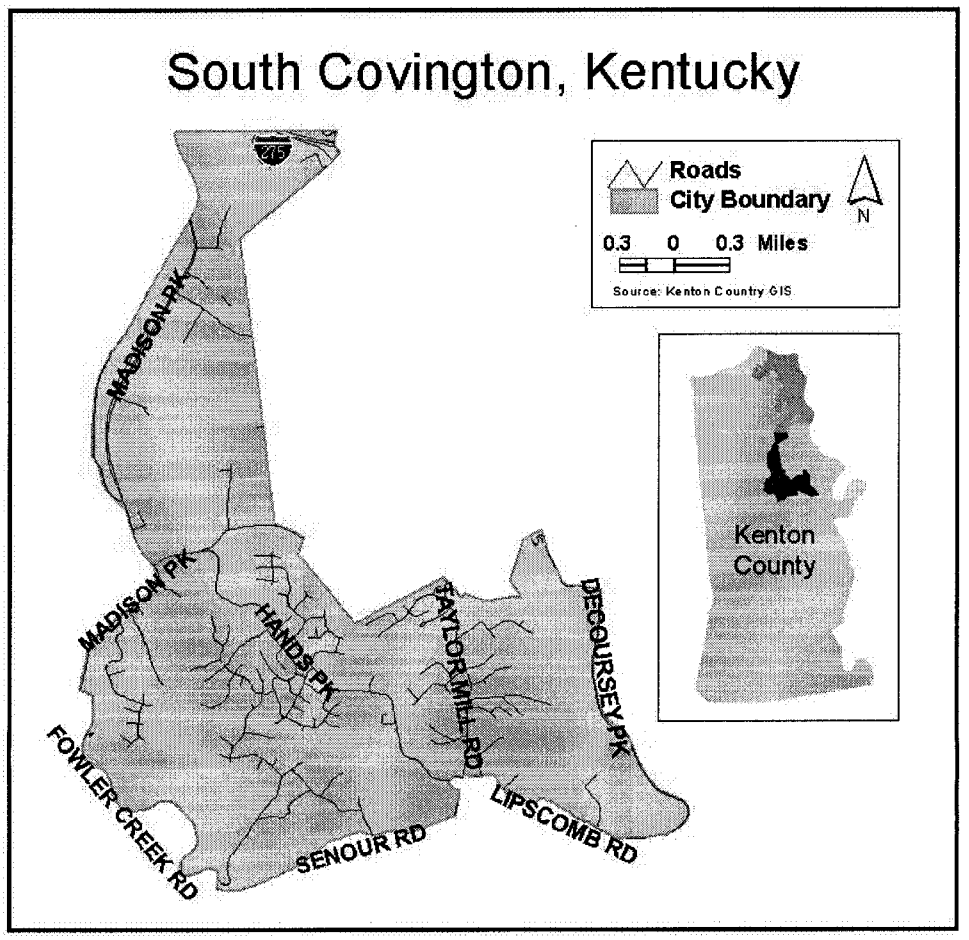
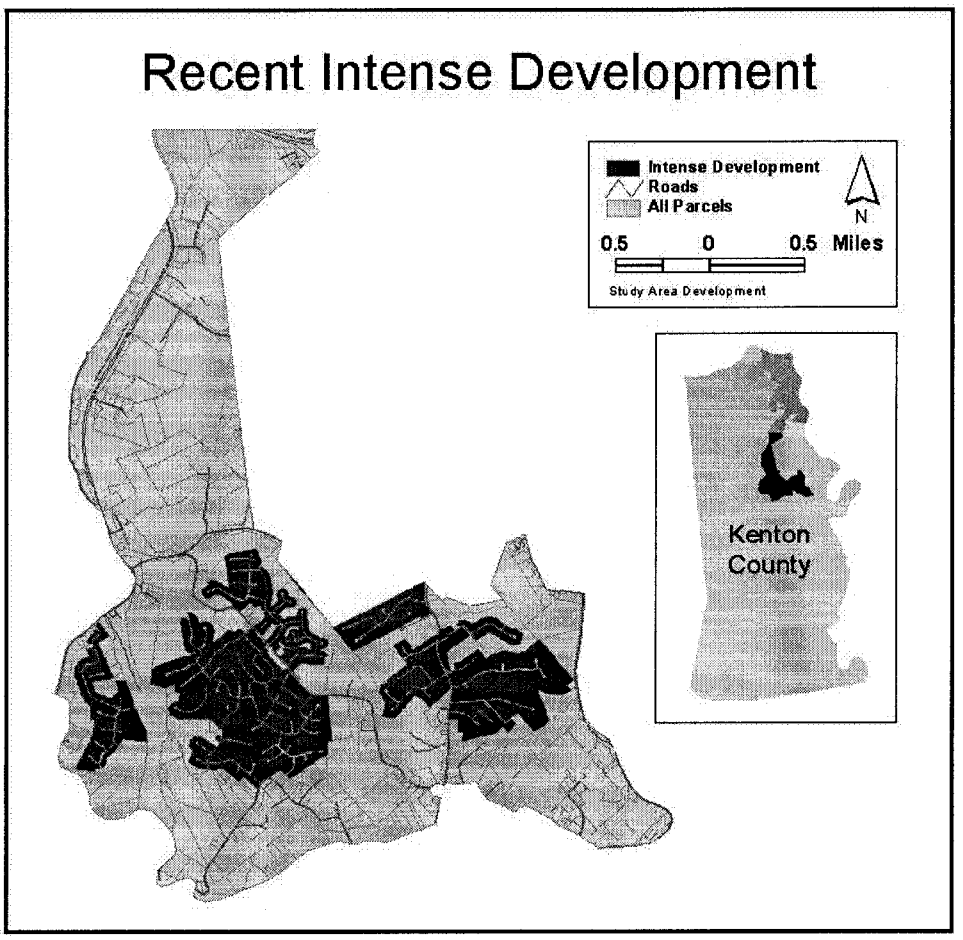


Figure 6



General Data Acquisition and Preparation of the GIS

General Data Acquisition

All the GIS shapefile data of Covington, Kentucky used for the analysis was obtained in digital form from the City of Covington Engineering Department. The cited source of this data is the Kenton County Department of Zoning and Planning's GIS Division. This data was imported into a project on ArcView 3.3 GIS software, where all data preparation and analysis was performed.

Year 2000 and future projected population and household data cited in the background chapter was downloaded from the U.S. Census at the website www.census.gov. Population and household data prior to the year 2000 was obtained from the City of Covington's Housing Department records and then crosschecked with data from the U.S. Census to insure accuracy.

General Data Preparation

The primary task of data preparation was to define the study area boundaries of South Covington to be used in the GIS. After this was done, all the other shapefile data was clipped to the boundaries of South Covington. All data was projected into State Plane - 1983 – Kentucky North, as this is the projection used for all the data acquired from Covington's Engineering Department.

Analysis

This section is divided into two parts; Existing Parks and Land Suitability Analysis. The procedure for each of these parts is explained step-by-step.

Existing Parks

The shapefile for existing parks was imported to the GIS project. The shapefile included Pioneer Park, Hands Pike Park, and the Taylor Mill Elementary (TME) Playground (Figure 17). To establish the service areas for these parks, the National Recreation and Parks Association's Recreation, Park and Open Space Standards and Guidelines (Figure 7) were consulted (Hoagland, 2000). The upper distance of service radii for each order of park was used because South Covington is a suburban residential area, which is less dense than urban areas. The distances are as follows; 0.25 mile for Mini-Parks, 1.0 mile for Neighborhood Parks, and 2.0 miles for Community Parks.

It was determined from the guidelines that each park had to be classified into one of the guideline's park types. The classifications are as followed; Pioneer Park is a Community Park, and both Hands Pike Park and the TME Playground are Mini-Parks. Distance buffers representing service areas appropriate to the park type were created in ArcView 3.2. Since higher order park types also provide the

services of a lower order park, service areas of Mini-Park and Neighborhood Park size were also delineated for Pioneer Park.

Figure 7

Recommended Park and Recreation Area Classification System

PARK TYPE	TYPICAL SIZE & SERVICE AREA	ACRES/1,000 POPULATION	TYPICAL FEATURES/FACILITIES
LOCAL SPACE:			
1. Mini-Park (MP)	+/- 1 Acre 1/8 – ½ Mile Service Radius	0.5 Acre/1,000	Typical facilities may include playgrounds, small multi-use court area, and benches.
2. Neighborhood Park (NP)	5-15 Acres ½-1.0 mile service radius. To serve a population up to 5,000	2.0 Acres/1,000	Suited for intense development. Typical facilities include field games, court games, playground apparatus, small pools, small neighborhood centers, drinking fountains, and restrooms.
3. Community Parks (CmP)	25-50+ Acres 1.0-2.0 mile service radius to serve several neighborhoods with populations up to 20,000+.	2.5 Acres/1,000	Typical facilities include all listed for Neighborhood Parks plus; major swimming pool, field or court game complex, major recreation or community center, etc. May be an area of natural quality for picnicking, walking, etc.

