CENTRAL FLORIDA: GROWING GREEN

by

KELSEY KERN

A REPORT

submitted in partial fulfillment of the requirements for the degree

MASTER OF LANDSCAPE ARCHITECTURE

Department of Landscape Architecture/Regional & Community Planning
College of Architecture Planning and Design

KANSAS STATE UNIVERSITY
Manhattan, Kansas

2009

Approved by:

Major Professor
Dr. Tim Keane, PhD

Abstract

The growth of Central Florida led to the planning of a Central Florida commuter rail and a larger interest in designing communities with the environment as a priority. A site suitable for sustainable development is located in DeBary, Florida, in the northern Orlando metropolitan area. The nine hundred acre site includes a commuter rail station and is located along the St. Johns River, a major river in Florida. The intent of this study was to understand and apply principles of sustainable development to the unique landscape of the site and propose a master plan for a community, creating a sense of place.

A major goal of the project was to compliment the commuter rail station and its contribution to the community. The project encompassed research of sustainable development and design, an analysis of the site, as well as an understanding of transportation's specific role in sustainable development.

The result of the study is a master plan of the community which utilizes principles of sustainable development, protects and highlights the ecological features of the site and creates a place unique to Central Florida as a healthy, sustainable community.

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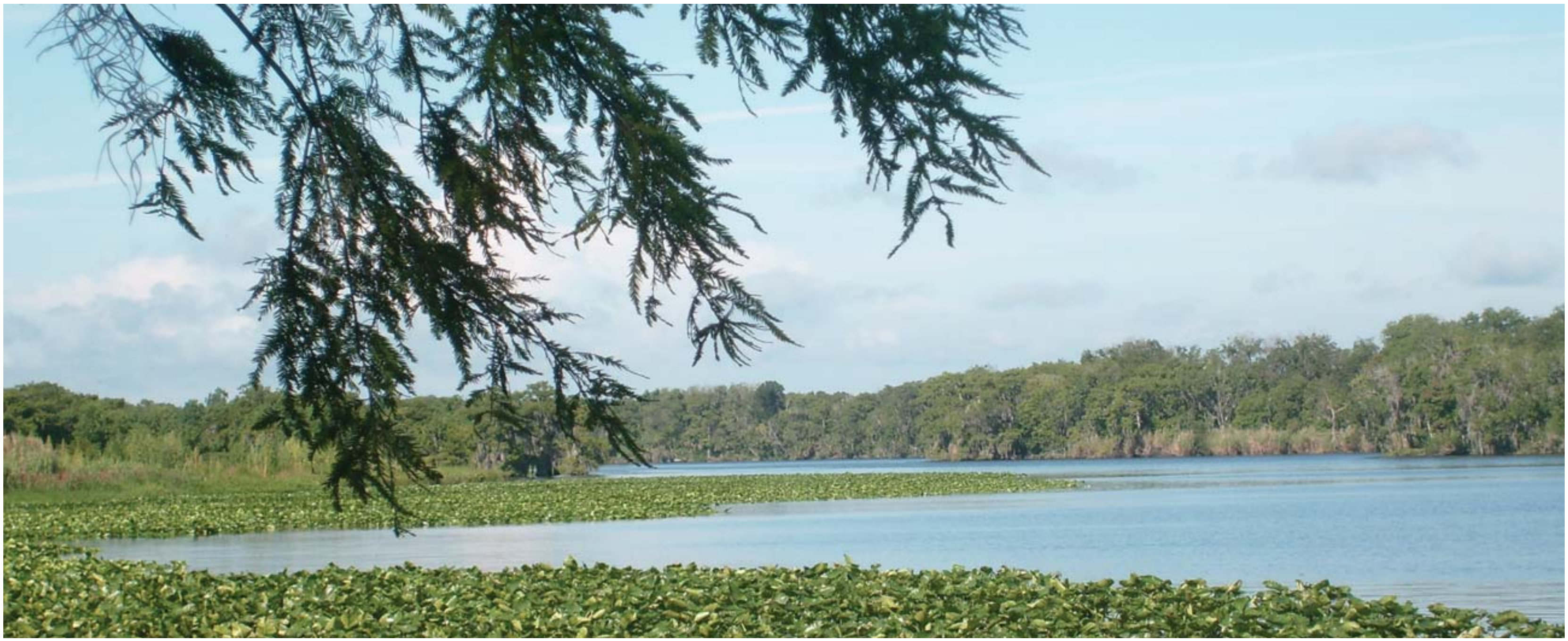
Central Florida: Growing Green

a study of sustainable development



Kelsey Kern Masters Capstone Project 2008-2009

(Cover Image) Site Photograph taken by author.

Abstract

The growth of Central Florida led to the planning of a Central Florida commuter rail and a larger interest in designing communities with the environment as a priority. A site suitable for sustainable development is located in DeBary, Florida, in the northern Orlando metropolitan area. The nine hundred acre site includes a commuter rail station and is located along the St. Johns River, a major river in Florida. The intent of this study was to understand and apply principles of sustainable development to the unique landscape of the site and propose a master plan for a community, creating a sense of place.

