

A COMPARISON OF SUSTAINABILITY IN GREENFIELD DEVELOPMENT  
UNDER FORM-BASED CODES AND EUCLIDEAN ZONING REGULATIONS:  
A CASE STUDY OF ST. LUCIE COUNTY, FLORIDA

By

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To my family and friends

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Abstract of Thesis Presented to the Graduate School  
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This study is concerned with determining whether form-based codes are more sustainable than conventional zoning regulations in greenfield development. To determine which code is more sustainable, the study uses an embedded case study with multiple sub-units to compare the codes. The sub-units used to compare the study are derived from a study of sustainability and include harmony with nature, equity, and livable built environments.

The sub-units per se are not measurable; therefore the study operationalizes the sub-units by creating proxies for each. The proxies for harmony with nature include open space quality and quantity. For equity, the proxy is affordable housing. The proxies for livable built environments are density, proximity of land uses, and mix of land uses.

The study uses the case of St. Lucie County, Florida, which adopted a form-based code to replace conventional zoning regulations in an undeveloped, greenfield area. These two codes are analyzed across the sustainability sub-unit proxies and then are compared with each other. When a code produces development that is more

sustainable than the other it is given credit towards a total score. These credits are tallied at the end of the study. The results conclude that the St. Lucie form-based regulations create development that is more sustainable than the conventional zoning code. Further analysis indicates that the form-based code is not necessarily more sustainable than conventional zoning and there are steps that planners can take to increase the sustainability of all regulations.

## CHAPTER 1 INTRODUCTION

Much time and effort has been devoted to the study of zoning, in the beginning its merits and more recently its deleterious social, physical, and economic impacts. While new techniques have been developed to curb zoning externalities, form-based regulations are one technique in particular that has found growing support. Because of the newness of the technique the support has been largely uncritical. Nevertheless, several places throughout the country have experimented with form-based codes in an effort to create planned places that promote sustainable development principles. St. Lucie County is one of these places.

Originally designed for privately owned communities like Seaside, Florida or Celebration, Florida, the public sector has begun to use form-based codes to develop and redevelop areas throughout the country such as the Columbia Pike in Maryland, the Miami21 plan in Miami, Florida and the Town, Village and Countryside Plan in St. Lucie County, Florida. Local governments use form-based codes with new and existing managed growth strategies in brownfield redevelopment scenarios and to guide growth in undeveloped greenfield areas, as is the case in St. Lucie County.

Form-based regulations have gained notoriety and a degree of legitimacy through self promotion, novelty, and a seemingly common sense approach to creating “good” development by regulating a land use and development form. It remains to be concluded, however, that form-based codes produce a better quality development than conventional Euclidean regulations. Advocates of form-based regulation tell heartwarming stories of children riding bikes to school, wax nostalgic on neighborhoods of the past, and appeal to peoples sense of environmental protection to support the

notion that conventional neighborhoods are worse off than developments created through form-based codes. If the form-based codes do produce better development than conventional regulations how can we measure the differences? In what areas is the development better, how much better is it, and in what context does it work the best?

By summarizing literature relevant to zoning, form-based codes, growth management and sustainability this thesis presents a thorough analysis of the context of St. Lucie County's decision to adopt form-based codes for an undeveloped portion of its jurisdiction. The paper begins with a chronological narrative of zoning, zoning's problems, and mechanisms developed to correct these problems. The narrative also investigates growth management, the New Urbanism movement, sustainability literature and includes a deeper investigation into the form-based code.

Sustainability is a key factor in the comparison of form-based codes with Euclidean zoning because it serves as a way to evaluate and compare the two codes. In this study, sustainability principles are gleaned from the literature and used to analyze the St. Lucie County codes. While form-based and conventional zoning codes may be substantially different in regulating the product of the built environment (Burdette, 2004), it remains to be seen if they address sustainability principles in fundamentally different ways or if they are indistinguishable on this basis. This paper seeks to investigate and analyze differences in form-based regulation and conventional zoning's planned unit development as they relate to sustainability. This paper seeks the answer to the question: Do form-based codes produce development that is more

sustainable than the conventional zoning regulations they replaced in greenfield development?

To answer this question, the study investigates the St. Lucie County codes that implement these differing perspectives. Using a comparative case study of St. Lucie County, Florida, this paper analyzes the zoning and form-based regulations in a greenfield setting using a framework of sustainability principles to draw limited conclusions about the codes' effectiveness. The remainder of this first chapter reviews the construction of the document outlining the contents of each chapter in the study.

Chapter 2 provides a history and analysis of zoning guided by relevant literature. With this in mind, the chapter turns to techniques developed to make zoning more workable and fair. The paper then investigates growth management principles and techniques that have been increasingly used to guide growth. The chapter continues by looking at some movements created to find solutions to zoning's problems including New Urbanism, the Smart Growth movement, and the creation of the form-based code. Investigation into growth management literature finds that sustainable principles can be used to evaluate growth management techniques. This chapter establishes six sustainability principles based on sustainability literature.

Chapter 3 describes the reasoning for choosing the single case study format. It outlines the selection criteria for choosing St. Lucie County, Florida as the case study. Chapter 2 delineates the criteria for evaluating and drawing conclusions about the code. Chapter 4 performs the St. Lucie County case study. First, a detailed history of the County illuminates the decision by the County Commission to develop the form-based regulation and replace the conventional zoning ordinance on a portion of County land.

The conventional zoning code and the new form-based codes are then analyzed to determine similarities between the codes. These similarities then become the units of analysis, which are then compared with each other within the framework of managed growth principles described in Chapter 3. Units of analysis in this study include open space, affordability, density and mix of uses. By comparing the two case study codes through the lens of sustainability principles, the paper attempts to glean information that is helpful in drawing generalized conclusions that answer the research question.

Chapter 5 draws generalized conclusions about the role of form-based regulation in growth management strategies to aid future developers of form-based regulation. It will also provide an opportunity to look at potential avenues for future research.

## CHAPTER 2 THE STORY OF ZONING, GROWTH MANAGEMENT AND THE FORM-BASED CODE

### **Planting Seeds: Zoning's Beginnings**

Land use regulation in the United States has a remarkably storied history. Colonial America viewed land as a collective public common (Juergensmeyer & Robers, 2003). During the 1600s many towns and villages regulated the common through rules that were similar among most colonial villages. Early laws specified where development could occur, what building materials could be used, specified the height of buildings and many required that development receive the approval of the Mayor (Juergensmeyer & Robers, 2003, p.44). Over time cities began to develop increasingly specialized laws to deal with specific problems (Juergensmeyer & Robers, 2003, p.44).

Across the Atlantic in the late 1800s, Germans began districting land to better manage growth and soon thereafter the idea spread north to England (Rabin, 1989, p. 103). Fueled by Darwin's ideas, the English used zoning to improve poor city conditions in efforts to increase "the health and efficiency of its working people" and to promote "courage and loyalty" of its military troops through a better physical environment (Rabin, 1989, p. 103).

In the early 1900s, real-estate developers and progressive urban reformers in America were exposed to zoning and championed the technique to promote their own ends (Rabin, 1989, p. 103). American cities proceeded to experiment with a combination of nuisance law and piecemeal zoning ordinances as a means to cure urban blight, improve unsanitary conditions, and improve safety.

Cities would eventually adopt comprehensive zoning ordinances to solve their problems. New York, like many other urban areas in the mid 19th century, began facing problems related to land use as people immigrated to the United States in search of a better life (Ernst, 1994, p. 56). Many immigrants made New York City their home resulting in a large population increases and housing shortages that forced many into cramped, dark and unsanitary living conditions (Ernst, 1994, p.47). The unsavory condition of the city extended past private dwellings into the public domain as burdened infrastructure broke due to demand created by the waves of immigrants (Ernst, 1994, p.20).

Furthermore, land use problems began to emerge as booming industry encroached into residential and retail districts. Pollution from factories compromised cleanliness and health, particularly of the upscale merchants and wealthy patrons of the 5th Avenue section of town (Williams, 1956, p. 256). Officials were also faced with the problems of newly approved taller buildings blocking light and air flow to nearby areas as building technology improved (Williams, 1956, p. 256).

Prior to government regulation of land use, cities used nuisance law to prevent urban problems rather than adopting regulation (Fischel, 1985, p.27). Nuisance law however, proved to be inadequate to deal with the challenges of a rapidly growing area because of the "narrow definition of nuisance", diminished government control, high litigation cost, and the tendency for nuisance litigation to result in injunctions rather than award damages (Fischel, 1985, p.27). To deal with pollution and modify living and working arrangements for the increasing population, officials and business owners



developed regulations with the intent of separating noxious uses from the affected population.

### **Germinating: The First Zoning Ordinances**

The ineffectiveness of nuisance law illuminated a need for a new approach to regulation. In 1913, a citizen commission, known as the Commission on Building Districts and Restrictions (Rabin, 1989, p. 105), composed of business people, lawyers, planners, students, builders, bankers, brokers and insurers among others was appointed to investigate a proposed resolution that would regulate the height, bulk and setbacks of buildings in New York City (Williams, 1922, p. 271). Using citizen input as a guide and a way to familiarize the public of the new regulations, the commission nearly unanimously agreed to the vital importance of zoning and to a detailed zoning plan for the city (Williams, 1922, p. 272). The resulting zoning resolution of 1916 set height limitations and bulk restrictions on buildings, implemented setback requirements, provided for open space within proscribed districts, designated use areas, divided the city into three use districts: residential, business and unrestricted, and provided for review of challenges by a board of appeals (Williams, 1922, p. 268; Baker, 1927, p. 89).

As early as 1922, however, officials realized that there were problems with the ordinance that needed to be remedied (Williams, 1922, p. 273). For example, the original resolution did not have a provision for single family housing and allowed tenement housing and single family uses within the same district (Williams, 1922, p. 273). The resolution also failed to regulate industrial uses (Williams, 1922, p. 273). With amendments to the resolution, the number of zoning districts increased, creating single family districts and several types of industrial districts to address the unforeseen problems (Williams, 1922, p. 273). Although criticisms of the zoning resolution appeared

over time, officials believed that zonings positive attributes in combating social ills outweighed the negative aspects of the resolution.

The most distinguishing characteristic of zoning, its separation of uses, is still apparent today, though zoning has evolved into land districts, each with their own allowable uses and distinct regulations. These districts regulate the use of land and structures often establishing criteria for lot size, building location, building bulk, residential density, and non-residential intensity of development among others (Arnold, 1998, p. 94). Basic zoning districts today include single family residential, multifamily residential, commercial, and industrial uses.

After watching the New York resolution take shape and sensing the need for national support of zoning, Federal officials created comprehensive zoning enabling legislation, later dubbed the Standard Zoning Enabling Act, which states could adopt throughout the nation in order to legitimize the tenuous legal position of zoning at that time.

### **Developing Roots: The Standard State Zoning Enabling Act**

A broad and continuing question as to the legality of zoning lingered as cities throughout the nation took note of the New York example and began to adopt comprehensive zoning ordinances of their own (Meck, 1996, p. 2). Some states had adopted legislation into their state constitution allowing zoning, but these enabling acts were not uniform (Meck, 1996, p. 1). By the 1920s, cities in states with enabling acts adopted zoning consistent with their states enabling act, while cities in states without enabling acts used home rule powers to develop zoning ordinances (Meck, 1996, p. 1). Zoning's widespread appeal soon registered at the national level and federal officials, sensing the shaky legal precedent, strategized about how to best approach the situation

to ensure the legalization of zoning. The eventual solution would be the Standard State Zoning Enabling Act (Department of Commerce, 1926).

In 1921, Department of Commerce Secretary Herbert Hoover decided that it was necessary for the national government to support zoning. Hoover believed that common adoption of zoning legislation among states was necessary to prevent invalidation if a legal challenge arose (Meck, 1996, p. 1; Wickersham, 2001, p. 553). Hoover convened an advisory committee comprised of a diverse group of professionals to create standard zoning enabling legislation that states could uniformly adopt (Meck, 1996, p. 1).

With a legal strategy devised, a multi-disciplinary advisory committee, similar to the one assembled for the New York resolution, proceeded to draft uniform state zoning enabling legislation (Meck, 1996, p. 2). The advisory committee created planning goals and objectives that reflected the New York example. Primarily, the advisory committee and government officials sought to address nuisance issues and overcrowding that urban cities were facing in the 1920s including encroachment of industry on less intensive uses and pollution "for the purpose of promoting health, safety, morals or the general welfare of the community (Horwich, 1998, p. 318; Department of Commerce, 1926, p. 4)." During the 1920s most development was focused densely near the center of the city because a lack of highway infrastructure and transportation technology limited access to the countryside (Meck, 1996, p. 3). With this knowledge, the advisory committee sought to address problematic central city urban development patterns including industry encroaching on commercial or residential districts and large multi-story apartments sited adjacent to single family homes (Meck, 1996, p. 3).

Prevailing dogma positioned single family homes as the most important land use and thus enabling legislation came to provide the most demanding protections in favor of detached single-family homes than any other type of development. The Standard State Zoning Enabling Act's version of zoning created a hierarchy of land uses with single family homes at the most protected end of a regulatory spectrum and industrial uses at the other (Meck, 1996; Department of Commerce, 1926). As proposed in the state enabling act, land uses higher on the spectrum, such as single family homes could be sited in lower districts on the spectrum but lower districts, such as industrial, could not move into higher districts (Meck, 1996; Department of Commerce, 1926). For example, single family homes could be sited in a commercial district but, commercial development could not be sited in a single family district.

Cities and states enjoyed the separation of uses and logical districting that zoning offered, eventually leading to unanimous state support for the Standard State Zoning Enabling Act (Jurgensmeyer & Roberts, 2003). States also agreed with Hoover's stance that having a unified state front in the likely event of a constitutional challenge would be necessary to protect their investment in zoning (Meck, 1996, p. 2). The popularity of enabling legislation quickly became evident. The advisory committee issued the final draft of the act in 1924 and a second edition of the final draft in 1926 (Meck, 1996, p. 2). In 1926 only five states had not passed enabling legislation (Wickersham , 2001, p. 555). By 1930, 35 states had adopted legislation based on the Standard State Zoning Enabling Act (Meck, 1996, p. 2).