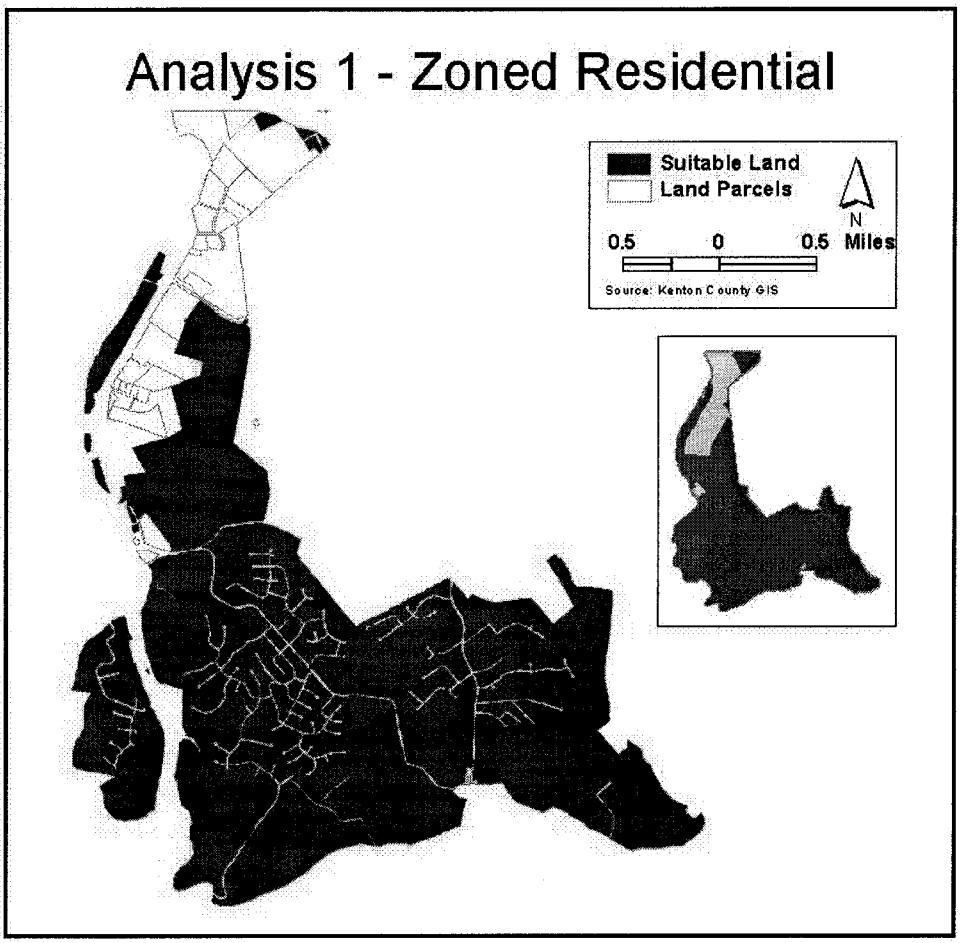
Source: Hoagland, 2000

Land Suitability Analysis

The basic objective of this land suitability analysis was to identify land that was suitable for park use in South Covington using a series of criteria. Overall, there were eight steps in the land suitability analysis that was conducted. The general steps are as follows: (1) Zoning, (2) Topography, (3) Proximity, (4) Accessibility,

(5) Residential Density, (6) Land Use, (7) Ownership, and (8) Size of Parcel. These steps are subsequently discussed separately.

Figure 8

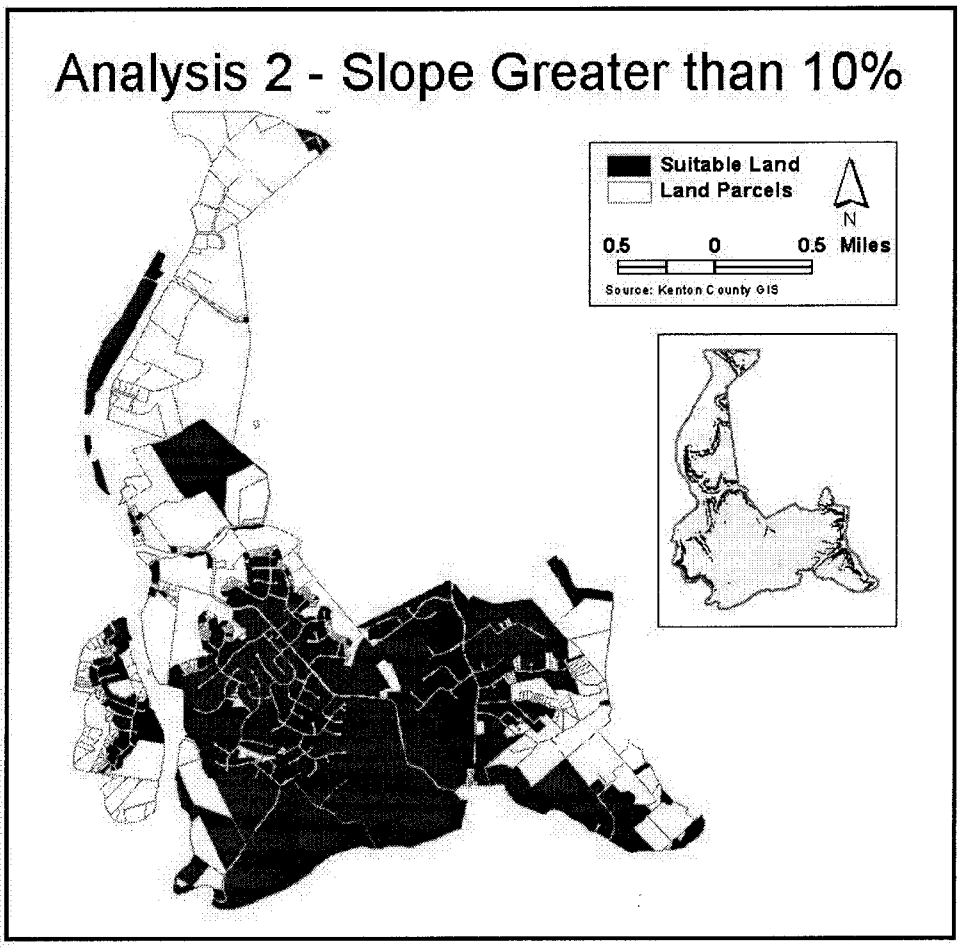


Zoning

The zoning shapefile for South Covington was imported to the project (see Figure 24). After reviewing the zoning codes (see Appendix A), it was determined that parks are only able to be developed in residentially zoned areas, so all of the areas that are residentially zoned were isolated into a separate shapefile. The various residential zones in the new shapefile were then merged.

Finally, a query was done using all of the land parcels for South Covington to select only the parcels that are residentially zoned. The resulting parcels were converted into a new shapefile (Figure 8).

Figure 9



Topography

The shapefile of 2-ft contour lines for South Covington was imported into the project. This shapefile was converted into a topographical grid that was then displayed as slope percentages. The percent slope of grid was finally categorized into slopes above and below 10% and displayed (as seen in the

inset of Figure 9), where the dark areas represent high slopes. A query was performed selecting from all of the residentially zoned land parcels, the parcels that are below 10% slope. The resulting parcels were converted into a new shapefile (Figure 9).

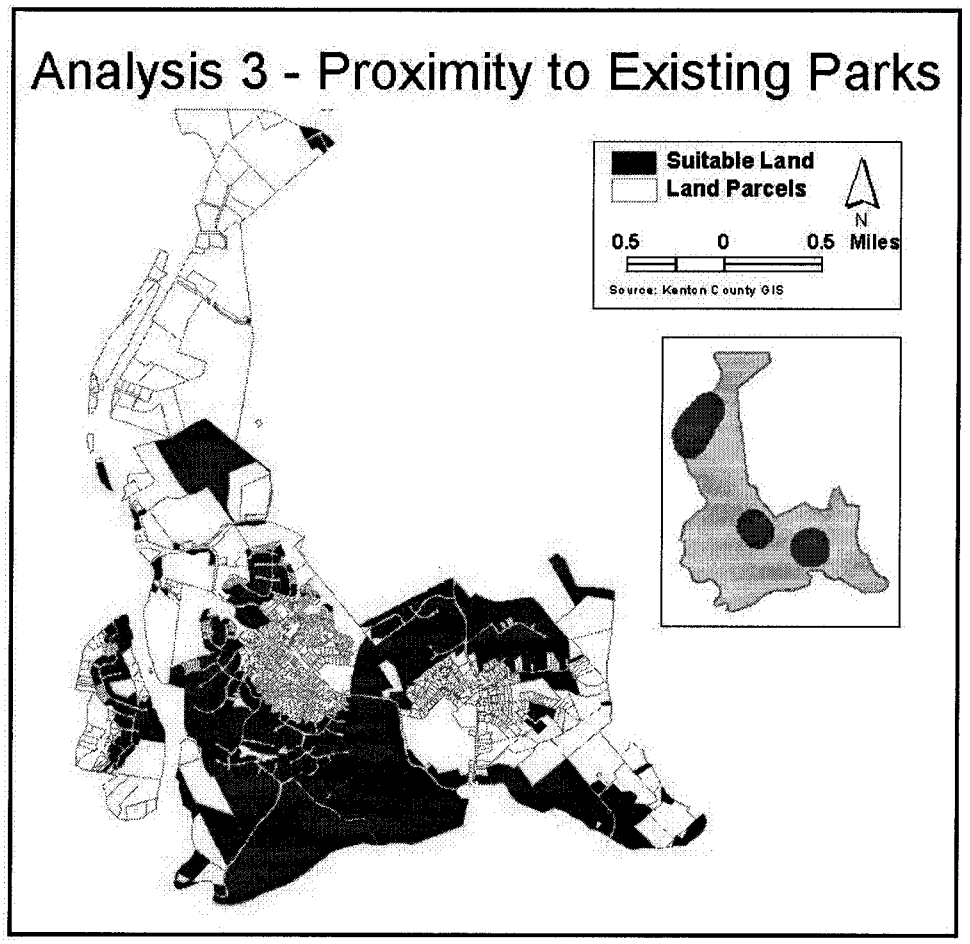
Slopes of 10% were chosen as the threshold due to an interview with the Eric Russo, the Executive Director of the Hillside Trust, (a local land conservancy group that focuses on hillside preservation). In the interview he discussed that the organizations definition of a hillside is usually anything greater then 10% slope because of problems that result from development. This figure was brought to the attention of J.T. Spence, a former Commissioner for the City of Covington. It was determined that the development of parks, at the least, requires minor construction, so this threshold was adopted for the analysis.