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Acknowledgements
I would like thank Professors Tim Keane, Stephanie Rolley and Blake Belanger for their support and guidance during the past year. Your interest in this project and its success is much appreciated.

Thank you to Dix.Lathrop and Associates, especially Jeff Dix, Jamie Wright, Scott Toschlog, and Shawne Grochowski. Thank you for introducing me to the projects that define my Masters project and for all your time, support, and encouragement.

I owe a huge thank you to my parents, Kirby and Patricia Kern, for their endless love and support during my time at Kansas State University.

-Kelsey

Contents:

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Note: Geographic Information Systems files were obtained from the following public access databases:
-East Central Florida Regional Planning Council. Central Florida Geographic Information Systems. http://www.cfgis.org/.
-Lake County, Florida. http://www.lakecountyfl.gov/departments/information_technology/geographic_information_services/.
-Lynx. http://www.golynx.com/?id=1156088.
-Seminole County Information Technology Services. http://www.seminolecountyfl.gov/gis/gisdata.asp.
-St. Johns River Water Management District. http://sjr.state.fl.us/gisdevelopment/index.html.
-USGS. http://water.usgs.gov/maps.html.
-USGS Geospatial Data Gateway.
-Volusia County Government Geographic Information Services. http://www.volusia.org/gis/.

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1
Introduction

Project History

During the selection process, the author identified personal and academic goals to accomplish by completing a Masters project. I wanted the project to encompass sustainability and community design. The Masters project needed to include a study of sustainable design or sustainable development. Researching these terms would be essential to achieve academic goals. A goal of the Masters project was to introduce and present sustainable development as feasible and the best way to achieve project goals.

The author's interest in community design and place-making was a foundation for the project selection. The project needed to communicate the impact of development on the lives of all citizens and families of a region. The design should allow people to live, work, play, and move through a community comfortably and gain a respect for natural and social systems.

Two projects were introduced to the author while working at Dix.Lathrop and Associates in Longwood, Florida. These projects, each with separate goals, were only one and one half miles apart. The Masters project evolved to become a vision for the community and addresses the relationship between a commuter rail stop and nearby residential neighborhood.

Sustainability

Introducing the concept of sustainability by defining the following terms as they apply to this project is required to introduce the reader to this Masters project. Sustainable means to maintain an ecological balance. Something is considered sustainable when it is capable of being continued with minimal harm to environment. Sustainability as a noun refers to the ability to be maintained. Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Edwards 2005, 17). Sustainable design refers to sustainability and ecological design, or design principles and practices that focus on the interaction of architecture, people, and nature (Edwards 2005, 97-98). This definition of sustainable design mirrors the definition of landscape architecture.

Defining the difference of sustainable design and sustainable development is necessary to apply principles of sustainability to different scales of the project. Although the entire Masters project could have focused solely on exploring and defining sustainability, it was necessary for the author to have a general background of knowledge to refer to during the master plan design phase. My research resulted in the definition of goals for sustainability at the community master plan scale referenced in the Theory and Application section; these goals became a basis for many design decisions.

Dilemma

Central Florida will experience change and growth due to the implementation of the Central Florida Commuter Rail. This public transportation will impact the type of development that will make up an adjacent community near the City of DeBary. The presence of a commuter rail station in this community has the potential to dramatically influence the way people live and move through the region utilizing public transit. Development will need to address the amenity of the St. Johns River and natural resources with the utility of the commuter rail station.

Thesis

To accommodate population growth, the region will need to address and put in practice principles of smart growth and sustainable development beyond the implementation of a commuter rail. While this public transportation is a large part of sustainable development at the regional scale, the community should be developed to compliment the commuter rail station utilizing theories and principles associated with sustainable development at a community scale. The relationship of the community to the rail station will influence the design of neighborhoods along the St. Johns River. Successfully designed corridors and accompanying development will encourage an environmentally-centered life style of residents. Sustainable design practices will need to become the standard for community design. Practices tailored to the region of Central Florida will ensure the sustainability of a community. The master plan and vision for the community will also define the community as a place and reflect the context, history and character of the site and its location.