### **Maturation: Euclid v. Ambler**

The watershed moment for zoning came after the national government and many states and cities had begun supporting zoning as a means of controlling development. In a precedent setting case culminating with a Supreme Court decision in 1926, the Ambler Realty Company challenged the validity of the Village of Euclid, Ohio's zoning ordinance claiming that zoning violated the due process clause of the 14th Amendment (Baker , 1927, p.142). The decision would give credibility and legal certainty to zoning legislation throughout the country and set a new course for land use legislation in the United States.

Through Ohio's enabling legislation, originally adopted in 1915, the Village of Euclid adopted zoning as a way to control growth within its boundaries much like other cities had done throughout the nation (Meck, 1996, p. 1). The zoning ordinance itself was typical of zoning ordinances of the time. It consisted of six use districts, three height districts and four area districts (Baker, 1927, p. 141). The districts overlapped so that each parcel would have use, height and area regulations (Baker, 1927). The use districts were structured on a tiered basis and ranged from wholly unrestrictive to allowing only one or two uses (Meck, 1996, p. 1). Envisioned as a pyramid, districts at the top were the most protected and allowed no other use (Meck, 1996). Districts lower on the pyramid were less restrictive and allowed a specific use and all those above it.

The Ambler Realty Company purchased a property in the Village of Euclid intending to develop it into an industrial site. Sometime after the company purchased the site, the Village of Euclid adopted zoning legislation preventing the company from developing the property as originally intended. Displeased with the ordinance which

effectively “down zoned” the property, or made the property less valuable by limiting what could be built, the Ambler Realty Company challenged the local zoning ordinance in its entirety arguing that the city violated the due process clause of the 14th amendment (Baker, 1927). The Euclid court determined that zoning did not deprive the property owners due process, thus validating zoning and legitimizing the zoning legislation as an extension of the police powers of the state. The Court did however reinforce the notion that individual parts of a zoning ordinance could be challenged (Village of Euclid, Ohio v. Ambler Realty Co., 1926)

The court’s Euclid analysis relied on existing nuisance law to establish the potential scope of zoning’s power (Village of Euclid, Ohio v. Ambler Realty Co., 1926) by inducing the nuisance law tenants of promoting safety and decreasing all types of pollution as well as promoting general state welfare (Acker, 1991, p.365). With zoning’s validation, proponents of zoning in states and municipalities that had already passed zoning legislation breathed a sigh of relief. After the decision, increasing numbers of city and state leaders adopted zoning legislation, approaching nearly unanimous acceptance. In 1977, 97%of local governments were utilizing zoning as the primary means of land use control (Haar & Kayden, 1989, p.185).

### **It’s Taking Over!: Problems with Zoning**

Prior to the widespread use of zoning, local officials, environmentalists, planners and citizens were becoming aware that it carried a cost. Land was increasingly degraded because of widespread road projects, copious amounts of low-density and low-intensity zoning and development facilitated by the new access to previously undeveloped area, and a changing social preferences for open space which created a

demand for low density housing. As externalities emerged, researchers began to study the social, environmental and fiscal impacts of zoning.

### **Social Impact**

Since zoning's inception, local officials, developers, and property owners have understood zoning's capability to affect population and resource distribution in a community and exploit minorities and poor and disadvantaged citizens of a community. Unsurprisingly, zoning has been used as a tool for racial segregation. In the case of *Buchanan v. Warley* (1917) the Supreme Court deemed zoning ordinances used to segregate by race unconstitutional. Cities primarily in the Southeast were undeterred by efforts to prevent racial zoning and effectively used Euclidean zoning to segregate by specifying minimum lot sizes and large setbacks (Rabin, 1989, p. 107). Poor minorities, including most blacks, could not afford the large minimum land requirements that large-lot zoning created.

Officials and property owners thus segregated the population by socioeconomic class exploiting zoning as tool to protect their economic interests (Arnold , 1998, p. 134). To keep residential property values elevated, some cities used zoning to entirely eliminate all poor and minority populations. The city commission in Mt. Laurel, New Jersey created a zoning ordinance allowing only single family homes with large minimum lot size and setback requirements effectively preventing low and moderate income people from living in the city (*Southern Burlington County N.A.A.C.P. v. Township of Mount Laurel*, 1975). The court found the ordinance discriminatory and required that cities provide housing opportunities for low and moderate income citizens in what is now known as the controversial Mt. Laurel doctrine (*Southern Burlington County N.A.A.C.P. v. Township of Mount Laurel*, 1975).

Other cities have used zoning to preserve property character and values in single family zoning districts. In Illinois, the Village of Arlington Heights approved an ordinance that prevented the development of a multifamily housing plan in a single family district (Village of Arlington Heights v. Metropolitan Housing Development Corp, 1975). The Court validated the ordinance because the village provided land for multifamily development elsewhere (Village of Arlington Heights v. Metropolitan Housing Development Corp, 1975).

Local officials sometimes vote down applications that amend a zoning district from single family to multifamily when they conflict with established single family districts. When this happens low and moderate income families are forced into homogenous areas of dense housing while larger areas of single family housing are protected from multifamily development. Whether intentional or accidental, segregation of the population into economic strata can have negative consequences and can create significant social implications such as abandonment cycles, landlord milking, speculative disinvestments, and redlining in the community (Dietrich, 1997, p. 33).

### **Economic Impact**

While zoning's creators conceived of zoning as a public safety and health mechanism, they also entertained a potent idea that zoning would protect and enhance single-family home values. Nearly a decade before the Euclid decision, Lawson Purdy, the vice chairman of New York's Commission on Building Districts and Restrictions, told the Tenth National Conference on City Planning to "think in terms of values a great deal, popularize the idea of preserving the value of a man's house, of a man's lot (Rabin, 1989, p. 105)." The strategy of using zoning to protect and enhance single-family home



values has worked marvelously, but sustained values were accompanied by unintended externalities.

Zoning has played a major role in promoting the single family home, although it is not entirely responsible for the negative externalities. During the Great Depression the federal government passed the Federal Housing Administration act that issued mortgage insurance and, after WWII, passed the Veterans Administration mortgage program that created tax incentives to subsidize single-family homes by offering low-interest, long-term mortgages (Kelly, 2010, p .15; Mullen, 2007, p. 261). These popular actions created support for the belief that home ownership was integral to the American dream which translated into a building boom (Frumkin, Frank & Jackson, 2004, p. 40). Before and during World War II, and starting in the 1950s, Americans were experiencing unprecedented personal economic growth (Ryscavage, 1999, p. 151). As average salaries increased, the demand for larger and larger homes increased as home buyers sought to take full advantage of the available tax benefits. Over the years increasingly favorable loan conditions such as low down payments, lower interest rates and longer payback terms coupled with the federal tax deductions for home mortgage interest and in some cases, state and local property tax deductions virtually ensured that more people bought increasingly larger homes (Mullen, 2007, p. 261). Although huge expanses of natural green space and farmland could physically accommodate new growth, it was not until congress approved and funded a national interstate highway system that development of this land became feasible.

The Dwight D. Eisenhower National System of Interstate and Defense Highways can also shoulder some of the blame for zoning's externalities. Planning for America's

interstate highways system began in the 1930s and fourteen years later Congress adopted the unfunded Federal-Aid Highway Act of 1944 authorizing construction of up to 40,000 miles of interregional highway connecting major metropolitan areas throughout the country (U.S. Department of Transportation, 2010). Although the first 37,700 miles of roadway were selected by 1947, the first token funds were not approved until 1952 and major funding was not approved until 1954 (U.S. Department of Transportation, 2010). As road construction progressed through the 1950s, land that was previously inaccessible opened for development.

Fueled by highway construction and gasoline subsidies for the commute, Americans demanded record numbers of larger detached single family homes further into suburban areas (Beauregard, 2006, pp. 85-86). Land suitable for development close to major metropolitan areas was quickly depleted and developers were forced to leap past the suburbs into the countryside in a sprawling development pattern (Beauregard, 2006, p. 94). Waves of new single-family housing consumed huge amounts of open space and farm land inducing sprawl, or unplanned, low-density, suburban development throughout the country (Beauregard, 2006, p. 94). While the externalities of sprawl may be significant, the negative effects do not fall squarely upon any group who will be roused to action to curtail the problem (Buzbee, 2000, p. 85). Sprawl impacts a variety of stakeholders. As developers use farmland and natural areas for housing, commercial activities and roads, the public at large suffers an increase in runoff pollution, a loss of biodiversity, an increase in air pollution, and a decrease in food security (Farber, 2005; Johnson & Klemens, 2005; Boone & Modarres, 2006, p. 83). Inner city urban areas are also hurt as disinvestment in urban housing stock

depresses property values which reduces taxes to pay for essential services (Buzbee, 2000).

No single group alone shoulders the blame for the externalities of sprawl. Public and private officials make decisions using established political and legal frameworks that benefit the decision makers often without direct consequences (Buzbee, 2000, p. 86). Local officials often allow sprawling development because of the promise of more taxes with little regard for quality (Soule, 2006, p. 337). One reason that developers build in sprawl patterns could be the ease of the approval process. For developers time is money and any time consuming amendments to the existing code could be the difference between success and failure (Lamer, 2004).

Furthermore, existing zoning and place politics often promote sprawl. As one potential urban reformer points out, land on the urban fringe and beyond is typically held in the lowest impact zoning district with the goal of promoting orderly and efficient development of infrastructure as development moves away from the urban core (Kendig, 1980, p. 9). Often the holding district is low-density residential (Kendig, 1980). Originally designed to promote efficient development patterns, the low density land that policy makers assumed would change instead became populated, creating pressure to maintain the district when denser zoning districts were proposed (Kendig, 1980). An example of this is when land available for multifamily residential development is limited because entrenched single family home owners fight to preserve their district at the expense of others (Acker, 1991, p. 366). Local officials often vote down proposed zoning changes amending low-density residential to an unwanted districts because of

negative perceptions of community harm, thus new development is forced past the existing development into the hinterland (Kendig, 1980).

The protectionist attitude known as NIMBY, or Not In My Back Yard, present in some zoning decisions not only promotes sprawl, it also creates artificial scarcity as less land is available for some housing projects and infrastructure (Gallent, Juntti, Kidd, & Shaw, 2008). This scarcity leads to increased prices in the few areas that allow intense uses (Hall & Pfeiffer, 2000, p. 240). In the case of NIMBY opposition to multifamily housing, low density residents may feel competition between multifamily and single family housing drives down home values for all residential units and their argument often makes rezoning politically unpalatable (Dietderich, 1997, p. 31). This creates the problem of artificially scarce land available for multifamily construction (Dietderich, 1997, p. 32). Because land for multifamily housing becomes scarce, buyers and renters ultimately pay a premium for multifamily housing due to the artificially increased costs (Dietderich, 1997, p. 32).

In situations like this, scarce multifamily land increases the cost of multifamily housing and zoning mandates (i.e. minimum lot sizes, setback requirements, etc.) increase the cost of single family homes by forcing consumption of resources, more than home owners may want or need, without allowing for other options (Dietderich, 1997, p. 32; Hall, 2007, p. 922). In short, the toxic combination of NIMBYism and zoning elevates the cost of all housing by preventing higher density housing and increasing the minimum amount of land required to build (Hall, 2007, p. 922; Acker, 1991, p. 367). Residential single-family properties usually mandate minimum lot sizes, minimum setbacks, minimum densities, and sometimes minimum house sizes. In a restrictive

single family zoning category, home owners rarely have the option to use less land or land substitutes like technology and design (Dietderich, 1997, p. 32). For example, in an efficient market, homeowners might be able to sell excess land in exchange for other resources (Dietderich, 1997, p. 32).

Small, less capitalized developers are also disadvantaged in the preliminary development phase (Acker, 1991, p. 367). Development plan requirements often include development review periods and public hearing schedules further exacerbating costs. Smaller developers undertaking the development review process may not have the capital required to complete the process which decreases competition and reduces market efficiency (Acker, 1991, p. 366).

Some critics may disagree with the use of zoning to solve urban problems citing their interference with land markets and suggest that a *lassie faire* approach would be best. While true that regulation has created problems of its own, government subsidies, public and private investment policies, facility pricing, and speculation have also contributed to an imperfect market and will continue to do so regardless of regulatory approach (Nelson & Duncan, 1995). Nelson and Duncan (1995) contend that a regression to the *lassie faire* market is problematic because the necessary conditions for efficient markets are not met and would be difficult to attain; therefore, market interventions are necessary to correct land market inefficiencies unless we develop the necessary criteria for a perfect market.

### **Physical Impact**

Zoning has had a detrimental physical impact in communities. The primary negative physical impact of zoning has been the proliferation of urban sprawl (Kendig

1980). Sprawl is characterized by unplanned, low-density development patterns and creates many well documented problems. These include the loss of wilderness and farmland, increased pollution, and increasing difficulty in providing adequate public services and facilities (Hall, 2007).

Lane Kendig has proposed a theory that explains why zonings widespread use creates problems. Kendig (1980) suggests that scattered development patterns characteristic of zoning are the result of ad hoc reactions to development that took the place of deliberate planning. As more zoning districts were created to accommodate uncommon types of development, the boundaries between the districts were blurred (Kendig, 1980). New zoning districts also created greater precedent for further use of zoning amendments, and diminished the comprehensiveness of existing plans (Kendig, 1980, p. 9).