Proximity

The previously created shapefiles of existing parks and their corresponding service areas were imported to the project. It is apparent that if a new parks network is to be developed that includes these existing locations, then, at the least, no new parks could be located within the existing service areas (as seen in the inset of Figure 10). Ideally, the buffers representing service areas would have been doubled to ensure the most economical coverage, but it was determined that this may be too restrictive when dealing in a reality of narrow land availability. A query was performed to identify, from all of the land parcels

below slopes of 10%, the land parcels that are on the exterior of the existing buffers. The resulting parcels were converted into a separate shapefile (Figure 10).

Figure 10

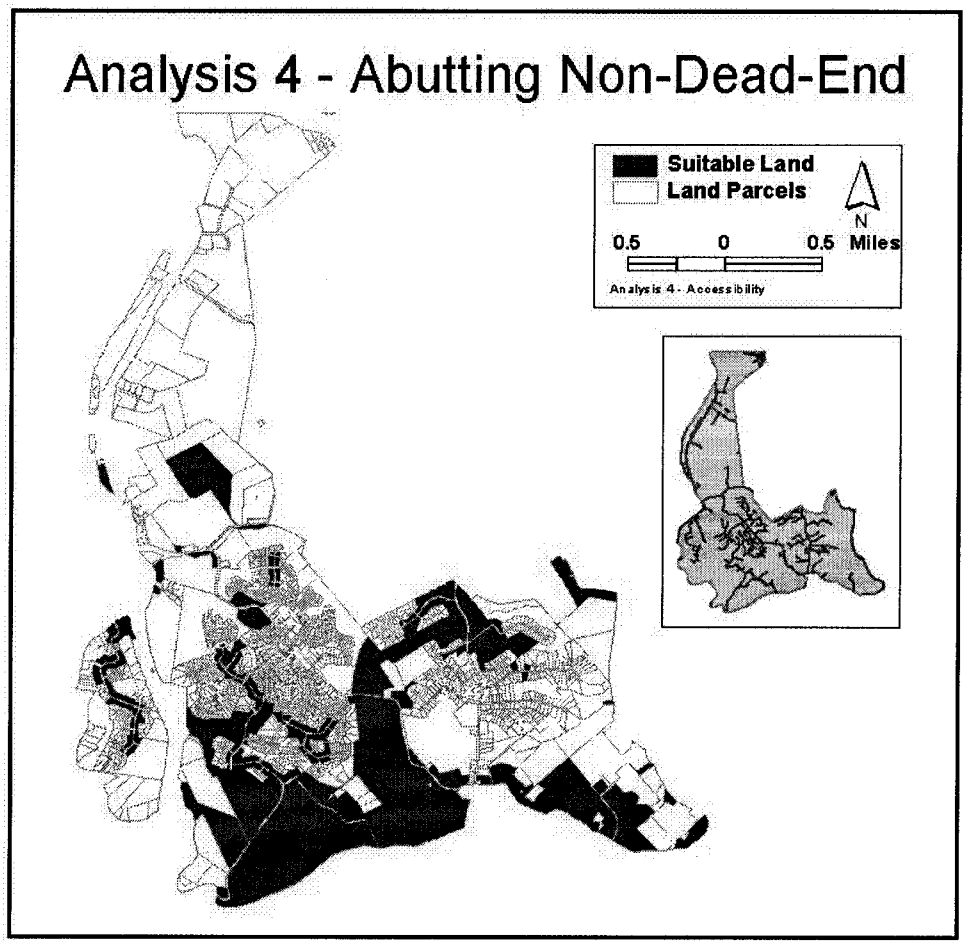


Accessibility

The purpose of this stage of the analysis was to identify all the land parcels that are not located directly on a dead end. The criterion for this was determined in accordance to an unwritten guideline followed by the City of Covington Recreation Department. In an interview with Denny Bowman, the Director of the

department, he expressed that it would be most logical to put a park in a location near road intersections in order to be accessible to many residents from various directions. Again, as not to be overly restrictive in the analysis, it was decided that at the very least a park should not be located on a dead end road segment.

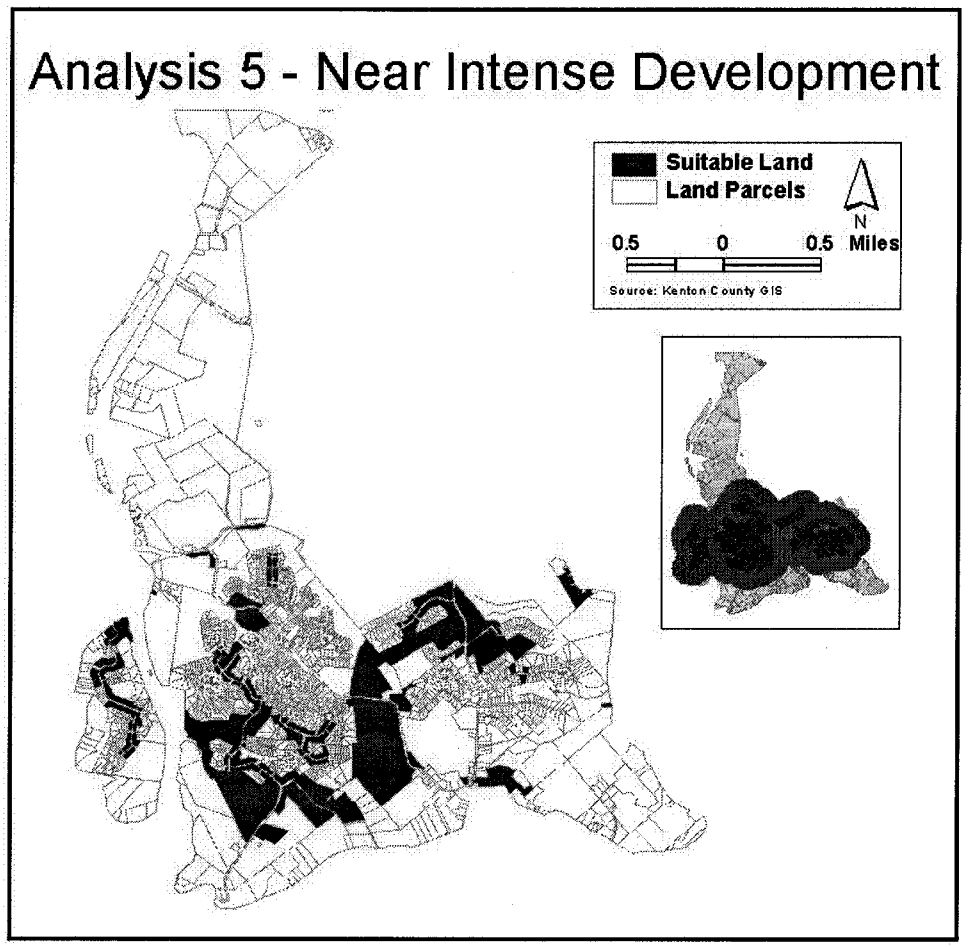
Figure 11



The roads shapefile for South Covington was exported into the project. All of the dead end road segments were selected and a query was performed to identify, from the parcels exterior to the existing park service areas, the land parcels that are not adjacent and, therefore, only accessible from the dead end road

segments. The resulting parcels were converted into a separated shapefile (Figure 11).

Figure 12



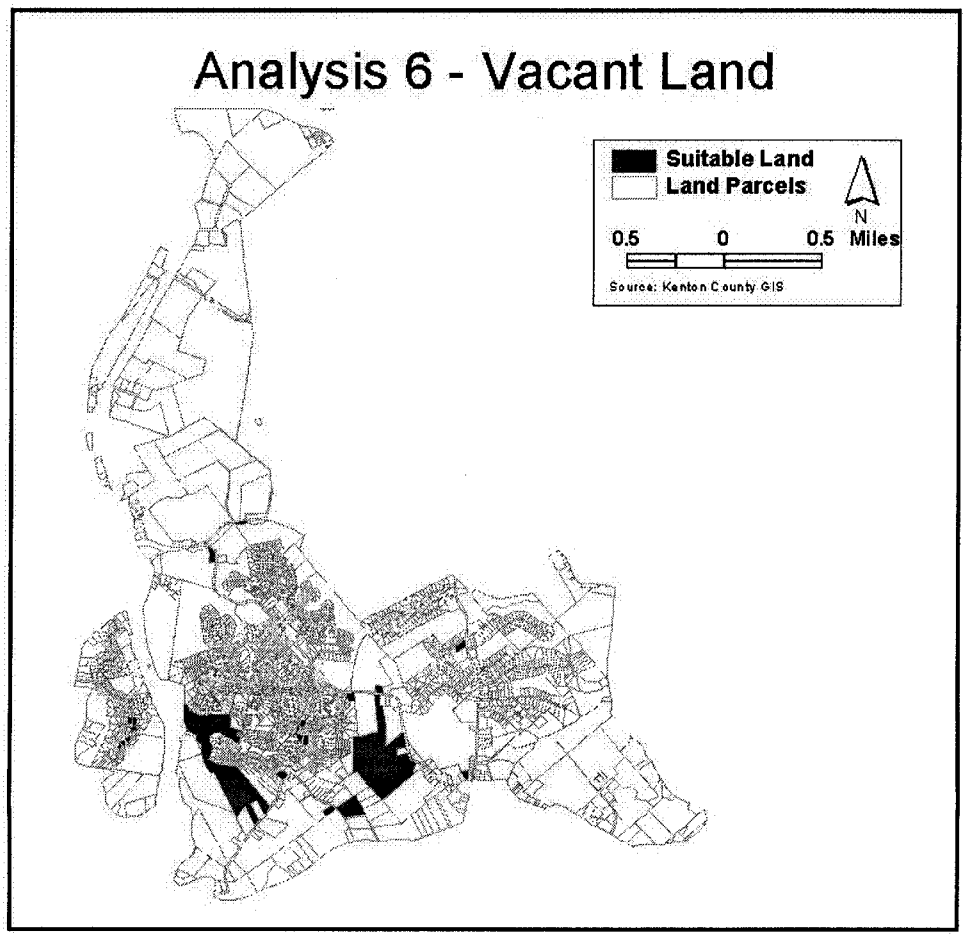
Residential Density

The objective of this stage of the analysis was to determine the land parcels that are located within an area of higher residential density. To determine these areas, extensive fieldwork was performed in the guidance of various staff members from the City of Covington's Housing Department. These various staff members identified these residential areas and the areas were noted on field

maps. These areas were then identified and selected on the land parcel shapefile for South Covington and converted to a separate recent development shapefile (Figure 6).

The recent development shapefile was imported into the project. A query was performed to identify, from the parcels not adjacent to dead end road segments, the parcels that are within 0.25 miles of this recent development (as seen in the inset of Figure12), since 0.25 miles is the lowest service area radius. The resulting parcels were converted into a separate shapefile (Figure 12).

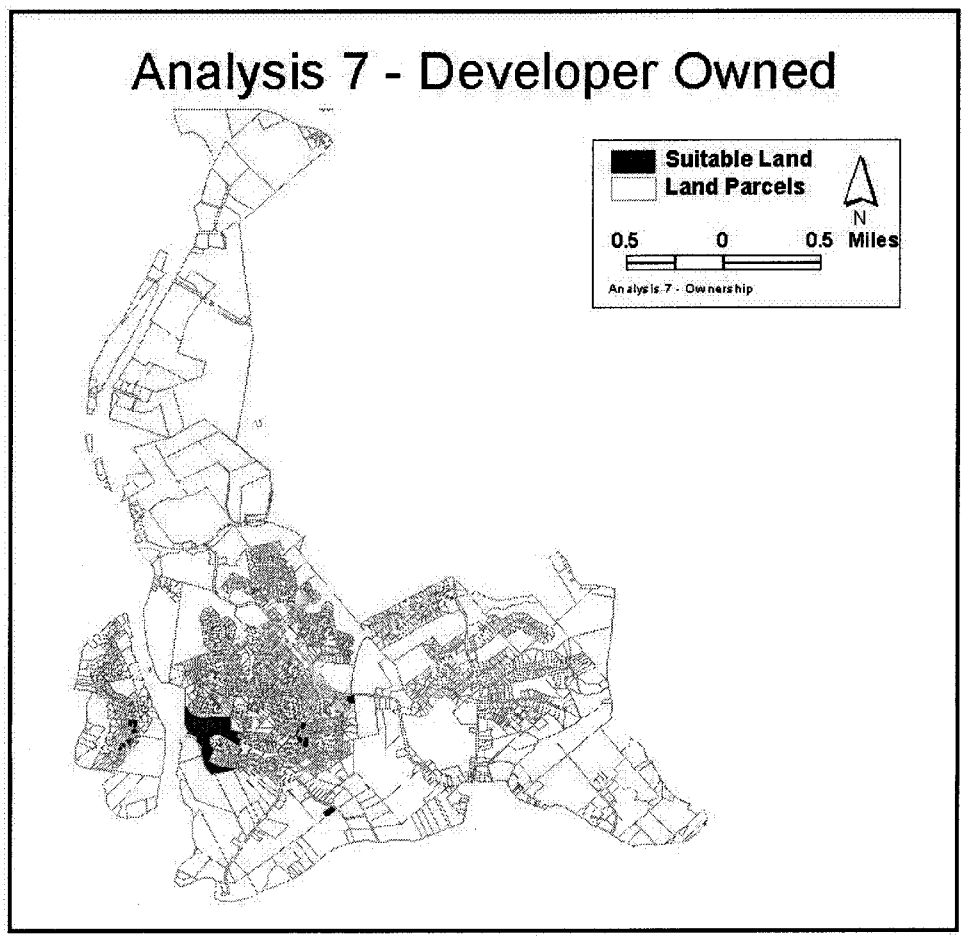
Figure 13



Land Use

This was a very elementary stage in the analysis. Basically, because of realities of preparing and developing land, it was determined by the City's Commission that only vacant land parcel should be considered for ease development. The table associated with land parcels shapefile has a "land use" category that identifies vacant parcels. A simple query was performed to identify, from the parcels that are near the recent development, the parcels that are classified as vacant. The resulting parcels were converted into a separate shapefile (Figure 13).

Figure 14



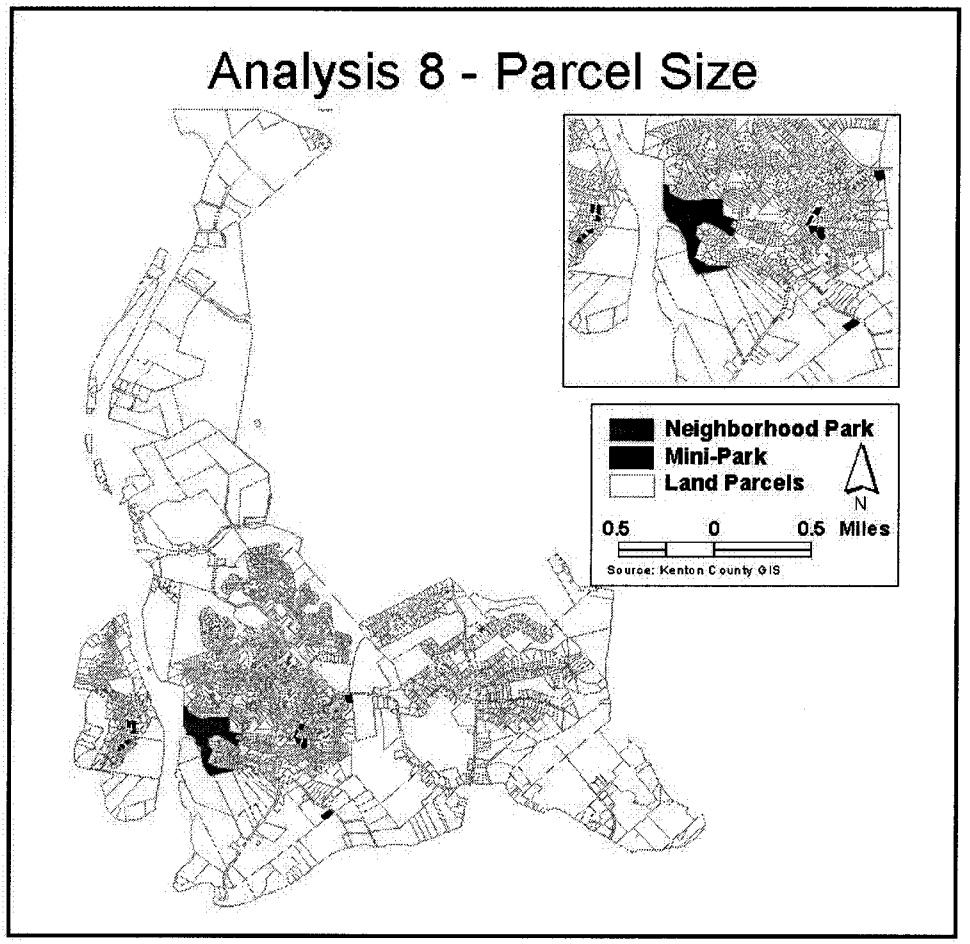
Ownership

This was another stage associated with the realities of developing parkland. The City's Commission expressed that resources to buy parkland would not be readily available and there is no available City owned land for further park development in South Covington. It was determined that since they had provided a developer friendly environment, the Commission could make deals with the various developers to acquired needed land. Therefore, land parcels that are developer owned needed to be identified. The table associated with land parcels shapefile has an "owner" category that identifies the primary owner of the corresponding parcel. This table was queried to identify, from the vacant land parcels, the parcels that were currently owned by development companies. The resulting parcels were converted into a separate final suitable land shapefile to be used with the model (Figure 14).

Land Parcel Size

This final stage of the land suitability analysis was, perhaps, the most important. In order to fit this analysis into the model developed for this study, the final suitable land had to be categorized according to sizes corresponding to a hierarchical park system. The different park size classifications can be seen in the Recommended Parks and Recreation Area Classification System (Figure 7). The final suitable land parcel shapefile was categorized according to the classifications and then converted into separate shapefiles corresponding to mini-parks or neighborhood parks (Figure 15).

Figure 15



Theoretical Model

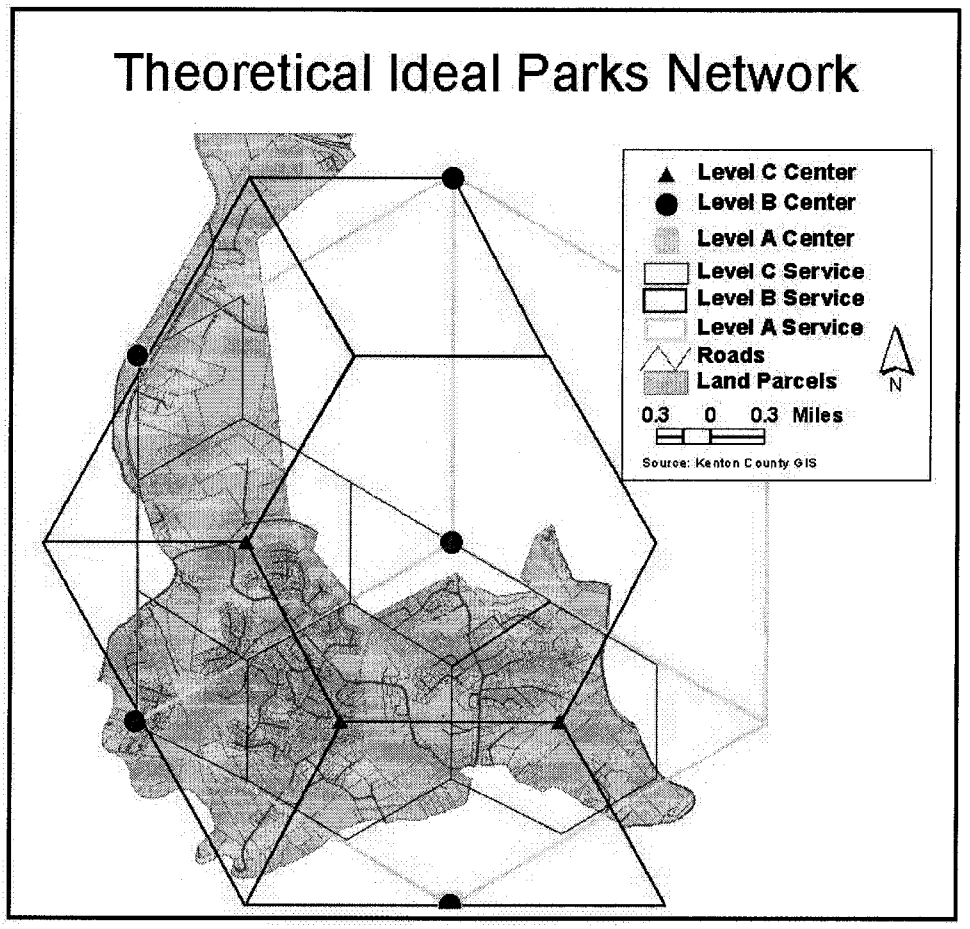
To ease in the identification of suitable locations for new parks to be included in a system for a residential area, South Covington in this study, a model of park location had to be developed. As discovered in the literature, currently there is no tangible model for park location relative to other parks of varying sizes and amenities. There are the National Recreation and Parks Association's Recreation, Park and Open Space Standards and Guidelines; however, this is a volunteer association and does not possess any power of enforcement. A simple model of park location is needed to deal with the current trend rapidly residential development.