In analyzing zoning, Kendig (1980, p. 10) finds the basic premise of zoning, its separation of uses, contrasts with private development of large tracts where developers tend to mix uses to produce a better product. Others agree that separation of uses limits creativity and choice in development process decision making (Acker, 1991, p. 363)

### **Cities Cope: Zoning's Clip-On Techniques**

To deal with these zoning related problems, amendments were created to the improve zones and the zoning process. Different types of zones such as floating zones, conditional zoning, performance zoning, planned unit developments, interim zoning and overlay zoning were developed to make zoning more flexible (Juergensmeyer & Roberts, 2003). Planners amended zoning processes to provide more leeway for

developers who used the special permit process and site review controls (Juergensmeyer & Roberts, 2003).

Floating zones are zoning categories created by the government but not yet used on a zoning map. Developers that have projects that meet the criteria of the floating zone can use either the existing designated zone or get a zoning amendment to the floating zone if it suits the project needs (Juergensmeyer & Roberts, 2003).

Overlay zones are zones that are used in conjunction with an existing zoning category. Properties within overlay zones are effectively in two zones at once, usually to protect historic or environmental resources (Juergensmeyer & Roberts, 2003).

Interim zoning is a zoning category typically used in quickly developing areas to protect land while a new zoning code is created or implemented or to freeze development in quickly growing areas to allow for time to solve urban problems that may arise (Juergensmeyer & Roberts, 2003).

Performance zoning is also a reaction to the inflexibility of zoning as well as to zonings detrimental effects requiring a fundamental change to the system. It sets the minimum criteria for various measurable factors (i.e. pollution) that each land use must adhere to (Kendig, 1980). In practice performance zoning regulates permitted uses and structures by measuring their by product in order to permit maximum development while protecting community resources (Kendig, 1980). Simply put, “any use (could) be placed anywhere as long as it (met) certain objective performance standards (Acker, 1991, p. 364).” Primarily, this type of zoning has been most used to regulate industrial activities (Juergensmeyer & Roberts, 2003).

Planned unit developments (PUD) are regulations in a zoning code that allow a developer to have more flexibility in the development process. While a project still must be consistent with the land development regulations, often the use provides general guidelines for development. PUD project plans are site specific and are often reviewed by an elected or appointed body. The PUD is one of the most common flexible mechanisms created and implemented to work with conventional zoning regulations. It is a useful tool for escaping the rigid separation of uses required by zoning. Developers using the PUD follow procedure outlined in local codes which was borne from a combination of cluster zoning and subdivision platting and allows development of land, owned by a single entity, which does not conform to lot size, bulk, land use, density, lot coverage, and open space (Juergensmeyer & Roberts, 2003). This procedure often has requirements provision of urban services, and timing of development and development approval hearings.

### **A Quiver of Strategies: Growth Management and Managed Growth Principles**

Put simply, growth management is a tool for achieving planning goals, though its scope can be wide and general or narrow and specific. The use of managed growth can range scope from specific and measurable small town goals to state or national policies with loosely defined objectives.

While states, counties and cities are responsible for guiding urban growth, not all governments use growth management techniques to control development. Florida, Oregon, California, Hawaii, New Jersey, Washington, Connecticut, Rhode Island, Maryland, and Arizona are "Growth Management" states that incorporate growth management planning (Anthony 2004). Some of these states, including Florida, require



or encourage their cities to implement comprehensive plans in order to plan for future growth (Anthony 2004). In Florida, comprehensive plans in each city and county must address sanitary sewer, solid waste, drainage, potable water, parks and recreation, schools, and transportation facilities to maintain concurrency (Florida Statutes, §163.3180, 2010). This ensures that "facilities shall be in place and available to serve new development (Florida Statutes, §163.3180, 2010)." In spite of direct legislation to promote managed growth at least one study has shown state growth management techniques have not prevented increased sprawl or decreased density at the state level (Anthony 2004).

At the heart of growth management is realization that unplanned growth can create negative externalities within a community and that something can and should be done to prevent these externalities. Growth management can protect natural and cultural resources, improve stability and value in the development process and create opportunities for providing efficient public services and facilities which prevent increased taxes through reduced government spending (Nelson & Duncan, 1995). It can also reduce the need for punitive government reactions to unplanned growth (i.e. a temporary ban on all development) as well as improve quality of development in a community (Nelson & Duncan, 1995).

### **The Oracle: Sustainability**

Businesses and governments have increasingly focused on sustainability as means to address a range of negative actions perpetrated by humanity on the planet's natural systems. One of these negative actions include conventional land use systems

which create environments that threaten ecosystems and facilitate increased use of fossil fuels.

Comprehensive plans are a means of guiding growth in order to promote sustainable development (Berke & Conroy, 2000). In a study of comprehensive plans, researchers develop performance criteria to evaluate the use of sustainability language to determine whether sustainability used as an organizing concept is more likely to promote sustainability principles than those that do not (Berke & Conroy, 2000).

The definition of sustainable development used in the study is specific to urban planning and studies the ability of a system to reproduce and revitalize itself, balance environmental, economic and social values, link local to global concerns, and maintain the dynamic process of evaluating and meeting a system's needs with the goal of system sustainability (Berke & Conroy, 2000; Beatley & Manning, 1998; Campbell, 1996; Kaiser, Godschalk & Chapin, 1995; Mega 1996; Neuman, 1999). To translate their definition into measurable criteria the researchers develop six principles of sustainable development and then use the type and frequency of comprehensive plan language to categorize and calculate a sustainability factor for individual comprehensive plans. The sustainability principles developed include harmony with nature, livable built environments, place-based economy, equity, polluters pay and responsible regionalism (Berke & Conroy, 2000). This paper analyzes the sustainability of two development styles using the sustainability principles harmony with nature, equity and livable built environments.

Harmony with nature refers to development that "support(s) the essential cycles and life support functions of ecosystems (Berke & Conroy, 2000)." Development that is

in harmony with nature interacts with ecosystems in a minimally destructive way without altering natural processes. It "preserve(s) biodiversity" and restores natural services provided by the environment (Berke & Conroy, 2000). Conservation and preservation of environmental resources are necessary because environmental degradation, characterized by air pollution, water pollution, and deforestation among others, is typically seen by private business interests as cheaper and more profitable than environmental protection (Nicholas & Juergensmeyer, 2003). Impact fees, mitigation, performance-based development and conventional regulation such as open space requirements, resource setbacks, and environmental overlay zones all work to create development that is in harmony with nature (Nicholas and Juergensmeyer, 2003).

Livable built environments conform to and promote the type of activities that inhabitants desire by designing physical spaces and managing characteristics such as "location, shape, density, mix, proportion, and quality (Berke & Conroy, 2000)". Livable environments facilitate "access among land uses" and foster a sense of place (Berke & Conroy, 2000). This study uses the ability to choose between motorized or non-motorized transportation as a proxy for access between land uses and measures the codes based on a mix of land uses, density and proximity between uses.

A mix of land uses facilitates livable built environments and sustainability because uses, when sited close together, reduce the need to travel long distances for work or recreation (Keeler & Burke, 2009, p. 196). This study analyzes the proximity of land uses in each of the codes. Proximity is related to the mixture of land uses because longer trips decrease the likelihood of walking or cycling (Frank et al, 2006, p. 76). Studies have shown that residents of "walkable" neighborhoods walk more each week

when compared with residents of conventional developments for transportation and exercise (Frank et al, 2006, p. 76).

Equity, as it relates to sustainability, refers to the ability of low-income population access to basics such as a healthy environment and human dignity (Berke & Conroy, 2000). Additionally, equity works to provide better access to social and economic resources of low-income citizens which can reduce the instance of poverty (Berke & Conroy, 2000). Equitable development should facilitate responsible planning of community infrastructure. This is necessary to level the playing field among all tax payers and reduces the need for existing community members to subsidize new development (Nelson & Duncan, 1995). Equity can also refer to tensions between the built and natural environments. Plans that anticipate this issue can help reconcile tensions between economic development, social justice, and environmental protection. Furthermore, equity can refer to challenges that arise where public and private interests meet. An example of this sometimes occurs when sides have competing land use goals (Nelson & Duncan, 1995). Effective equity planning can work to clarify public land use goals and set a standard for amendment. Planning can also address fairness problems of an unregulated market (Nelson & Duncan, 1995).

### **An Evolving Weapon: Form Based Codes**

Form-based codes are enforceable and prescriptive development regulations that create "time-tested forms of urbanism" characterized by practical and functional pedestrian friendly design features (Talen, 2009, p.146). They also represent a complete rethinking of the conventional zoning system that transforms the conventional district-based, proscriptive, and use-focused process into a vision-based, form oriented,

prescriptive process that works to “create the place envisioned by the community (Parolek, Parolek, & Crawford, 2008, p.11 & 74).” Because the code focuses on urban design, they produce consistent, contextual, and pedestrian-friendly development (Parolek, Parolek, & Crawford, 2008, p.13).

Form-based codes are different from zoning and urban design guidelines in many ways. Fundamentally, the form-based code differ from conventional zoning because they focus on regulating the form of the built environment rather than the uses (Elliott, 2008, p.26). Form-based codes establish unique regulations to guide the siting of buildings and contain regulations to guide the form of the buildings.

Form-based codes typically include a the following components: regulating plan, building form standards, public space standards, an administrative section, and a glossary though some codes do have additional components such as block, building type, architectural, green building, and landscape standards (Parolek, Parolek, & Crawford, 2008, pp.15-16).

The regulating plan or map is often the entry point for using the form-based code (Parolek, Parolek, & Crawford, 2008, p.17). The plan is comprised of an index and a design for the development that illustrates in pictures the location and organization of transect zones and sometimes provides direct regulation in the form of building or site regulations (Parolek, Parolek, & Crawford, 2008, p.17). Transect zones organize development based on intensity by delineating several zones and creating regulations to facilitate development within each zone (Parolek, Parolek, & Crawford, 2008, p.18). The regulating plan helps create a gradual transition between the intensity and form of adjacent zones. The transect typically organizes uses from highest to lowest intensity;

the original regulating plan created by Duany Plater-Zyberk and Company created seven zones: Natural - T1, Rural – T2, Sub-urban – T3, General Urban – T4, Urban Center – T5, Urban Core – T6, and a special district for uses not specifically permitted within the first six zones (Parolek, Parolek, & Crawford, 2008, p.18). In the lowest numbered transect zones, development is characterized by very low density development and a large amount of open space. In the mid-numbered range transect zones development has a moderate level of density and intensity and in the high-numbered range, development is very dense and intense.

Development intensity and regulations for each transect zone are created with images and text in the building form standards (Parolek, Parolek, & Crawford, 2008, p.39). Building form standards typically include an overview of the zone and regulate building placement and form, parking, use, frontage and building types, and encroachments (Parolek, Parolek, & Crawford, 2008, p.39).

Public space standards address civic spaces and thoroughfares (Parolek, Parolek, & Crawford, 2008, p.28). These two areas account for a large portion of developed land that needs proper design to promote safe and comfortable pedestrian environments while also providing sufficient automobile and bicycle capacity (Parolek, Parolek, & Crawford, 2008, p.28). Good thoroughfare design is transect zone specific and takes into account traffic, parking and bicycle lanes, curbing, landscaping, storm water management, and lighting (Parolek, Parolek, & Crawford, 2008, p.29). Civic space design provides for passive and active recreation and is transect zone specific (Parolek, Parolek, & Crawford, 2008, p.28). Form-based regulations for civic spaces focus on the

location, acreage, dimensions, activity, and character of the space (Parolek, Parolek, & Crawford, 2008, pp. 36-38).

The code administration section of the form-based regulation establishes the administrative standards for reviewing development applications. These administrative standards include describing what is required for the approval of a form-based development, what is required of elected officials, review boards, planning staff or the staff architect, and any procedures that address variances and nonconformities (Parolek, Parolek, & Crawford, 2008, p.88). The administrative section promotes objectivity using administrative review rather than a subjective discretionary review that can undermine effective implementation of the code (Parolek, Parolek, & Crawford, 2008, p.89). Administrative review allows the form-based code, which is based on the community vision, to be implemented and is possible when codes are sufficiently specific about the vision and quality (Parolek, Parolek, & Crawford, 2008, p.89).

The difference between the form-based code and zoning can be viewed as the increased complexity of building regulation but the reduced complexity of use regulation (Elliot, 2008, p.32). The increased complexity of the regulations opens form-based regulation to legal challenges stemming from the opportunity for elected and administrative officials to make decisions in a biased, unfair, or inconsistent manner (Garvin, & Jourdan, 2008). One study has posited that form-based regulations are more susceptible to procedural due process claims than Euclidean zoning because unlike rigid zoning regulations that provide definitive guidance, form-based regulations provide guidelines and use language specific to the design industry which can be vague (Garvin, & Jourdan, 2008, p.416). Additionally, form-based regulations may be subject

to challenges based on takings and spot zoning if a particular existing use or parcel is inconsistent with new regulations and is either forced to design a building that will not work in its context or is issued variances that grant rights not available to other property owners (Garvin, & Jourdan, 2008).

Regardless of their legal status, form-based regulation has been accepted by urban planners and is being used more frequently throughout the country. This is partially because form-based regulation are seen as having the ability to provide a mechanism for development to evolve with market forces more naturally than conventional zoning (Parolek, Parolek, & Crawford, 2008, p.120). Most of the applications of the form-based code have been for infill development at the building and block scale but the development can be created at a village or city scale (Sorlein & Speed, 2006, p.338). Creating a larger project can be financially expensive and can be unsustainable if designers do not consider the larger context of the city and region (Sorlein & Speed, 2006, p.338).

Form-based regulations are a relatively new development technique that uses components that have not been used historically in urban planning. They regulate form as well as use with the goal of creating an urban environment that improves upon that created by conventional zoning. The technique, however, needs to be studied further and tested both in the courtroom and in practice before it can be reliably adopted into the urban planning arsenal.



## CHAPTER 3 METHODOLOGY

This thesis is concerned with the viability of form-based regulation as a part of a growth management strategy in greenfield development. The study was designed to answer the research question: Do form-based codes produce development that is more sustainable than the conventional zoning regulations they replaced in greenfield development?