As highlighted in the review of literature, a series of London park plans, developed through extensive sociological research, in the latter half of the 20th Century came very close to this, finally proposing a hierarchical network of evenly spaced parks of varying sizes with varying sizes of 'catchment' areas. Unfortunately, this plan was never implemented and basically forgotten. The similarities of that proposed scheme to the basic structure of Christaller's Central Place Theory was uncanny. The logical leap was to adapt the basic structure of Christaller's model for use in locating parks in a network.

Christaller's model has been discredited in representing the development of central places (cities, towns, etc.) in complexities of reality; however, the spatial

structure cam be directly applied to park distributional location in order to ensure an acceptable level of equitable access to residents. This structure can be basically used as an overlay template for residential areas to identify ideal park locations. Of course, the realities of land acquisition or population dynamics may present barriers to strictly following the model, but this model does provide a template in which to aspire.

Figure 16



As seen in Figure 7, the National Recreation and Parks Association (NRPA) identifies three level, or orders in Christaller terms, of parks and their

corresponding service areas and amenities. This virtually mirrors the proposal for the London park plan. Basically, these three levels are substituted for the central places in Christaller's model. The appropriate form is the K=3 structure (Figure 4) where C-Levels represent Mini-Parks, B-Levels represent Neighborhood Parks, and A-Levels represent Community Parks. Pioneer Park was used as the starting point for structuring the model in South Covington (Figure 16).

Parks of a larger size, or higher order, as described in the NRPA's guidelines and in the London plan, may fulfill the service of smaller parks for the immediate area while also providing higher order service for a larger area. This, again, mirrors Christaller's theory. Parks are one-time trip destinations, so minimization of travel through three centers is not a concern for the model. Lösch's critique was reviewed earlier to illustrate that Christaller's 'rigid structure' is sufficient in park location and is desired for simplicity in application.

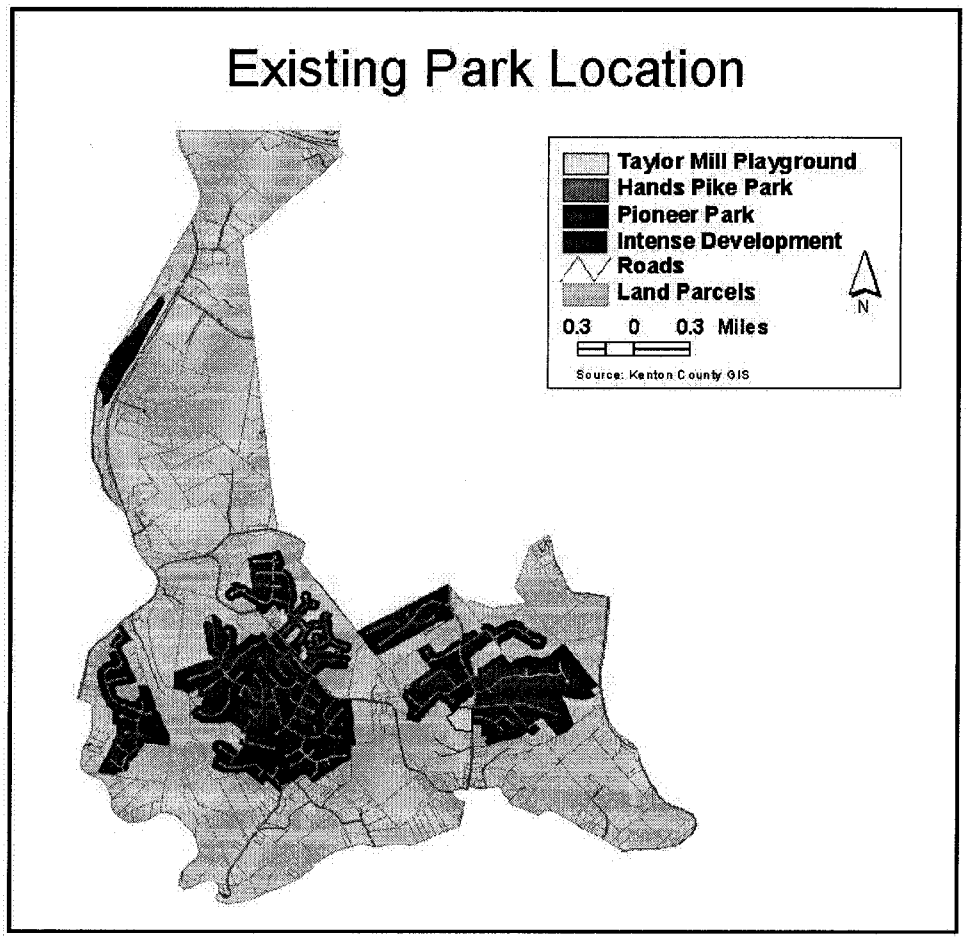
Analysis

The analysis for this study consisted of three general sections; (1) existing parks identification and classification, (2) the land suitability analysis, and (3) the application of the model of park location. For clarity, each of these is discussed separately in procedural order. Finally, conclusions are discussed in a fourth section.

Existing Parks

There are three recreational park locations in South Covington (Figure 17), one of which (Hands Pike Park) is owned and maintained by the city. The following is a summarized analysis of existing parks showing ownership, basic amenities, classification according to the NRPA, and service areas (Figure 18).

Figure 17



Pioneer Park

This park, owned by Kenton County, is located on the west side of the "northern bottleneck" of South Covington and provides the greatest variety of options for recreation. This park is classified as a community park by the National Recreation and Parks Association and should serve, according to standards, a 1½ to 2 mile radius. However, because it is located on Madison Pike, a 55 mile per hour highway, its accessibility is greatly diminished because it is not accessible to patrons on foot. Further, the highway not only obstructs foot access, but also prevents it from being directly adjacent to any community and, therefore, eliminates its ability to function as a Mini-Park or Neighborhood Park for any resident. It is virtually impossible to visit this park by foot or even bicycle because the highway acts as a barrier and a distancing agent. Recently, Kenton County made numerous improvements to Pioneer Park including improving playground equipment and a pedestrian bridge connecting the sports fields to the parking area. The park contains:

- 2 shelters
- 2 basketball courts
- 2 tennis courts
- 2 playgrounds
- 2 baseball fields
- 2 horseshoe lanes
- 1 soccer field
- various picnic areas
- hiking trail

Taylor Mill Elementary Playground

This area is owned by the Kenton County School District and is located on Taylor Mill Road behind the elementary school. The recreation area is open for use by surrounding neighborhoods; however, Taylor Mill Road is a 45-mile per hour route, which decreases accessibility for younger children. There are no pedestrian crossing signals to facilitate safe access for park patrons. Further, Taylor Mill Road does not have sidewalks, even in the immediate vicinity, to aid in travel to the park. This park is classified as a Mini-Park by the NRPA and a park of this size is meant to be easily and safely accessible by foot or by bike from adjacent neighborhoods. It contains:

- 3 swing sets
- 3 slides
- merry-go-round
- various play equipment
- small field area
- benches
- shelter

Hands Pike Park

This is the only parcel of land that the City owns in South Covington, so this was the logical location for the installation of their first Mini-Park. This park is a good example of the small recreation space needed by many of the communities in South Covington. It is two acres of land located on Hands Pike adjacent to a fire station and cost $65,000 to develop in 2001. This is classified as a Mini-Park by

the National Recreation and Parks Association, which should serve a half a mile radius and a population up to 4000. The initial construction of the fire station and the subsequent addition of the park, illustrates the City's understanding of the area's need for services.