In order to answer this question, this paper relies on an embedded single case study that looks at one place with two distinct codes and compares them across three sustainability subunits. The form-based code and the Euclidean zoning code were chosen as the criteria used to judge potential development because the codes give the force of law to planning. Because there is no well documented theory governing the sustainability of form-based regulation versus Euclidean zoning, this single case study represents a unique example of form-based regulation replacing Euclidean zoning in a greenfield landscape. Additionally, the study provides a before and after picture of a place. This case study can also be interpreted as a pilot study and as a prelude to similar future studies of the same area or other areas that meet the case study criteria.

Criteria used to select the case study included location, the adoption of a form-based code which replaced a Euclidean zoning code, and the potential implementation of the form-based code in a greenfield environment. A greenfield environment was chosen because regulation of an undeveloped area is easier to operationalize than regulations guiding development in a brownfield, reuse environment. Greenfield regulations guide development across a larger area than a smaller reuse site

regulations. By studying greenfield regulations, the scope of the regulations control over a greater amount of land provides the opportunity to more comprehensively study the regulations. The southeast portion of the United States is used to limit the case study area to adhere to a nominal research budget which limited travel to the code area for physical inspection. The study chose the form-based code area from a total of 141 code candidates in Florida, Georgia, Alabama, Mississippi, South Carolina, North Carolina and Tennessee. This list of 141 codes was gathered from a list of 353 development codes accumulated by PlaceMakers, a development consulting company. Some of the form-based codes that were considered are included in Table 3-1. The entire list of form-based regulations can be found at <http://www.smartcodecomplete.com/learn/code-study.html>. After the list was created, research was performed to see which form-based codes replaced conventional zoning in a greenfield development. St. Lucie county was chosen from this list as the case study area because of its proximity for performing research and gathering data and the form-based code was specifically designed to regulate development in a greenfield.

Table 3-1. Partial list of form-based regulations considered for case study

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Arlington, Virginia - Columbia Pike,
Atlanta, Georgia
Bluffton, South Carolina - Old Town Master Plan & Code
Habersham, North Carolina
Hapeville, Georgia
Hillsborough: Northwest Hillsborough County Master Plan
Macon, Georgia - Beall's Hill
Miami, Florida - Miami 21 SmartCode
Montgomery, Alabama
Pike Road, Alabama
Sarasota, Florida - Form-based code for Mixed Use Infill
St. Lucie County, Florida - Towns, Villages, and Countyside

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St. Lucie County, Florida recently adopted a form-based code that met all of the criteria. During the preliminary investigation of the codes, the staff at St. Lucie County facilitated information gathering and much of the process of developing the form-based regulations was documented on either the St. Lucie County website or the Treasure Coast Regional Planning Council website. St. Lucie County's recently adopted a form-based code is part of a larger, comprehensive growth management strategy for the primarily undeveloped, traditionally agricultural, western portion of the county which met the criteria for greenfield growth management.

This study evaluates the sustainability of the form-based regulations and compares it to the sustainability of the conventional regulations. Sustainability is evaluated using three measurable subunits of sustainability. These subunits were derived from the sustainability literature, and were particularly adapted from a study of the sustainability of comprehensive plans by Berke and Conroy (2000). The subunits are include harmony with nature, equity, and livable built environment. Each of these subunits was chosen because measurable criteria could be assigned to each. These three units were chosen out of the six total choices because harmony with nature, equity, and livable built environments provided the greatest opportunity to operationalize for research purposes. Proxies for these sustainability sub-units were readily available as opposed to place based economy, polluters pay, and responsible regionalism which would be more difficult to operationalize.

The study of harmony with nature provides a qualitative discussion on the pieces that comprise functional open space in each code. The study investigates differences between the components of open space, for example, whether both codes include parks

or agriculture as open space. Then the study quantifies the amount of open space required by each code. Both the discussion and the quantification of open space will serve as the criteria to draw conclusions about which code creates development that is most in harmony with nature. A code will be considered more in harmony with nature if it provides more open space. The study looks at the minimum open space required because development would likely utilize the minimum permitted by the code. Additional open space provided is beneficial to the environment.

Analysis of the subunit equity seeks to determine which code produces a more equitable development. For this study, the amount of workforce housing and affordable housing in general were chosen as two indicators to assess the equity in the codes. Workforce housing was chosen because it serves as a quantifiable variable to assess the equity in one of the codes. Affordable housing was chosen as another variable because one of the codes does not have a quantifiable workforce housing component, but as a whole, the County has policies to support affordable housing. A quantitative analysis of the two codes will provide the criteria for evaluating the codes. This analysis will be supplemented by a qualitative discussion of the codes. A code will be considered more equitable if it provides more affordable housing. The study looks at the minimum affordable housing requirements provided by the code because development would likely develop to the minimum standard under this proxy and development could potentially achieve 100% affordability under any development regulation under the right circumstances. Additional affordable housing would increase the sustainability of the development.

The livable built environment portion relies on an analysis of the density, type of land uses permitted, and proximity of land uses to gauge which code produces a more livable built environment. The study consists of a quantitative analysis of the permitted and required densities. A qualitative discussion of the land uses permitted and the proximity of these land uses will be conducted to supplement the quantitative density discussion. A development will be considered more livable when it provides a proximal, dense, and varied mix of land uses. Connectivity is also an important component of this analysis; however, the analysis does not consider connectivity due to the complexity of the analysis required. The study looks at the minimum and maximum density, the maximum mix of land uses, and the ability of development to support proximal land uses. The study does not take the minimum mix of land uses required by development because this study is primarily concerned with determining the maximum sustainability of the codes. However, the study briefly expounds upon the ability of a development to support uses that are not proximal. This study uses a hypothetical development to provide an example of each code. The purpose of providing a hypothetical development is to clarify the codes comparisons. The hypothetical development is used to analyze analogous code parts in the form-based code and the Euclidean code. The form-based code allows three development styles; however, the development style called the Planned Town or Village (PTV) will be used as the example for the form-based regulation. Within this category, two types of development are permitted and each has a minimum land area: a town and a village. The hypothetical development uses the village development pattern because it requires fewer acres of land.

The Euclidean zoning code uses planned unit developments (PUD) as a flexible alternative to single use zoning. These PUDs are analogous to the form-based code development patterns. The Planned Mixed Use Development (PMUD) is comparable to the PTV along characteristics such as mix of uses, density, intensity, affordable housing requirements, and type of open space required. PMUD zoning is permitted in 14 of 15 future land use categories. The parcels chosen for the hypothetical development analysis are located in the Mixed Use Development (MXD) future land use category. The MXD category has densities and intensities that are comparable to those of the PTV future land use.

The hypothetical development would be within the urban service boundary because the MXD future land use is not permitted outside of the planned public service area. The hypothetical development is 115.47 acres, which exceeds the minimum 110 acre size of a village, to provide an accurate illustration of the codes' development potential. The development is located on Indrio Road and Johnston Road in an area that is encouraged for development. The site is located approximately one mile from the intersection of I-95 and Indrio Road. Currently, the parcel is used for agricultural purposes. The hypothetical development would be built as a complete development and not incrementally as permitted by the plan to immediately illustrate the impacts of the development.

## CHAPTER 4 CASE STUDY: ST. LUCIE COUNTY

St. Lucie County, Florida was the 13th fastest growing county in the country from July 1, 2004 to July 1, 2005 (Christie, 2006). Its 572 acres on the State's East coast was home to 271,961 people as of April 1, 2007 (Bureau of Economic and Business Research, 2008). The county has two major cities, Port St. Lucie and Ft. Pierce, and one village, St. Lucie Village. As of April 1, 2007, 155,315 residents of the county were located in Port St. Lucie while the unincorporated County had 74,039 (Bureau of Economic and Business Research, 2008). Comparatively, Fort Pierce had 41,972 people and St. Lucie Village had 635 people (Bureau of Economic and Business Research, 2008). These population statistics are shown in Figure 4-1.

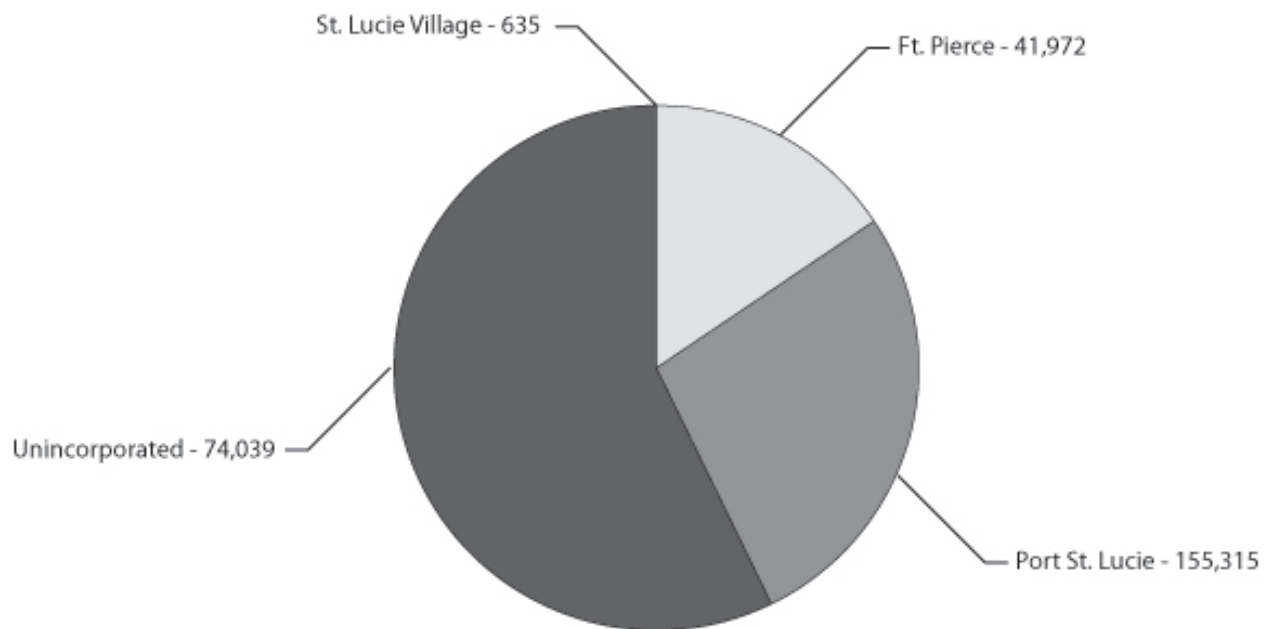


Figure 4-1. St. Lucie county population, April 1, 2007

The county's rapid growth and the desire to prevent the "endless sprawl" that exists in places such as Miami-Dade, Broward and Palm Beach Counties led community leaders and citizen activists in St. Lucie County to temporarily halt development in order to create an alternative to the existing codes (Treasure Coast Regional Planning Council, n.d.). The goal was to preserve countryside, manage water comprehensively, plan for transportation and infrastructure in order to prevent the relocation of the existing urban service boundary (Treasure Coast Regional Planning Council, n.d.). The citizens of the community engaged in a week long charrette, or design workshop, in order to develop a master plan for a 28 square mile area of unincorporated county (Treasure Coast Regional Planning Council, n.d.). The product of this exercise would serve as the foundation for the Town, Village and Countryside (TVC) plan, St. Lucie County's form-based solution to population growth.

In Florida, zoning code policies must be based on the goals, objectives and policies adopted into a local government's comprehensive plan (Florida Statutes. §163.3194, 2002). The Florida Department of Community Affairs (DCA) is the agency responsible for ensuring that each community in Florida has a set of governing principles where urban growth is concerned and regularly updates these principles to be consistent with state law. In order for the County to finalize plans for the TVC plan, which incorporated a form-based code, it had to first be approved by the DCA because it amended several of the required elements in the comprehensive plan and created an entirely new element.

The county's conventional zoning code consists of 30 zoning categories; three agricultural zones, 14 residential zones, three commercial zones, three industrial zones,



three planned development zones, and one each of utilities, institutional, religious, and recreational vehicle zones. In addition to the use restrictions, each zoning category has specific site restrictions. The zoning categories in the St. Lucie land development code are similar to the ones in Dade, Broward and Palm Beach counties which were specifically cited as examples of poor urban form (Treasure Coast Regional Planning Council, n.d.).

### **Town, Village and Countryside Code History**

Correspondingly the Town, Village and Countryside (TVC) code is a form-based response to the unpredictability of the old zoning code. While the form-based codes are not predictive tools, the codes use prescriptive regulation to require a certain general development standard that guide many aspects of development design. With this in mind a community in the County sought to implement a form-based response to the conventional zoning code.

As Northern St. Lucie County residents anticipated sprawling development encroaching from South Florida they sought a new development pattern which would foster community goals and curtail urban sprawl (Treasure Coast Regional Planning Council, n.d.). Residents urged local officials to create a master plan that would preserve countryside, comprehensively manage community infrastructure, maintain the current location of the urban service boundary, and plan for growth in the next 50 years (Treasure Coast Regional Planning Council, n.d.).

In response to the citizen's plea, the county initiated a week long charrette. Charrettes are collaborative planning exercises designed to foster public participation and facilitate implementation of the project (National Charrette Institute, 2010). The

charrette took place February 6, 2004 through February 14, 2004 and its scope included visioning and planning an area in the North Central portion of the county (Treasure Coast Regional Planning Council, 2004). More than 350 people attended a formal charrette event and a local shopping center held an informal walk-up studio where 75 people daily contributed to the visioning exercise (Treasure Coast Regional Planning Council, 2004). Charrette work products were presented to the County Commission and received support. The County proceeded to develop a Comprehensive Plan Element that would support an overhaul of the development code in the study area to include the basis for creating the code, information addressing how the code would be implemented, and a transfer of development rights program necessary for new development to meet the density requirements in the new regulations.

On October 17, 2005 the County sent an adopted Town, Village and Countryside Comprehensive Plan Element to the Florida Department of Community Affairs for review as required by Chapter 163, Part II of the Florida Statutes (St. Lucie County, 2006a). Then on May 30, 2006 the Commission adopted the corresponding Town, Village and Countryside land development regulations and the transfer of development rights program (St. Lucie County, 2006a; St. Lucie County, 2006b). However, after the county had adopted the land development regulations the Department of Community Affairs deemed the comprehensive plan

not in compliance because the new Towns, Villages and Countryside Element and the future land use map amendments are not supported by a demonstration that potable water is available; the Capital Improvements Element does not include transportation facilities needed to support the Towns, Villages and

Countryside Element ... and the Towns, Villages and Countryside Element does not contain sufficient detail regarding income qualification criteria and long term maintenance of the workforce housing. (St. Lucie County, 2007)

This setback was overcome more than a year later on June 5, 2007 prior to an administrative hearing to discuss the matter with the DCA. The County with permission from the DCA adopted an interim Town, Villages and Countryside ordinance that was in compliance with the comprehensive plan. The County is currently using this interim comprehensive plan language. The TVC code consists of three development styles: planned town and village (PTV), planned retail workspace (PRW), and planned country subdivision.

### **PTV Development Pattern**

The PTV district is the namesake of the TVC code and is its primary settlement pattern consisting of residential and commercial uses. Its purpose is to use the principles of traditional neighborhood design to create a sustainable growth pattern characterized by a mix of uses, building types, and income levels on a pedestrian-friendly block and street network. (St. Lucie County, 2010b)

Within the TVC code, the PTV district utilizes settlement principles such as the use of pre-defined neighborhoods, urban-to-rural transect, variety of housing types, civic uses, walkable blocks, proper building placement, interconnected street network, mix of uses, and a provision for countryside to facilitate the TVC goals and objectives (St. Lucie County, 2010a)

Within the PTV district, developers are permitted to develop as either a town or a village. The distinction between the two is determined by the size of the lot and the amount of proposed development. This study's hypothetical development is 115.47

acres and a village inside the urban service boundary is required to be a minimum of 110 acres (St. Lucie County, 2010b). Figure 4-2 shows the location of the TVC area and of the hypothetical development site.

Both towns and villages are comprised of neighborhoods, which are focused development areas with a quarter-mile radius and defined edges (St. Lucie County, 2010a). Approximately two neighborhoods comprise a town and one neighborhood comprises a village. The hypothetical development would be permitted one neighborhood. A hypothetical neighborhood developed by county consultants is discussed in detail in this paper.

Under the TVC comprehensive plan element, the original density of the property is limited to that allowed by the Transfer of Development Value (TDV) map. The TDV map assigns the property a permitted density of five units per acre; however, the TVC element provides for potential density bonuses for development within the USB. Development can also utilize transfer of development rights policies to increase the density of the site. The TVC code mandates a minimum density for proposed towns and villages. The minimum average density for a village inside the USB is 5 dwelling units per acre (St. Lucie County, 2010b).

Villages located inside the USB have reduced open space and countryside requirements in addition to allowing incremental development if a property owner chooses to subdivide (St. Lucie County, 2010a).

### **PMUD Development Pattern**

The Planned Mixed Use Development (PMUD) is roughly equivalent to the TVC's PTV model of development in terms of stated purposes and allowable densities and

intensities. PMUDs have a stated purposes of encouraging a broad range of services in close proximity to their need, allowing efficient use of land, allowing horizontal and vertical juxtaposition of land uses, encouraging uses that are compatible with the surrounding land uses, and permitting the preservation of natural features (St. Lucie County, 2010b).

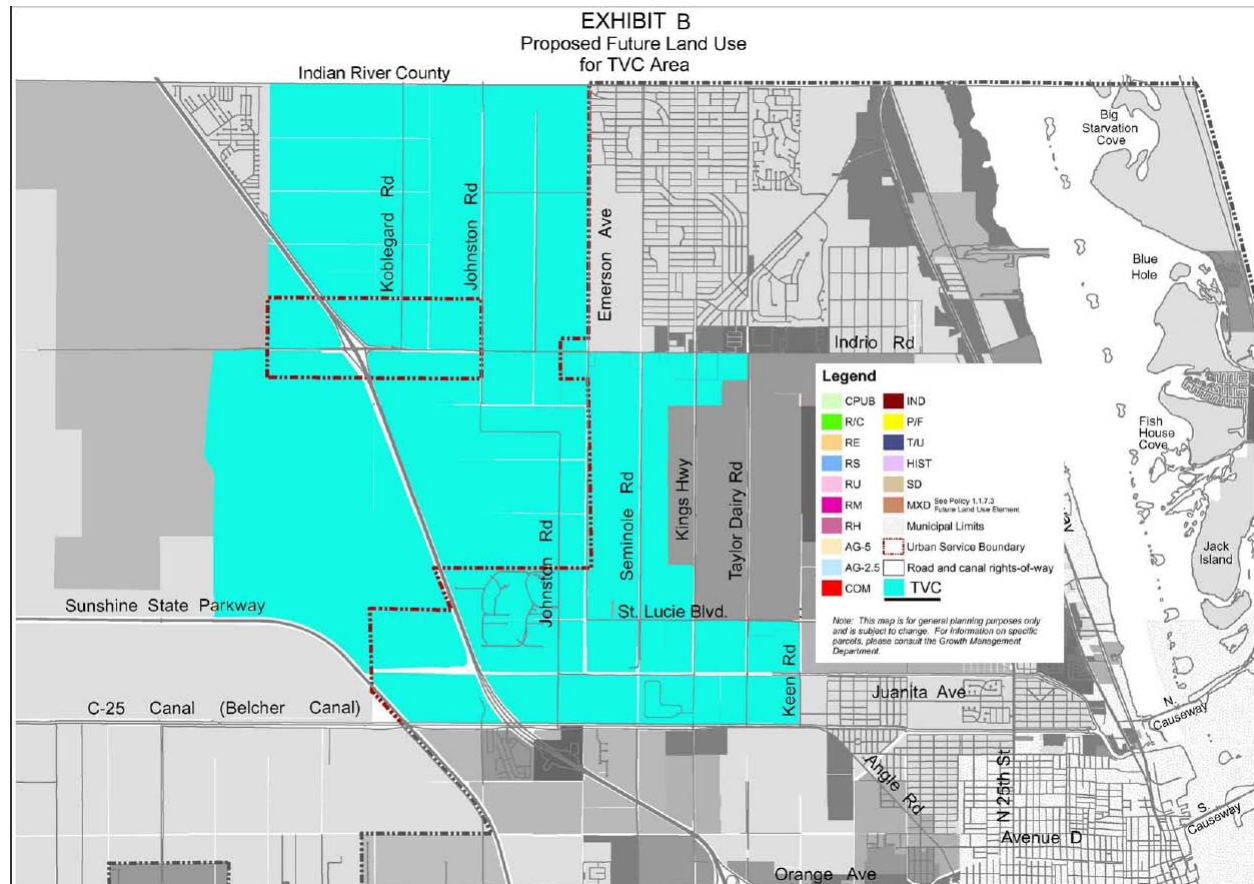


Figure 4-2. TVC future land use [Source: St. Lucie County, 2010a]

The minimum size for a PMUD is restricted to one acre per land use and an additional acre for each land use over the first. The low minimum acreage required by the PMUD contrasts sharply with higher minimum acreage for towns and villages. For the purposes of this study, a hypothetical development will be used to provide continuity when analyzing the PMUD and TVC development.

The hypothetical development in this study is located in the Low Intensity MXD future land use category, which allows a maximum density of five units per acre and a maximum non-residential intensity of 0.5 Floor Area Ratio (FAR). Figure 4-3 shows the previous future land use conditions prior to the adoption of the TVC element.

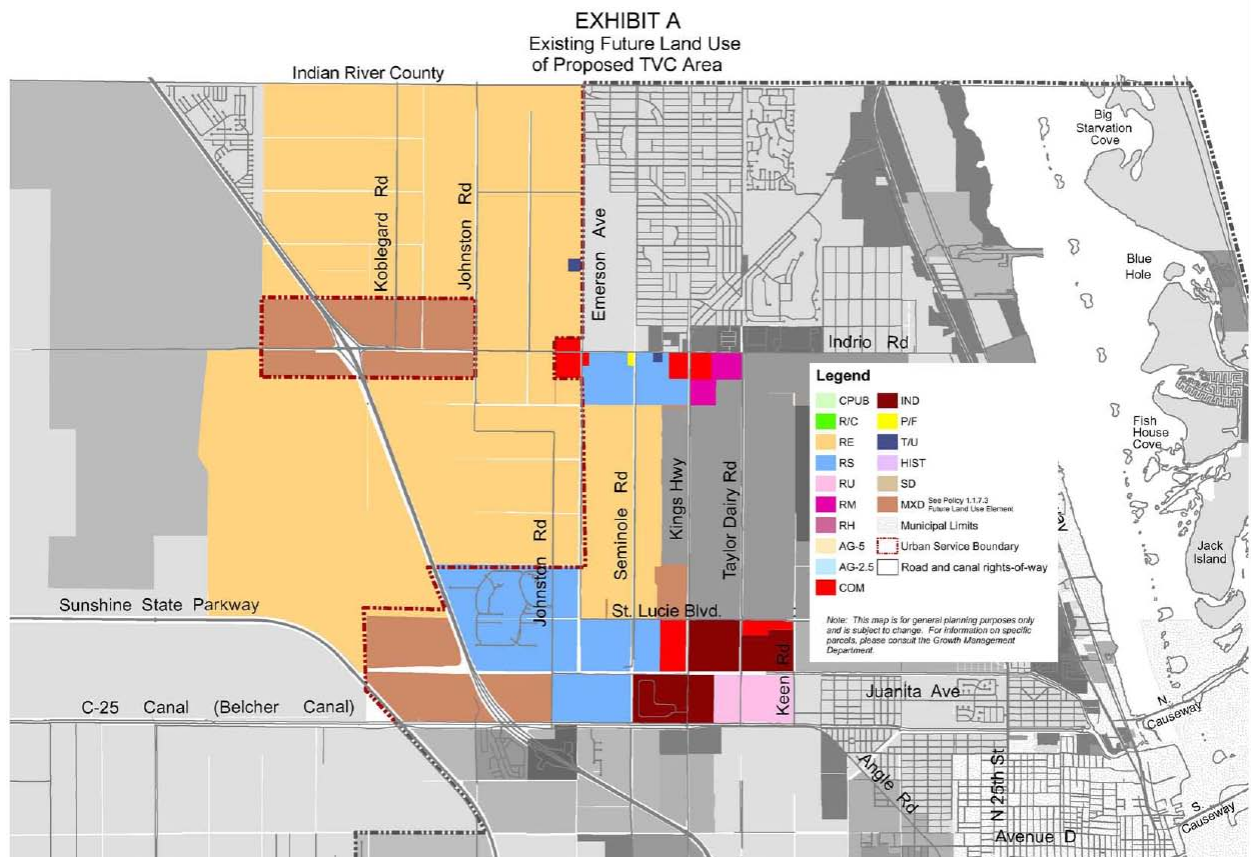


Figure 4-3. Previous future land use districts [Source: St. Lucie County, 2010a]

### Comparing the Codes: Sustainability

This study seeks to determine whether the TVC code is more sustainable than the zoning regulation that it replaced. Sustainability can be viewed in terms of sustainability principles (Berke & Conroy, 2000). This study uses the sustainability principles to compare the TVC plans and codes with conventional zoning regulations and a

quantitative and/or qualitative study and discussion ensues. The intent is to determine which code is a more sustainable set of development regulations. This section will use three of the six sustainability principles identified in the Berke and Conroy study of sustainability of comprehensive plans (2000) as a framework to guide the study and ultimately to gauge the sustainability of the codes. The goal will be to determine which code is more sustainable. The three sustainability principles used are harmony with nature, equity, and livable built environment.

### **Harmony With Nature**

When development codes promote a healthy natural environment they foster one aspect of sustainability (Berke & Conroy, 2000). There are many ways that a code can create a place in harmony with nature. It can promote energy efficiency through an appropriate mix of land use and transportation, support and protect viable ecosystems and wildlife, or reduce the sources and impacts of pollution (Berke & Conroy, 2000).

This investigation of harmony with nature focuses on open space requirements, which is one measurable data set available in both the TVC code and the zoning code. Open space is a meaningful indicator of harmony with nature because open space policies can facilitate objectives designed to improve water quality and mitigate flood damage, protect and restore stream channels, conserve wildlife corridors and riparian habitats, promote aquifer recharge, and protect wetlands (Randolph 2004, Page 96). Open spaces can also provide habitat for plants and animals, provide filtration for storm water runoff, mitigate flooding, reduce noise and help regulate climate (Bullock, 2005, p. 49).

The study of open space seeks to determine which code requires more open space and what is required as part of the open space to resolve which code's open space requirements are more in harmony with nature, and thus more sustainable. The research hypothesis is that the TVC code is more sustainable than the conventional regulations in terms of the amount and quality of open space required for new development.

The TVC code requires villages to have both open space and countryside. Open space does not address environmental issues and is therefore not applicable to question of harmony with nature. Open space, as defined in the TVC element, can be civic uses, targeted industry, higher education, large lots, and workforce housing (St. Lucie County, 2010a). Countryside does have environmental components. It is comprised of agriculture, native habitat and environmentally sensitive areas, water management flow ways, and community amenities such as recreation areas, parks, greens and squares and golf courses (St. Lucie County, 2010a).

The TVC development pattern requires countryside elements to create "an interconnected system (St. Lucie County, 2010a)." Included in this system are native habitat preserves, greenways, parks, and open space (St. Lucie County, 2010a). Additionally, the TVC element has the goal of restoring the natural flow of water on the site through a connected storm water management flow way system (St. Lucie County, 2010a). In the PTV district, villages developed inside the USB are required to have 40% of the area devoted to countryside.

In contrast with the TVC's village development pattern, the zoning code open space definition includes recreation areas, natural preserves, landscaping and common



areas greater than one acre, previous recreation areas such as playgrounds, golf courses, outdoor agricultural activities, water bodies, and storm water retention and detention facilities (St. Lucie County, 2010b).