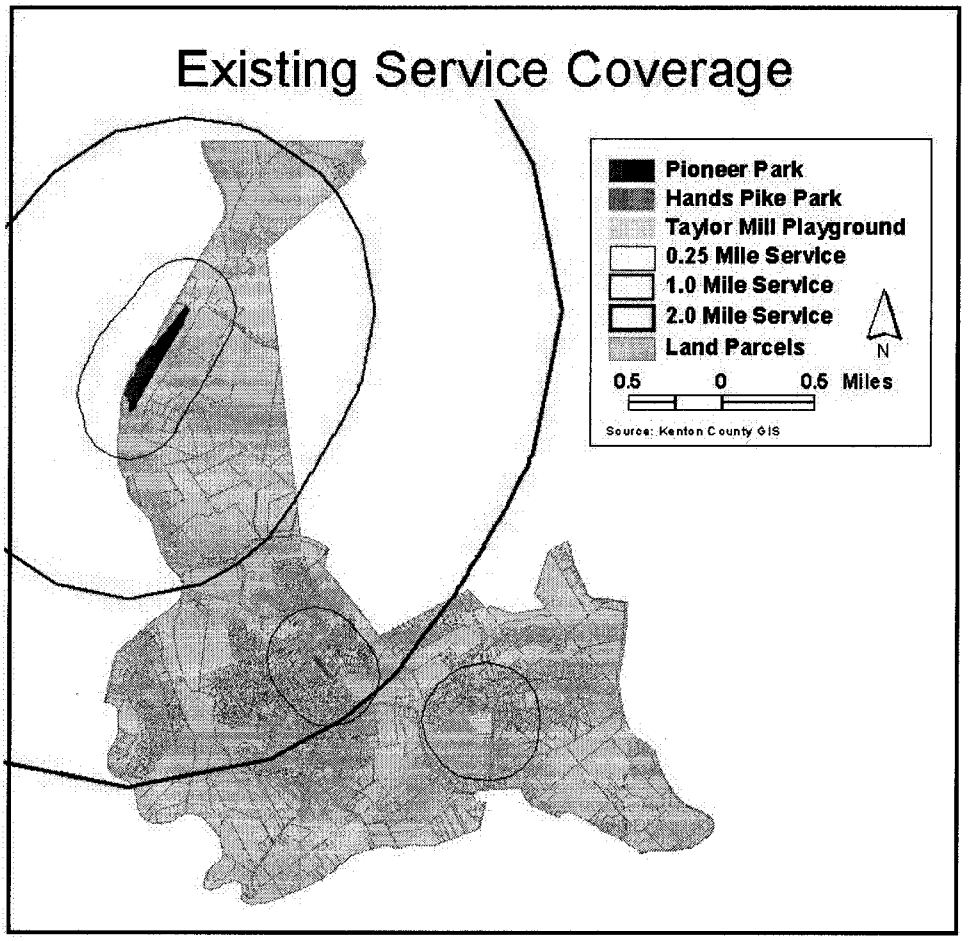
Interviews with various firemen that work at the adjacent fire station (built in 1990) indicate that this recreation site is utilized extensively by the surrounding neighborhoods. Because of the consistent utilization restroom facilities may be necessary to accommodate the park visitors. Also, safe access to the park from the west diminished because the sidewalk from the east ends in front of the fire station. In relation to this, Hands Pike is a 45 miles per hour route and there are no pedestrian crossing signals to facilitate safety for park patrons. A park of this size, as with the TME Playground, is meant to be easily and safely accessible by foot or by bike from adjacent neighborhoods. The park contains:

- playground equipment
- benches
- swings

Overview

As seen in Figure 18, there is definitely a lack of service area coverage of parks in South Covington; however, the condition is actually worse than indicated, because of the hierarchical nature and relative location of the existing parks.

Figure 18



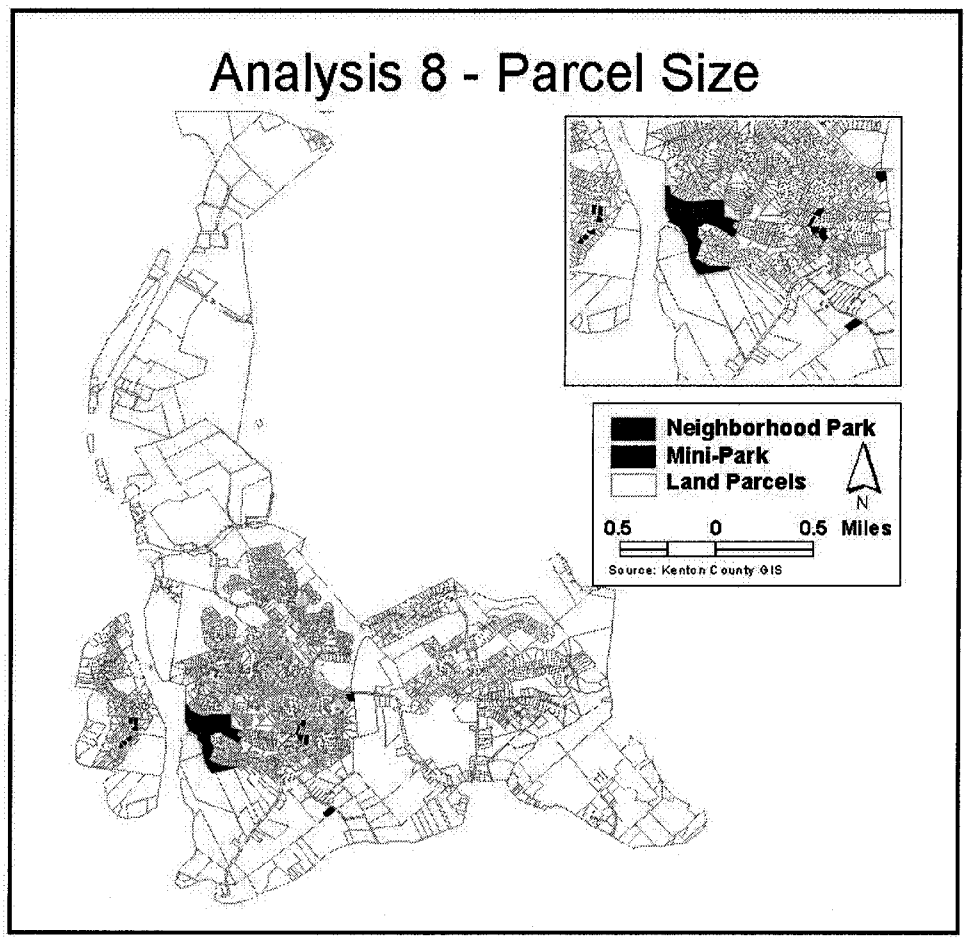
Pioneer Park's Community Park service area, as indicated by the 2.0-mile service buffer, covers roughly half of the most densely developed area (Figure 18), which can be identified by the small parcel sizes. Further, its Neighborhood Park service area, as indicated by the 1.0-mile service buffer, covers an area of South Covington that is virtually void of residential development (Figure 18). Even further, its Mini-Park service area covers only commercial and industrial land (see Figure 8).

Basically, there is coverage of Community Park and Mini-Park orders, but the residential areas lack any covered from the intermediate Neighborhood Park order. Next, consider the Mini-Park service orders separately. As indicated earlier, the Mini-Park service area of Pioneer Park serves absolutely no residents of South Covington. In addition, there is a significant area of residential developments that lack the basic level of Mini-Park service. All of this considered indicates that the existing parks provide in adequate service and, therefore, accessibility to the residents of South Covington. An updated network of parks is needed, which was identified by the model of park location developed for this study, but was first essential to identify land parcels that are suitable for parks.

Land Suitability Analysis

There were eight basic steps to this portion of the analysis; these were thoroughly explained in the methodology of this study. These steps were (1) Zoning, (2) Topography, (3) Proximity, (4) Accessibility, (5) Residential Density, (6) Land Use, (7) Ownership, and (8) Size of Parcel. The criteria for each step was processed in the above order to isolate, from all the land parcels of South Covington, the parcels suitable for inclusion in the parks network for South Covington. The final suitable parcels are shown in Figure 15, reinserted below.

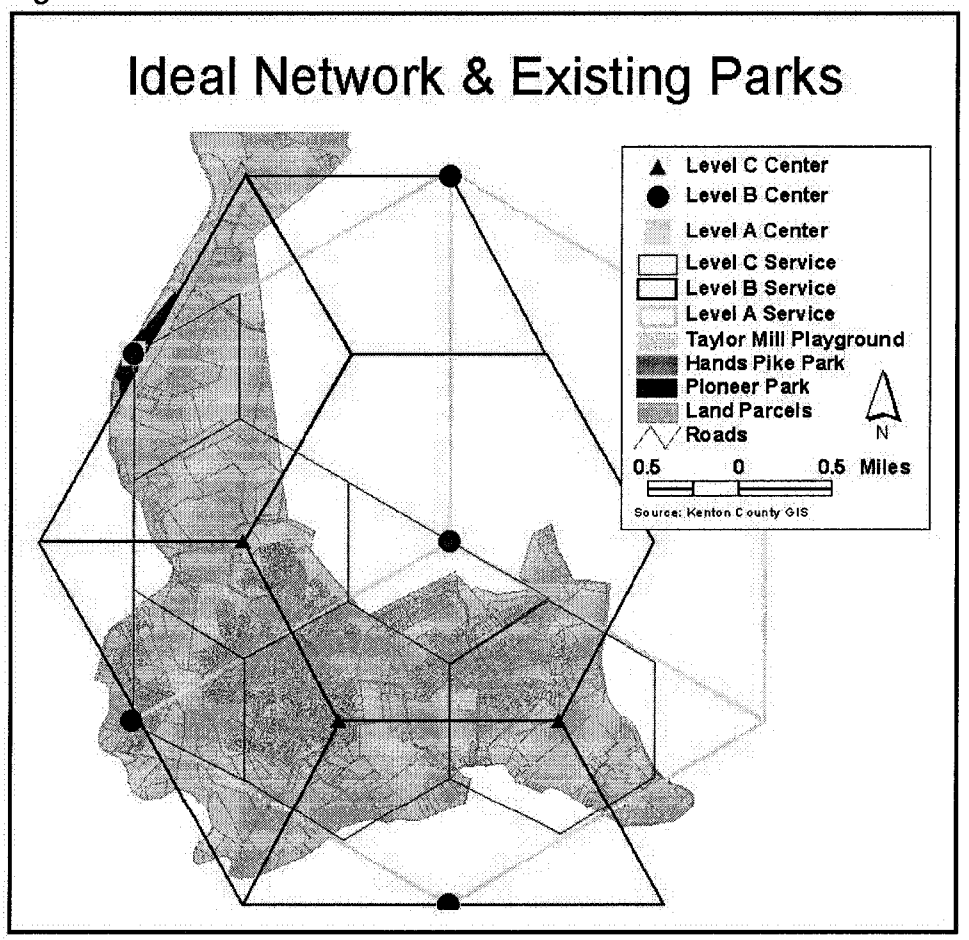
Figure 15 (reprint)



Application of the Park Location Model

When the adapted Christaller model is applied to South Covington, it is apparent that the existing parks do not adhere to any structure (Figure 19). As mentioned in the methodology, Pioneer Park was used as the initial building point for the development of the model, so it is the only recreation location that aligns with any node on the model. The two Mini-Park ordered locations obviously do not conform to this structure.