The code requires PMUDs to commit "a minimum 35% of the gross area" to open space (St. Lucie County, 2010b). The code also requires the preservation of "15% of any existing native upland habitat on the property" which can be used towards the 35% requirement (St. Lucie County, 2010b). For any additional upland habitat protected, 150% credit is provided towards the 35% requirement for each acre over 15% (St. Lucie County, 2010b). Table 4-1 below summarizes the open space or countryside requirements of each code (St. Lucie County, 2010b).

Table 4-1. Open space requirements and uses

	Open Space/ Countryside	Open Space Uses
Village (PTV)	65% outside USB 40% inside USB	Agriculture Native habitat Environmentally sensitive areas Water management flow ways Community amenities Recreation areas Parks Greens Squares Golf courses
Planned Mixed-Use Development (PMUD)	35% or less*	Recreation areas Natural preserves Landscaping and common areas greater than one acre Playgrounds Golf courses Outdoor agricultural activities Water bodies Storm water retention and detention facilities

Source: St. Lucie County, 2010b

\* Could be less depending on the quantity of native uplands preserved

To facilitate a practical understanding of the code, the hypothetical development is used here as a tool to clarify the regulation's possibilities. If the 115.47 acre hypothetical development site contained no native upland habitat, the TVC code would require a minimum of 40% or 46.19 acres as countryside, while the PMUD development style would require a minimum of 35% or 40.41 acres as open space. This 5.78 acre disparity is a quantitative indication that the TVC code provides more open space.

The addition of native upland habitat to a development site can affect the actual open space required. If 30 acres of the site were vegetated with native upland habitat there would be no impact to the amount of countryside required under the TVC regulations. Habitat type does not alter the amount of required countryside; 40% of the site must be comprised of countryside. The hypothetical TVC development would be required to designate 46.19 acres of land as countryside regardless of the site conditions. But under the PMUD regulations, the total amount of open space could be reduced based on the amount of upland habitat preserved.

In the PMUD development style, native upland habitat on a site can affect the actual open space provided. If 30 acres of native upland habitat is located on a site, the code allows a reduction in the amount of open space below 35% of the site area. The PMUD section of the zoning code requires the preservation of 15% of all native upland habitat regardless of further open space designation on the site. With 30 acres of native upland habitat on a site, the mandatory preservation of native upland habitat equals 4.5 acres.

Further preservation of native upland habitat can be counted toward open space at a rate of 150%. After the mandatory 4.5 acres is subtracted from the 30 total acres, 25.5

acres remain. The remaining acres of native upland habitat can then be given 150% credit towards the open space requirement. At 150% open space credit per acre, 25.5 acres is effectively 38.25 acres of open space. In total the 30 acres of native upland habitat on the site can be credited as 42.75 acres of open space (38.25 acres plus 4.5 acres).

In order to achieve the minimum required open space the development must preserve the first 15% of the native upland habitat or 4.5 acres, and an additional 23.94 acres of native upland habitat at a rate of 150% per acre. In total, the PMUD development could meet the open space requirements by preserving only 28.44 acres of habitat.

The PMUD code places a priority on protecting native upland vegetation while the TVC code merely encourages diverse vegetation, elevations, and drainage conveyances to establish a healthy ecosystem (St. Lucie County, 2010a). TVC areas however, are primarily improved agricultural lands with an extremely limited number of environmental resources based on a review of aerial photos. Therefore, a decreased emphasis on protecting native vegetation is not as detrimental as it may be in areas with greater environmental resources.

Ultimately, since environmental resources are limited in this area, a greater quantity of open space becomes the most important environmental criteria. New open space creates habitat for animals, facilitates re-vegetation of the environment, and better manages storm water runoff. Since the TVC code provides a greater quantity of countryside than the PMUD and does not have provisions to reduce the required

amount of open space based on habitat protection, the TVC better facilitates a harmony with nature as it relates to providing open space.

## **Equity**

This section of the study aims to measure the equity of the St. Lucie County codes. Equity refers to the ability of low-income populations to access basics such as a healthy environment, and social and economic resources (Berke & Conroy, 2000). Affordable housing is one appropriate measure of equity because it can facilitate low and moderate income housing in areas that may not be inclusive of such populations. This study uses the St. Lucie County affordable housing codes and policies as a metric for a qualitative analysis of housing equity.

Housing is deemed affordable when a household spends 30% or less of their gross salary on housing expenses (Schwartz & Wilson, n.d.). Affordable households are segmented into groups by income range expressed as a percentage of the Area Median Income (AMI). Workforce housing is one segment defined as households that make 80% to 120% of AMI and was used in this study because it provides a consistent metric between the codes (St. Lucie County, 2010b). No policies or codes explicitly addressed income segments lower than the workforce housing segment.

Both the conventional regulations and the TVC code attempt to promote affordable housing and target households in St. Lucie County. In the existing comprehensive plan the County creates public and private incentives for affordable housing, which include "density bonuses, fast-track processing, maintaining the current supply of land designated and zoned for high density development and maintaining a minimum twenty-five percent (25%) surplus of vacant residential land within the Urban Services Area

Boundary (St. Lucie County, 2010a)." In addition to comprehensive plan policies, the County supports public initiatives such as the Housing Authority of Ft. Pierce which administers the Section 8 housing program, the Community Development Block Grant program and the SHIP program. By mixing these incentives for public and private affordable housing development the County hopes to meet its affordable housing needs.

The TVC element of the comprehensive plan and the TVC code both have prescriptive workforce housing requirements mandating 8% of the available housing units in the TVC area be affordable for households making 80% to 120% of AMI (St. Lucie County, 2010a). The workforce housing is required to remain affordable for at least 25 years (St. Lucie County, 2010a).

The county commissioned a residential market analysis of the TVC area by Zimmerman, Volk and Associates (2005) when it was considering the financial aspects of the residential portion of a hypothetical development. The market analysis indicates that the AMI of the County in 2004 was \$40,000 per household. A household making \$40,000 per year lives in an affordable home when it spends 30% of its income on housing. A household spending 30% of the \$40,000 AMI on housing expenses spends \$12,000 per year or \$1,000 per month. Households making 80% of median income, or \$32,000 per year, are living in an affordable house when they spend 30% of their income or approximately \$800 per month on housing expenses and households making 120% of median income are living in affordable housing when they spend approximately \$1,200 per month on housing expenses.

According to the study, the median home price in the county was \$120,700 in 2004 (Zimmerman, Volk and Associates, 2005). A dwelling unit at this price costs approximately \$800 dollars per month using a 30 year mortgage term and 6% interest rate (Bankrate.com, 2011). Therefore, the median housing in the County in 2004 was affordable to households at the low end of the workforce housing spectrum that make 80% of AMI.

The Zimmerman, Volk and Associates (2005) housing feasibility study analyzes the residential market conditions of a hypothetical prototype neighborhood in the Urban Service Boundary. The study's hypothetical prototype neighborhood inside the Urban Service Boundary consists of 125 acres and an optimum mix of 980 housing units. These units consist of multifamily for-rent units, multifamily for-sale units, and single family units in varying price brackets. Combined, the total development consists of 28.5% multi-family housing and 71.5% single family housing.

The hypothetical development proposal by Zimmerman, Volk and Associates (2005) allocates 19.4% of the total development units, or 190 units, as multi-family for-rent. The study proposes a rental price between \$900 and \$1,400 per month. These units would be affordable to households making between 90 and 140% AMI.

The lowest priced units in the study, and most affordable units overall, were multi-family for-sale residences, consisting of condominiums and two-level units. The study proposes 89 multi-family for-sale units in the hypothetical development, equating to 9.1% of total housing. These units are estimated to cost between \$125,000 and \$200,000 with approximate monthly payments between \$599 and \$959 and would be affordable to households making 59.9 to 95.9% of the AMI.

Single-family attached for-sale housing consisting of townhouses and attached villas comprise the next tier of pricing. The least expensive of these units are affordable for households qualifying for at the high end of the workforce housing spectrum. The study includes 65 single-family attached for-sale units which comprise 6.6% of all proposed units. The study anticipates that these units will be sold for \$240,000 to \$290,000. At this price range, monthly rent would cost between \$1,151 and \$1,390 per month. There is potential that these products could remain affordable to households making between 115 and 120% of AMI.

Some single-family detached for-sale housing is also priced at levels affordable to households making up to 120% of median income. The low-range of single family detached houses is estimated to cost \$225,000 to \$310,000 and has a monthly payment of \$1,079 to \$1,486. Similar to the attached single-family product, some of the low-range detached single family homes are affordable to households making between 107 and 120% of AMI. These units are more affordable and more numerous than their attached counterpart. The hypothetical development proposes 175 of these units or 17.9% of total residential development.

Mid-range and high-range single-family detached houses are not affordable to households with workforce housing incomes. The mid-range houses are estimated to cost \$340,000 to \$440,000. The monthly payment for these houses ranges between \$1,630 and \$2,110 per month and are affordable to households making between 163 and 211% of AMI. The mid-range product is the most numerous in the study with an anticipated allocation of 305 units comprising 31.1% of the entire residential portion of the development.

Table 4-2. Optimum market position of a compact infill neighborhood prototype inside the urban service boundary

Type of Housing	Number of Units	Percentage of Total Units	Estimated Cost per Unit (in dollars)		Estimated Monthly Payment* (in dollars)		Percent of Median Income (Rounded to nearest percent)	
			Low	High	Low	High	Low	High
Multifamily for rent (rental units in apartment buildings and accessory units)	190	19.4	n/a	n/a	900	1400	90%	140%
Multi-family for-sale (condominium flats and two-level units)	89	9.1	125,000	200,000	599	959	60%	96%
Single-family attached for-sale (townhouses and attached villas)	65	6.6	240,000	290,000	1151	1390	115%	139%
Low-range single-family detached houses	175	17.9	225,000	310,000	1079	1486	108%	149%
Mid-range single-family detached houses	305	31.1	340,000	440,000	1630	2110	163%	211%
High-range single-family detached houses	156	15.9	500,000	600,000	2398	2877	240%	288%

Source: Zimmerman, Volk and Associates, 2005

\* calculated using 6% interest rate, 30 year loan term, and mortgage amount equal to estimated cost minus 20% down payment.

<http://www.bankrate.com/calculators/mortgages/mortgage-calculator.aspx>

The high-range single-family detached housing product is projected to cost between \$500,000 and \$600,000 with an projected monthly payment between \$2,398



and \$2,877 per month. This amount is affordable to household making between 239 and 287% of AMI. The study includes 156 units in this range which amounts to 15.9% of total units. Table 4-2 is adapted from a study by Zimmerman, Volk, and Associates (2005) and summarizes the preceding information.

A minimum of 8% of the total units are required to be affordable to households qualifying for workforce housing as required by the St. Lucie County Comprehensive plan (St. Lucie County, 2010a) . This represents 79 units in the hypothetical development.

In total, a maximum of 519 units could be constructed as workforce housing although this figure is derived by assuming the lowest priced unit is built in each housing type. The number of affordable housing units built in this unlikely scenario represents approximately 53% of the 980 total units.

The actual demand for workforce housing, as estimated by the Shimberg Center for Affordable Housing studies (n.d.), is projected to be approximately 23% of total housing in 2010. Workforce housing demand is expected to remain between 23% to 24% of total households as projected through 2025 (Shimberg Center for Affordable Housing Studies, n.d.). Assuming that the need for workforce housing is evenly distributed across the entire county then 23% of the households looking for housing in the optimal neighborhood will qualify for workforce housing. In this scenario, a shortfall of 15% of units needed to fully accommodate workforce housing would result. In order to achieve the maximum of 23% workforce households, 226 units must be affordable to households making between 80 and 120% of median income.

Unaccounted for in the comprehensive plan or land development regulations is a requirement to provide for low income households, 30 to 50% AMI, and moderate income households, 50 to 80% AMI. Households making 0 to 80% of median income represent approximately 38% of 2010 projected households in St. Lucie county and are estimated to maintain that percentage of total households through 2025 (Shimberg Center for Affordable Housing Studies, n.d.).

Within this hypothetical development plan, it is possible that moderate income households could potentially find units within their price range. Multi-family for-sale units have a minimum study price that would constitute an affordable housing for some moderate income households making between 60 and 80% AMI (Zimmerman, Volk and Associates, 2005). In the study, a maximum of 89 units or 9.1% of residential units, could be developed at this price.

Although the hypothetical development provides housing for workforce and potentially moderate income households, the development is skewed toward a community for a wealthier population. The Shimberg Center affordable housing projections for households making 0 to 120% of AMI indicate that the segment is expected to represent over 61% of total households in 2010 (Shimberg Center for Affordable Housing Studies, n.d.). In 2025, Shimberg Center for Affordable Housing Studies (n.d.) data projects that this segment will increase to over 62% of household population.

At a maximum, 53% of the units in the hypothetical development may be affordable. The hypothetical development does not account for the entire 62% need projected within the county for incomes ranging from 0 to 120% of median income.

Accounting solely for workforce housing, there is a small potential that the maximum need can be met. More likely, development will include workforce housing in quantities closer to the 8% minimum required in order to maximize profits.

The County's approach to affordable housing development in areas outside of the TVC is to implement density bonuses and fast-track processing, and maintain the current supply of land designated zoned for high density development and a minimum twenty-five percent (25%) surplus of vacant residential land within the Urban Services Area Boundary (St. Lucie County, 2010a)." In addition to comprehensive plan policies, the County supports public initiatives such as the Housing Authority of Ft. Pierce which administers the Section 8 housing program, the Community Development Block Grant program and the SHIP program. There is no requirement for affordable housing in new developments.