Figure 19



In Figure 20, all of the suitable land parcels for park development are added, presenting those parcels with the existing parks and the ideal network model. It must be remembered that Hands Pike Park and the TME Playground are classified as Mini-Parks, or Level C in the model, and Pioneer is a Community Park, which should provide the services of the two lower order types of parks. However, as discussed previously, Pioneer Park only serves as the highest order of park because it is location is separated from the areas of recent intense residential development (see Figure 18). There is no Neighborhood Park, or Level B, service whatsoever.

Figure 20

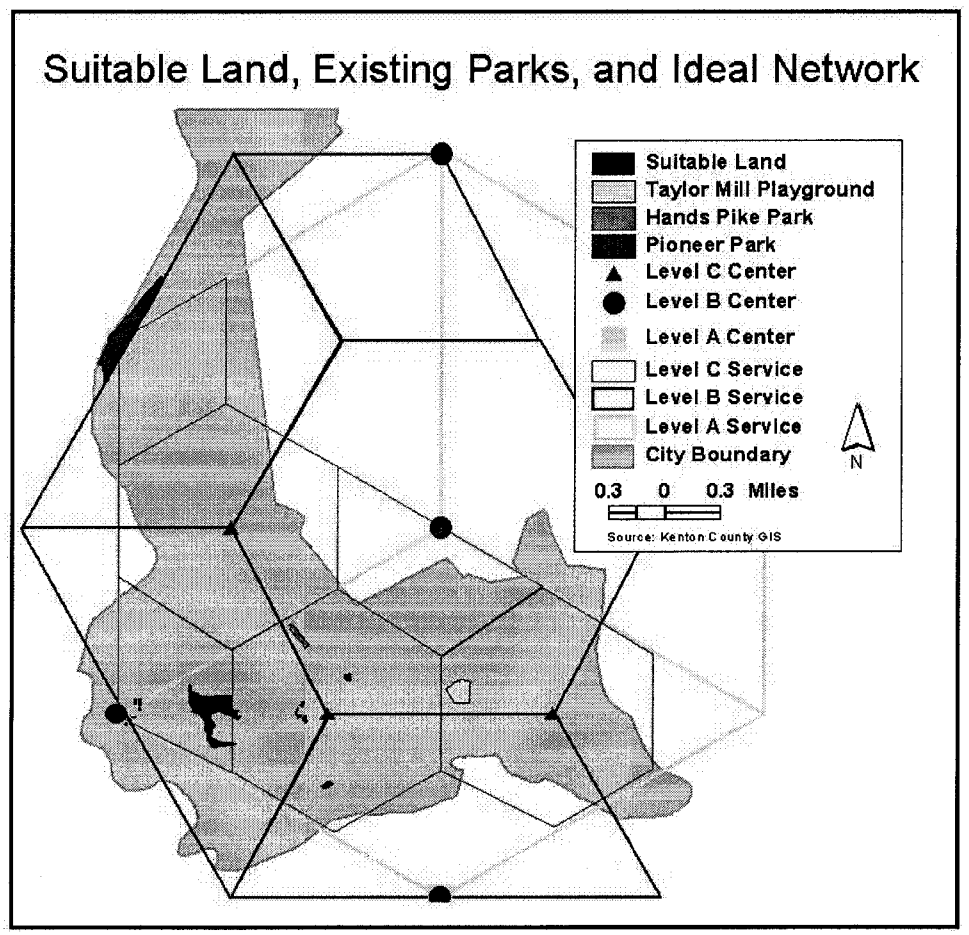
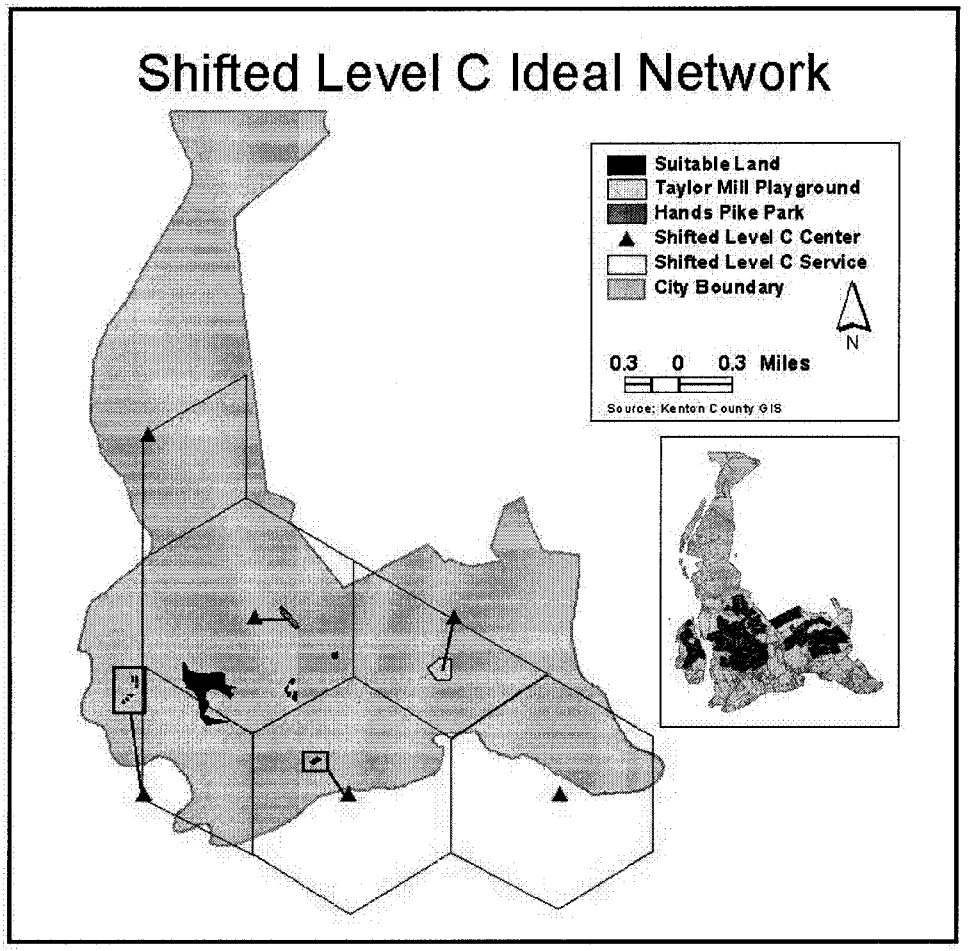


Figure 21



Of most concern is that because of Pioneer Park's location and the order of both the existing parks being Mini-Parks, there are significant areas of residential development that are not immediately served by lower order parks and some areas to the south east that are served by any order of park. The existing locations of parks do not seem to correspond to the model, but if the lower order Level C, of parks ideal network is isolated and shifted (Figure 21), the situation is clarified. Now Hands Pike Park and the TME Playground begin to fit the pattern. The necessary shifting is justified because the areas of recent intense

development (inset of Figure 21) is concentrated the mid-section of South Covington. Further, since existing parks are not going to be moved, the model must adjust to fit reality while keeping its rigid equitable structure. Finally, the suitable land parcels for park development may now be integrated into the structure. Simply, the closest suitable parcels to the nodes of the shifted network are the locations most appropriate for new park locations. While this does not correspond directly with the model because of issues of reality, adherence to it assists in identifying the most appropriate locations. The model's networks can be shifted to relate with realistic situations.

Conclusions

The existing park locations of South Covington do not provide accessible service to the residents, especially the areas of recent intense development. Also, Pioneer Park only serves the area as a Community Park and there are no Neighborhood Parks. Additions to the existing park network are needed.