While there is no explicit requirement for new development to provide any type of affordable housing, there is a significant amount of vacant housing available within the entire County. The United State Census American Fact Finder survey has projected in its 5-year average estimate for 2005 to 2009, that of the approximately 127,648 housing units in the County, approximately 22.6% or 28,795 units are vacant (U.S. Census Bureau, 2009). In 2005, closer to the time of adoption of the TVC comprehensive plan amendment, the Census determined that there were approximately 117,020 housing units and approximately 18% or 21,908 units were vacant (U.S. Census Bureau, 2005). The instance of vacancy throughout the country has risen in the wake the credit crunch and resulting housing crises in 2007 and 2008 (Brunnermeier, 2009).

The demand for affordable housing is anticipated to increase. The County's data and analysis indicates that from 2007 through 2030, an additional 4,999 households, or 51.5% of total households, will have an income less than 80% of AMI. Additionally, during the same time period the County projects that 7,010 households, or 72.3%, will have an income less than 120 area median income (St. Lucie County, 2010a).

The PMUD development style provides a framework of flexibility that could accommodate affordable housing but does not necessarily provide it. The County's approach to providing affordable housing in areas designated PMUD lacks a definitive requirement that addresses lower income populations and it relies primarily on an abundance of vacant land set aside for affordable housing as stipulated in the comprehensive plan for providing affordable housing. While vacant land with an appropriate future land use may not be sufficient to spur affordable housing, the County can also rely on existing vacant housing supplies to alleviate concerns in the near term because of a relatively high vacancy rate.

In TVC development, a minimum of 8% of the lots must be workforce housing and there is no requirement for low and moderate income housing. Like the PMUD development style, the TVC code provides the flexibility to accommodate populations making between 0 and 80% AMI, but there is no requirement to do so. In fact, in the near term, demand for walkable development is high and existing walkable areas command price premiums (Leinberger, 2007, p.4). Housing cost are increased because buildings are required to meet architectural standards (Rosen & Katz, 1981, p.325). Alternatively, studies have shown that infrastructure costs are reduced when densities increase (Kimball, 1997, p.10).

Though TVC policies may further segmenting the County's population because of reduced opportunities for low income housing, its effects are not egregious when compared with conventional development. The TVC code provides for more mandated workforce housing than the PMUD. Between the PMUD and the TVC, the TVC may have limitations of increased costs and price premiums, which may be offset by infrastructure savings (Leinberger, 2007; Kimball, 1997). While the results of this study may lean towards the TVC providing greater equity based on workforce housing requirements, an increase in the size of the TVC area should warrant further study into the viability of providing long term affordable housing for all segments of the population.

### **Livable Built Environments**

Livable built environments conform to and promote the type of activities that inhabitants desire by designing physical spaces and managing characteristics such as "location, shape, density, mix, proportion, and quality (Berke & Conroy, 2000)." One aspect of a livable built environment is its ability to foster "access among land uses" with the ultimate goal of creating a sense of place (Berke & Conroy, 2000). By evaluating planning and/or design standards in the St. Lucie County Land Development Code and TVC code, this paper seeks to determine whether the TVC land use strategies create a more livable built environment than conventional zoning strategies by qualitatively analyzing the ability of the codes to create developments that have a proximal mix of land uses.

In order to measure which code produces a more livable mixed use environment, the analysis investigates density, use, and location policies and regulations for both the PMUD and TVC development styles. In this study, a development that is more livable

will be more dense, have a greater diversity of uses, and will have uses that are proximal. This study is divided into three distinct sections: a study of density, a study of use, and a study of proximity of land uses.

### **Livable built environments: density**

Density is integral to a functional mixed use environment (Knaap, Huibert, Clifton & Frece., 2007, p. 73). Greater urban densities have been shown to increase walking and public transit ridership (European Conference of Ministers of Transport, 2007, p. 123).

In the PMUD, the permitted density is governed by one of three intensities of underlying Mixed Use Development (MXD) future land use: High Intensity, Medium Intensity, and Low Intensity (St. Lucie County, 2010a; St. Lucie County, 2010b). PMUD developments in the High Intensity MXD land use are mandated to have a minimum of five dwelling units per acre and a maximum of 15 dwelling units per acre (St. Lucie County, 2010b). PMUD developments in the Medium Intensity MXD land use are required to have a minimum of five dwelling units per acre and a maximum of nine dwelling units per acre (St. Lucie County, 2010b). Finally, PMUD developments in the Low Intensity MXD land use have no minimum requirement and are limited to a maximum of five dwelling units per acre (St. Lucie County, 2010b). In the PMUD, residential land uses may not exceed 40% of the development (St. Lucie County, 2010b).

In the TVC's PTV district, the permitted density has two components: an overall base density per parcel regulated by the comprehensive plan and a required density mandated by the TVC regulations. A base density is established on a per site basis by

the Transferable Development Value Map in the TVC element of the comprehensive plan. Base densities range from zero to nine units per acre.

In addition to the base density, the County mandates a minimum density for PTVs. In order to increase density on a potential site to meet or exceed the minimum required density, the County created a transferable development rights program where density from one site within the TVC area could be moved to another site.

Required minimum densities vary based on whether the development is a Planned Town or a Planned Village. In a Planned Town the minimum average density required is five dwelling units per acre outside the Urban Service Boundary and six dwelling units per acre inside the Urban Service Boundary (St. Lucie County, 2010b). A Planned Village is required to have a minimum density of five dwelling units per acre regardless of its location (St. Lucie County, 2010b). The PTV has no maximum density.

The hypothetical development could have drastically different densities under the PMUD and PTV development styles. Using the PMUD the development is limited to a density of five dwelling units per acre. On the 115.47 acre site, the PMUD development would allow a maximum of 577 dwelling units. Since the hypothetical development is inside the USB, the PTV requires a minimum density of six units per acre which equates to a minimum of 692 dwelling units. The dwelling unit study performed by Zimmerman, Volk and Associates (2005) determined that the optimum mix of housing in a village sited on a 125 acre site would be comprised of 980 dwelling units. Since there is no maximum number of units permitted in the PTV, the number of units on a site is only limited by the amount of funding to purchase development rights and therefore, they could potentially climb much higher than 980 units.

Urban densities should be higher within the urban service boundary rather than outside of it and PTV development provides a framework to achieve greater density than the PMUD development style.

### **Livable built environments: mix of uses**

In addition to density, development must also have a functional mix of uses to maintain a sustainable environment (Knaap, Huibert, Clifton & Frece., 2007, p. 98). A functional mix of uses can be characterized as a mix of residential and commercial uses and can be analyzed at various grains (Knaap, Huibert, Clifton & Frece., 2007, p. 87). Land use mix can be analyzed within an area, within an individual building, and over time (Knaap, Huibert, Clifton & Frece., 2007, p. 88). This portion of the study is primarily concerned with the permitted uses within the development area.

The zoning code's PMUD allows permitted uses that are governed by the MXD future land use district in the comprehensive plan. Permitted residential uses in the MXD future land use district include a variety of housing types ranging from estates homes on one acre to multifamily homes at a density of 15 units per acre. Non-residential development permitted in the district includes neighborhood commercial, commercial office, commercial general, light and heavy industrial, institutional, and utility uses. Within the MXD district there are three intensity plans: High, Medium and Low. Each intensity plan delineates the permitted uses (St. Lucie County, 2010a; St. Lucie County, 2010b).

The greatest range of residential and nonresidential uses is permitted in the High Intensity MXD future land use area and the smallest range is permitted in the Low Intensity MXD future land use area (St. Lucie County, 2010a; St. Lucie County, 2010b). High Intensity allows the most dense and intense development, while Low Intensity



allows the least intense uses and the lowest density (St. Lucie County, 2010a; St. Lucie County, 2010b). Medium Intensity is between the High and Low Intensity in terms of range of uses, intensity of uses, and number of uses (St. Lucie County, 2010a; St. Lucie County, 2010b).

Prior to the implementation of the TVC element of the Comprehensive Plan, the land on which the hypothetical development is sited was designated low intensity MXD (St. Lucie County, 2010a). Low intensity MXD allows the uses shown in Table 4-3 (St. Lucie County, 2010a). Residential uses in the table indicate the permitted density per acre.

Table 4-3. MXD low intensity permitted uses

Residential Uses	Non-Residential Uses
Multiple-Family-5	Commercial, Neighborhood
Residential, Mobile Home-5	Commercial, Office
Residential, Estate - 1	Commercial, General
Residential, Estate - 2	Industrial, Light
Residential, Single-Family - 2	
Residential, Single-Family - 3	
Residential, Single-Family - 4	

Source: St. Lucie County, 2010a

PTV uses are based on lot types established in the land development regulations. There are 12 lot types which are listed in Table 4-4 (St. Lucie County, 2010b). Each lot type is assigned permitted uses that can be used flexibly to implement the development's regulating plan. The lot types allow a variety of high and low density residential land uses as well as non-residential uses. The permitted uses are listed in Table 4-5 (St. Lucie County, 2010b).

The hypothetical development would permit similar uses under the PMUD and PTV zoning categories. The permitted uses for both the PMUD and the PTV are the same except for three zoning categories: Industrial Light, Industrial Heavy and

Commercial General. These zoning districts and their uses are not permitted in the PTV district while they are permitted in the PMUD district. The Commercial General zoning district contains 50 distinct uses. While Commercial Neighborhood and Commercial Office uses are permitted in the PTV and do allow some of the uses in the Commercial General zoning district, a majority of these uses are not permitted in the PTV. The PMUD does allow Commercial General zoning and its 50 uses. One significant use permitted in the commercial general zoning district is movie theatres.

Table 4-4. PTV lot types

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Civic Building Lot
Mixed-Use Building Lot
Retail Building Lot
Apartment Building Lot
Live/Work Building Lot
Apartment House Lot
Rowhouse Lot
Cottage House Lot
Sideyard House Lot
House Lot
Estate Lot
Countryside Tract

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Source: St. Lucie County, 2010b

Similarly, PTV does not permit Light or Heavy Industrial zoning while the PMUD does allow these zoning districts. Although zonings purpose at its inception was to separate incompatible uses and it is common practice to separate industrial uses from commercial and residential uses, there is a need for industrial zoning in the hinterland when developed in conjunction with residential development (Keeler & Burke, 2009,196). The preclusion of Commercial General and Industrial zoning categories is one of the major drawbacks to a livable built environment in the TVC.

The PMUD district allows both Commercial General and Industrial categories in certain cases and therefore can provide a more efficient mix of uses when looking at a

development at a macro level. The PMUD district also limits residential development to 40% of the development's land area leaving a large area for employment generating uses. By placing employment centers in the same area as housing areas, roadway trips to and from work are shorter for the employees who live in nearby neighborhoods. This system of siting employment centers close to housing is more efficient than the TVCs requirement that neighborhood residents commute longer distances to work. Therefore, the PMUD has the potential to provide a more meaningful mix of uses in close proximity than the TVC.

Table 4-5. PTV permitted uses

Residential Uses	Non-Residential Uses
Two-family dwellings	Commercial, Neighborhood (CN)
Multiple-family dwellings (3 or more units)	Commercial, Office (CO)
Community Residential Homes	Institutional (I)
Family Residential Homes [beyond 1,000']	Family Day Care Homes
Family Residential Homes [within 1,000']	Bed and Breakfast Residences
Single-family detached dwellings	Religious Facilities (RF)
Residential Accessory Uses	Civic Uses
	Countryside Uses

Source: St. Lucie County, 2010b

### **Livable built environments: proximity**

Land-use planning is a tool to organize uses and to manage growth for the benefit of the public and applies to the location and function of land use categories (Nolon, 2006, p. 263). Development that supports a proximal mix of uses reduces transportation costs and offers opportunities for public transportation, biking, and walking (Nelson, 2007, p. 32). In order to determine which style of development produces more proximal development, this study first investigates the pattern of development.

PMUD development organizes permitted uses based on a road network matrix where the road capacity prescribes the permitted siting of allowable uses. Table 4-6 is comprised of a road network matrix with road classifications, uses, and projected average daily trips (St. Lucie County, 2010b). Within the matrix, roads with larger projected trips allow a larger range of uses. Arterial roads and collector roads are the largest corridors and have 4,501 to greater than a 10,000 projected trips per day, are permitted to have the most dense and intense development. These street types allow industrial, public services, general commercial, office, institutional and some residential. The local general roadway classification is compatible with all of the uses permitted in arterials and collectors as well as duplexes, triplexes and neighborhood commercial. The local residential classification allows institutional, neighborhood commercial and all residential uses including single family.

In a Planned Town or Village, allowable uses are based on the application of transect zones in a regulating plan (St. Lucie County, 2010b). There are six zones though not all are required. From most dense to least dense, they include: Core, Center, General, Edge, Fringe and Rural. Principles to guide the placement of transects zones include "similar uses should face across streets", areas adjacent to highways and busy streets may allow Core or Center transect zones, and when adjoining existing development, neighborhoods should establish similar transect conditions (St. Lucie County, 2010b).

All of the land within a PTV must be designated as one transect zone and cannot be designated more than one. Each transect zone allows certain lot types. There are 12 lot types as described in Table 4-4. Each lot type allows a certain uses. Each transect

zone is assigned multiple lot types which, in turn, regulate uses within the development. Table 4-7 specifies which the lot types that are permitted in each transect zone (St. Lucie County, 2010b). Table 4-8 provides a matrix to determine allowable uses in each lot type (St. Lucie County, 2010b).

Table 4-6. Compatibility of uses vs roadway classification & impact of use in PMUD

Use	Arterial	Collector	Local General	Local Residential
Residential (individual single family)				< 4,500
Residential (individual two or three family)			< 4,500	< 4,500
Residential (other)	> 10,000	4501 - 10,000	< 4,500	< 4,500
Institutional	> 10,000	4501 - 15,000	< 7,500	< 4,500
Professional Service / Office	> 10,000	4501 - 15,000	< 4,500	
Neighborhood Commercial			7,500	4,500
General Commercial	> 10,000	4501 - 10,000	< 4,500	
Public Services / Utilities	> 10,000	4501 - 10,000	< 4,500	
Industrial	> 10,000	4501 - 15,000	< 7,500	

Source: St. Lucie County, 2010b

The Core transect allows only the most dense and intense lot types. This ensures that when an area is designated Core, it provides a large amount of housing and services within a relatively small area. The Center transect allows the greatest diversity of lots. All of the lot types permitted in the Core are also allowed in the Center. Additionally, the Center allows a greater variety of multi-family residential lot types. The General transect zone is a designated residential area because commercial lots are not permitted. It allows all residential lots except for the least dense estate lot and

countryside tract. The Edge transect zone allows suburban style, low density, development, allowing house lots and estate lots which provide a single-family option within the development. Finally, the Fringe transect is comprised of estate lots and countryside tracts. These lots provide a single-family option on large lots.

Table 4-7. TVC allowable lot types per transect zone

	Core	Center	General	Edge	Fringe
Civic Building Lot	x	x	x	x	x
Mixed-Use Building Lot	x	x			
Retail Building Lot	x	x			
Apartment Building Lot	x	x	x		
Live/Work Building Lot	x	x	x		
Apartment House Lot		x	x		
Rowhouse Lot		x	x		
Cottage House Lot		x	x		
Sideyard House Lot		x	x		
House Lot			x	x	
Estate Lot				x	x
Countryside Tract					x

Source: St. Lucie County, 2010b

The hypothetical development is located in an undeveloped greenfield. Because of this, when looking at the potential developments at a macroscopic level, differences in proximity between land uses is negligible when comparing development styles. The subject parcel is relatively small and all uses will necessarily be close together regardless of which code is used.

To look at the developments at a finer scale, one that would be helpful for analyzing the ability of citizens to use alternative methods of transportation such as walking and biking, this study investigates the pattern of development permitted by the code. The PMUD development style relies primarily on the roadway classification table

Table 4-8. Permitted uses per lot type in PTV

	Mixed- Use Building Lot*	Retail Building Lot	Apartment Building Lot	Live/Work Building Lot	Apartment House Lot	Row house Lot	Cottage House Lot	Sideyard House Lot	House Lot	Estate Lot	Civic Building Lot	Country- side Tract
Single-family detached dwellings							P	P	P	P		
Two-family dwellings	P*			P		P						
Multiple-family dwellings (3 or more units)	P*	P	P	P	P	P						
Community Residential Homes	P*	P	P	P	P	P				C	P	
Family Day Care Homes	P*	P	P	P	P	P	P	P	P	P	P	
Family Residential Homes [beyond 1,000']	P*	P	P	P	P	P	P	P	P	P	P	
Family Residential Homes [within 1,000']	P*	P	P	P	C	C	C	C	C	C	C	P
Bed and Breakfast Residences	P*	P	P	P	C	C				C		
Residential Accessory Uses	P*	P	P	P	P	P	P	P	P	P	P	

Table 4-8. Continued.

	Mixed- Use Building Lot*	Retail Building Lot	Apartment Building Lot	Live/Wor k Building Lot	Apartment House Lot	Row house Lot	Cottage House Lot	Sideyard House Lot	Hous e Lot	Estat e Lot	Civic Building Lot	Country- side Tract
Civic Uses	P	P		P							P	P
Countryside Uses												P
Commercial, Neighbor-hood (CN)	S	S		S								
Commercial, Office (CO)	S	S		S								
Commercial, General (CG)												
Industrial Light (IL)												
Institutional (I)	S	S		S							S	
Religious Facilities (RF)	S	S		S							S	

Source: St. Lucie County, 2010b

NOTES  
:

C = conditional  
use

S = same uses as allowable for any parcel in listed  
zoning district (in addition to all uses specifically  
indicated in other columns)

P = permitted use

- = uses are not permitted

\*Residential uses in Mixed-Use Building Lots may not be placed in the  
first story.



to guide the placement of permitted uses. Single family residential development is limited to local residential roads and all other uses can be applied to at least two and at most all four of the roadway classifications. The code provides a great deal of flexibility which can either create proximal development or may separate uses. A developer interested in mixing compatible uses to the greatest extent possible might design an interconnected network of streets that creates proximal land uses. The land development regulations indicate that PMUD development intends to foster proximity between disparate land uses. The development style is also intended to allow flexibility and creativity in the design process in order to efficiently use land, encourage a broad range of services in close proximity to their need, to allow a juxtaposition of land uses horizontally and vertically, and to preserve natural features and open space (St. Lucie County, 2010b). Alternatively, a developer uninterested in creating proximal development may also find it possible to create a development plan that separated uses.

In the TVC, the Core and Center transects contain uses that are necessarily close together. Furthermore, all of the commercial activity in the development occurs in these two transect zones. A significant amount of residential density may also be in these transect zones as well as the surrounding General transect. To achieve the required minimum density and meet the minimum open space requirements, it is necessary to create dense development and dense development is only permitted within the Core, Center and General transect zones. This ensures that some residential units will be proximal to commercial uses.

The code provides flexibility for a developer to delineate transect zones in the regulating plan which suit the developer's particular needs. This makes measuring and describing the relationship between the proximity of land uses in a development difficult. But while it is difficult to interpret the entire range of possibilities, some general principles can be gleaned.

In the TVC code, the more Core and Center transect that is delineated, the greater likelihood that there is going to be more commercial development, although the uses are limited compared with the PMUD. Because the Core and Center transect zones provide a mix of uses, the application of these transect zones ensure a relatively dense built environment versus a conventional development. While it is possible that a PMUD could develop in a similar way there is no requirement for dense and intense development. The prescriptive nature of the TVC code mandates that the Core and Center are dense and intense.

One of the TVC settlement principles requires neighborhoods, the building block of Towns and Villages, to be scaled on approximately a five-minute walk or a quarter mile from the Neighborhood Center transect zone. This requirement typically leads to the siting of urban transect zones near the center of a neighborhood. The five-minute walk requirement encourages development to be compact and uses to be within walking distance. This is fundamentally different from the PMUD development style which does not provide prescriptive guidelines.

While the permitted uses in the TVC are proximal, the development style does not provides all of the land uses that are necessary for a fully functioning community because of the lack of permitted commercial general and industrial land uses which can

provide necessary employment for a population that is required to commute to employment centers. Residents of a TVC development who work in industries that must be sited in these land uses must commute in order to obtain employment. Other residents may need to commute to these land uses to obtain the services that are not permitted in the development. In this way TVC developments are less proximal than the PMUD.

**Discussion**

The study analyses a variety of sub-units related to sustainability and compares them between two development patterns: the TVC and the PMUD. When a development pattern was better in terms of quantity or quality under a sub-unit, it was determined to be more sustainable in that sub-unit category. A list of the development styles and their relationship to each other in terms of the sustainability sub-units is shown in Table 4-9. The checked boxes in Table 4-9 indicate which development style was determined to be more sustainable across the sustainability sub-unit.

Table 4-9. Comparison of sustainability sub-unit outcomes across development styles

	TVC	PMUD
Open Space Quality	x	x
Open Space Quantity	x	
Mix of Uses		x
Density	x	
Proximity - Local	x	
Proximity - Regional		x
Affordable Housing	x	

Ultimately, the TVC code was determined to be more sustainable than the PMUD development style because it was determined to be more sustainable or equal to PMUD

across five of seven sustainable development sub-units while the PMUD development style was more sustainable or equal to the TVC across three of seven sustainability subunits. The TVC development style was more sustainable because it provided a greater quantity of open space, provided better proximity between land uses when looking at a specific site, and provided greater density and affordable housing than the PMUD. The PMUD development style had the potential to provide a greater mix of uses and better proximity at a regional scale.

## CHAPTER 5 CONCLUSION

This study analyzed a form-based development code and a planned unit development code using a case study of St. Lucie County, Florida to determine which was more sustainable. The case study used aspects of sustainability to triangulate the data gathered and draw conclusions about the particular case. The three aspects of sustainability used include equity, livability of the built environment, and harmony with nature. These criteria represent three of six ways that development can be classified as sustainable (Berke & Conroy, 2005). The study used both qualitative and quantitative data derived from study's related to the codes and from the codes themselves.

This study used open space requirements as a proxy for harmony with nature. The code that provides the most open space is considered more in harmony with nature. The study determined that the TVC development style provides more open space than the PMUD zoning alternative. TVC development mandates 40% open space while PMUD zoning allows 35% or less; therefore, the TVC development style is considered more sustainable.

The study used affordable housing as a proxy for equity. The code that facilitated the development of affordable housing more effectively was considered more equitable. While there exist publicly driven incentives to develop affordable housing throughout the county, the TVC code mandated a minimum of 8% workforce housing while the PMUD zoning category did not have a provision for affordable housing. Based on this analysis the TVC is considered more equitable.

Finally, the study uses density, a mix of uses, and proximity of uses as a proxy for livable built environments. Environments that are more livable are more dense, provide a greater range of uses that proximal. The study determined that the TVC requires development that is more dense than the PMUD zoning district. This conclusion is based on a hypothetical development located in the low intensity future land use category. The low intensity MXD future land use district allows a maximum of five units per acre while the TVC requires a minimum of six units per acre. If the hypothetical development were located in the moderate or high MXD future land use district it would be required to have a minimum of five units per acre and a maximum of up to 15 units per acre. The TVC has no maximum density. Based on this analysis, the study determines that the TVC provides denser development.

The study uses the range of permitted uses to help determine livability. The regulations that provide the greatest range of uses is considered more livable. The PMUD zoning district allows all of the uses permitted in the TVC district, plus it allows uses permitted in the Commercial General zoning district and uses permitted in the Industrial zoning districts. These two zoning districts provide a range of essential uses that are not permitted in the TVC district. The study determines that the PMUD zoning district provides the greatest number of uses and is more livable in this respect.

Proximity of land uses is also used as a proxy for livable built environments in the study. The code that produces the most proximal development is considered more livable. Both codes allow proximal development by making multiple land uses accessible through walking and biking, but the TVC mandates it. Because there is an chance that PMUD zoning may not provide proximal development by separating uses

the TVC is considered by the study to be more proximal at the site level. At a regional scale, the TVC's lack of commercial general and industrial uses means that all necessary development for a sustainable is not proximal; therefore, the PMUD zoning category is more proximal at this scale.

Overall, the TVC code provided more open space, more affordable housing, was more dense, and created a more proximal mix of land uses at a small scale than the PMUD zoning district. The PMUD zoning district allowed more uses and had the potential to provide more proximal development at a larger scale. Because the TVC code was met criteria deemed more sustainable in four of six measured sustainability criteria, it creates more sustainable development than the PMUD zoning district.

The methodology used in this study is applicable to other areas where a form-based code has replaced a conventional zoning code in an undeveloped area. This study could be continued in a variety of ways. More aspects of each sustainability criteria used in this study has more dimensions than those investigated. Equity, for example, can look at criteria related to the development's ability to provide either social or economic resources to low and moderate income households. Livability can be further investigated by looking at the connectivity of transportation corridors within developments. Harmony with nature can look at the codes ability to create meaningful habitat. Future research can also compare these criteria in existing developments to see what actually develops. Furthermore, future research can investigate the other criteria of sustainability including place-based economy, polluters pay and responsible regionalism.

While the form-based code was demonstrated to be the more sustainable code, it is possible that conventional zoning codes could have been easily modified to produce a similar outcome. For example, planners could modify the PMUD style to increase housing density, open space quantity, and affordable housing requirements to achieve results that were either similar to or greater than those measured by the TVC along the selected sustainability sub-units. It is possible that planners could also derive regulations to ensure that developments provide a proximal mix of uses. Using this study's methodology for determining sustainability, both form-based regulation and conventional regulations could produce similar results. Furthermore, the design aspect of the form-based regulation could be incorporated into a conventional development using design guidelines.

One advantage to using a form-based code is that the regulation of uses in a form-based codes may be more flexible than a conventional regulation. Uses in the form-based code are guided by lot type, whereas in conventional zoning, uses are limited to a specific lot. Guiding uses by lot type allows existing uses to be substituted with other allowable uses as needed. This adaptability is not reflected in the methodology presented in this document; however, future researchers may determine that adaptability is a viable proxy for a sustainability sub-unit.

Form-based regulations are easier to regulate when working with greenfield property; however, if development of greenfields occurs at the expense of revitalizing brownfield sites in previously developed areas, it runs the risk of creating a sprawling development pattern and continuing the problems identified by the critics of zoning.



Finally, one aspect of sustainability is not addressed by the Berke and Conroy study of sustainability (2005). This is the ability of a regulation to work in the real world. The TVC code has not produced a viable development to date; however, it was created and implemented just prior to the credit crunch of 2007-2008 where lending tightened and the number of home buyers decreased (Brunnermeier, 2010). For a development code to be sustainable, it must be practical. Time will decide if the St. Lucie County form-based code will produce an economically sustainable framework for development. If it turns out that the code is too onerous to be practical, a course of study would be to determine what barriers exist to the plan implementation.

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## BIOGRAPHICAL SKETCH

Shane Laakso was born in Hollywood, Florida in 1983. He attended the University of Florida and earned a Bachelor of Science in Construction Management from the Rinker School of Building Construction in 2005. Mr. Laakso continued his education by enrolling in the Master of Arts in Urban and Regional Planning program at the University of Florida. While earning his degree, Mr. Laakso worked as an entitlement intern for the Land Division at Lennar Homes where he completed a multi-county study of home prices and amenities while gaining an understanding of the land acquisition process. Mr. Laakso also worked as a planning intern for Glatting Jackson, a planning consulting firm, where he worked on multiple projects including a DRI submittal, performed research on form-based regulations, and drafted a report on rural land stewardship. Additionally, while completing classes, Mr. Laakso worked part-time as the planning director for the City of Hawthorne, Florida where he was responsible for the City's current and comprehensive planning. Mr. Laakso also worked for the State of Florida at the Department of Community Affairs in the Areas of Critical State Concern Program. Mr. Laakso received his Master of Arts in Urban and Regional Planning from the University of Florida in spring of 2011.