Figure 22

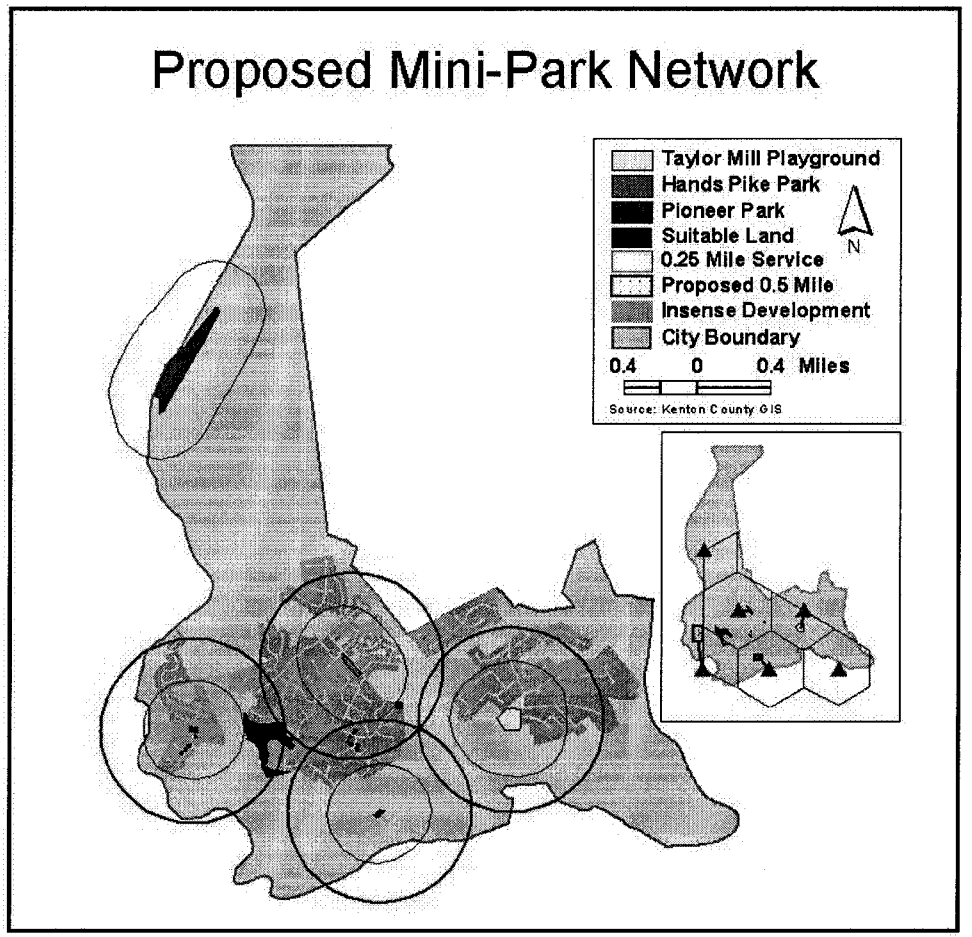
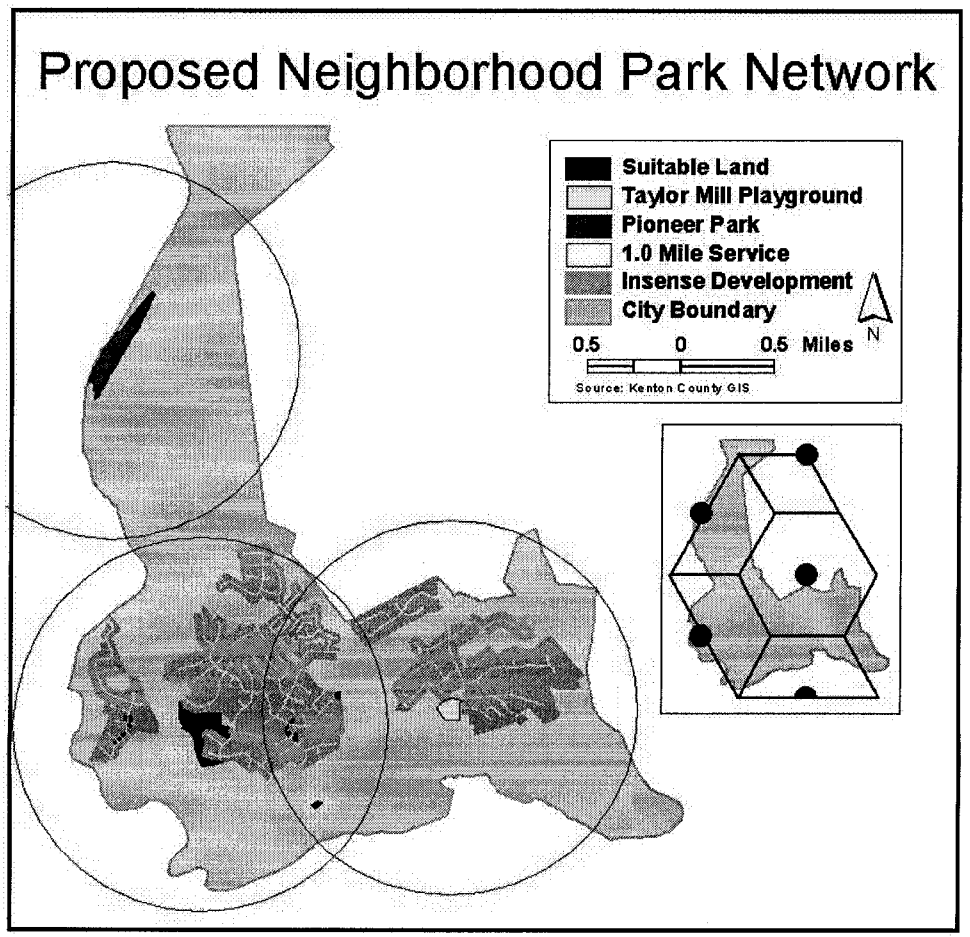


Figure 22 proposes the appropriate Mini-Parks network according to the model adapted from Christaller; the inset portrays the shifted ideal Level-C model.

Included are the existing parks and the most appropriate suitable land parcels. This proposed network provides sufficient coverage and accessibility to the areas of recent intense development. Further, two distances of service areas are portrayed, 0.25 miles as suggested by the NPRA and 0.50 miles as dictated by the model of park location. It is suggested that the service areas of the Mini-Park order may be extended because this area is of suburban residential density and not urban. According to the population density of South Covington (see Figure 1), the 0.25-mile as suggested by the NRPA is under sized. Furthermore, an increase of 0.25 miles, although doubled, is not a substantial increase.

Figure 23



Next, Figure 23 proposes the appropriate Neighborhood Park network according to the model adapted from Christaller; the inset portrays the ideal Level-B model. Included are the TME Playground and the most appropriate suitable land parcel of Neighborhood Pak size. It is suggested that the large suitable land parcel be developed into a park and the TME Playground be upgraded into a Neighborhood Park. This proposed network provides sufficient coverage and accessibility of Neighborhood Park amenities to the areas of recent intense development. While there is overlap in the service areas, in the real world, this is as accurate as the network can come to the ideal model.

In addition to making the above proposals, the model may be consulted as residential development continues to grow in the area an according to the City's Commission, it will. Depending upon where the development occurs, new parks can be suggested near corresponding nodes of the model. A seemingly rigid becomes flexible in this regard. In complexity of reality, no model can account for every circumstance. Further, as models become increasingly intricate to deal with the complexity, the more difficult they become to apply. When applying a basic and rigid network structure such as the Christaller Central Place Theory to park location, it retains its equitable structure of service area and is simple to employ. Lastly, the model is amendable enough to deal with shifting development by detaching the various levels and shifting them or just continuing the pattern with additional nodes.

Limitations

It is recognized that there is a fundamental limitation to this study. Because this study grew out of a project explicitly directed at improving the parks and recreation condition within the borders of the City of Covington, this research basically treated the area of South Covington as an isolated island. It is acknowledged that the surrounding environment and people, inside and outside of the borders of Covington, have a direct effect and interrelate with South Covington. The city borders are abstract and not real barriers to any resident who wishes to use public spaces, such as the parks studied here. People may move freely over these borders to utilize the public spaces of other municipalities, just as Kenton County's Pioneer Park is located in the City of Covington, but is a park designated for any county resident. This study would be more robust if the area of interest would have been extended to include the surrounding areas, focusing any residential development and parks. This could be undertaken in future research designed to further explore the network model for park location proposed in this study.

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Appendix: Covington Zoning Code

The following zoning information is adapted from the Land Usage section of the Covington, Kentucky Code of Ordinances. Not all zones and definitions found in the City of Covington are provided since all the types of zones are not found in South Covington; only pertinent zones are identified (Figure 24). Since some of the zoning definitions are thoroughly long, the following explanations are extensively paraphrased. Contained in each paraphrased zone definition is the primary permitted use of the zone and minimum allowable lot area. These coupled together give a sense of the density and atmosphere of the zone. "Accessory uses" and "conditional uses" have been omitted from this paraphrased version of zoning definitions because they are, in general, similar from zone to zone.

R-RE (Residential Rural Estate) Zone:

> 1 acre minimum lot area; Permitted Uses: Single-family residential dwellings (detached); Agricultural uses, Sale of products (raised, produced, and processed on premises), Greenhouses and nurseries, Stables and riding academies, One mobile home on parcels of 30 acres or more that has an existing dwelling unit; Recreational Uses: Publicly owned recreation, Golf courses, Country clubs, Swimming pools, Tennis courts/clubs, Fishing lakes and clubs, Gun clubs and ranges

R-1C (Residential One-C) Zone:

12,500 ft^2 minimum lot area; Permitted Uses: Single-family residential dwellings (detached);Recreational Uses: Publicly owned recreation, Golf courses, Country clubs and swimming pools

R-1E (Residential One-E) Zone:

7,500 ft^2 minimum lot area; Permitted Uses: Single-family residential dwellings (detached); Recreational Uses: Publicly owned recreation, Golf courses, Country clubs, Swimming pools

R-2b (Residential Two b) Zone:

22,500 ft^2 minimum lot area; Permitted Uses: Two family residential dwellings, Multi-family residential dwelling; Recreational Uses: Publicly owned recreation, Golf courses, Country clubs, Swimming pools

NC-2 (Neighborhood Commercial) Zone:

Permitted Uses: All uses permitted in NC-1 Zone, Off-street community parking areas, Fire stations and post offices, Residential dwelling units above the ground floor or located to the rear of a commercial establishment; No Allowable Recreation Use

NSC (Neighborhood Shopping Center) Zone:

Permitted Uses: Various types of retail and service establishments; No Allowable Recreation Use

IP (Industrial Park) Zone:

Permitted Uses: Various types of manufacturing, compounding, processing, packaging, assembling, servicing, wholesaling, or other industrial or manufacturing related uses, Fire stations, Animal shelters; No Allowable Recreation Use

I-1 (Industrial One) Zone:

Permitted Uses: Various types of manufacturing, compounding, processing, packaging, assembling, servicing, wholesaling, or other industrial or manufacturing related uses, Fire stations; No Allowable Recreation Use

PO (Professional Office) Zone:

Permitted Uses: Banks and other financial institutions, Clinics or medical/dental offices, Off-street parking lots/garages, Police and fire stations, Post offices, Office parks; No Allowable Recreation Use

RCD (Residential Cluster Development) Overlay Zone

Figure 24