2

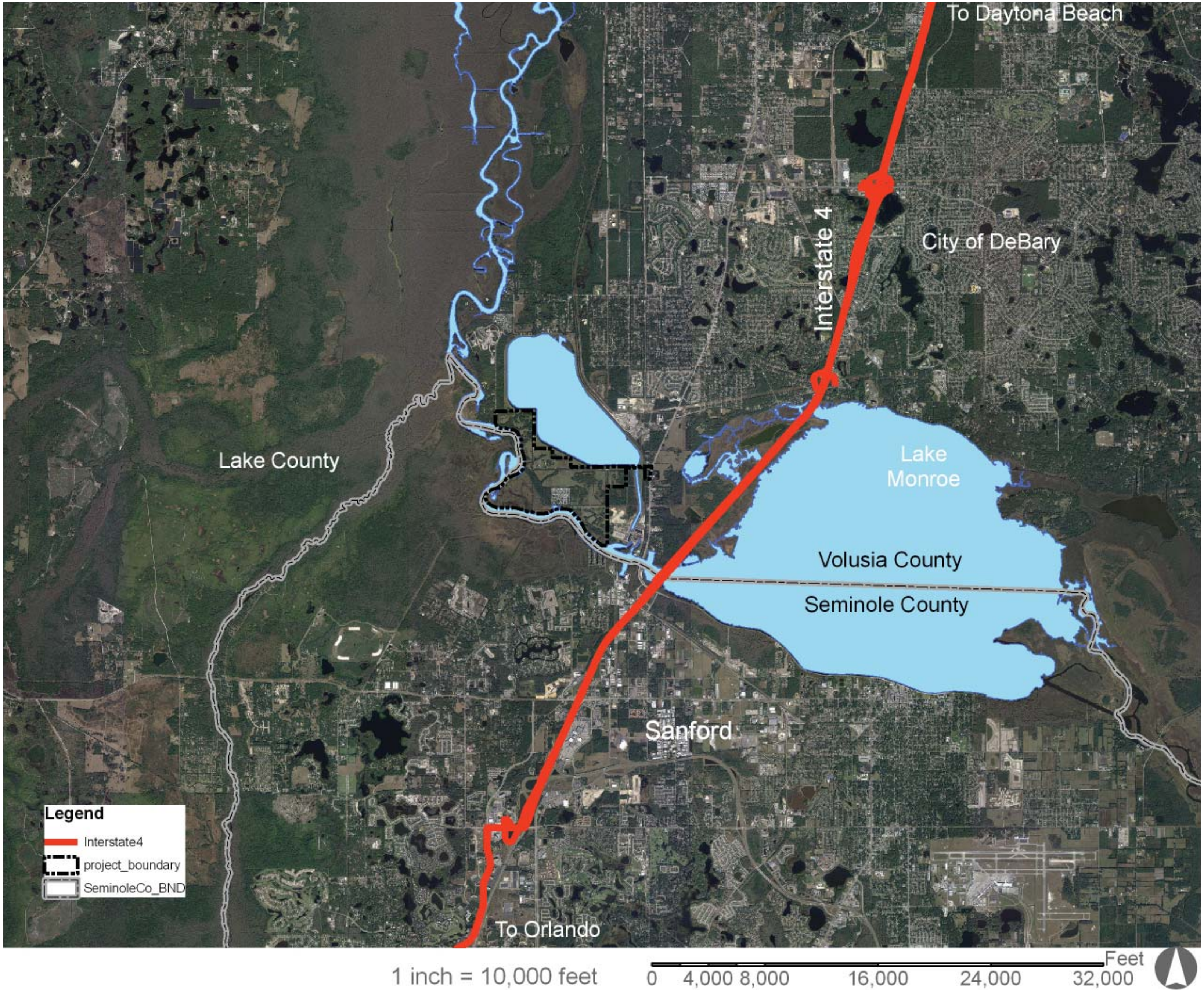
Project Context & Introduction

Project Location and Description

The project site is located in northern Central Florida in Volusia County near Interstate 4. Daytona Beach is to the north and east and Orlando is to the south. The project is on the border of Volusia County along the St. Johns River west of Lake Monroe. The site is in the limits of the City of Debary, the City of Sanford is directly to the south in Seminole County.

(Above) Figure 2.1 - Florida State Context Map. Volusia County is located in northern Central Florida. Source: Map created by author.

(Right) Figure 2.2 - Large Context Map. The project is located on the southern border of Volusia County near Seminole County. Source: Map created by author.


To Daytona Beach
Interstate 4
City of DeBary
Lake County
Lake
Monroe
Volusia County
Seminole County
Sanford
To Orlando
Legend
Interstate4
project_boundary
SeminoleCo_BND
1 inch = 10,000 feet
0
4,000
8,000
16,000
24,000
32,000
Feet

Project Site and Adjacencies

Although the project site is located in the City of Debary, it is separated from the city proper by Konomac Lake, a cooling pond used by the power plant near the site. The closest arterial highway adjacent to the site is Highway 17-92 and serves more local traffic north and south bound. Ft. Florida Road connects the site from east to west.

The St. Johns River acts as the western and southern boundaries of the project site. North and west of the site is low density residential development as well as a newly developed gated community. The northwest portion of the site is owned by a developer and will hereafter be referred to as the River Bend site. East of the site, along Highway 17-92, is the planned site of a commuter rail stop to service the City of DeBary. This is the northernmost stop on the Central Florida commuter rail route for phase one. Property to south and east, as well as the power plant adjacent to the site is owned by Florida Power and Light.

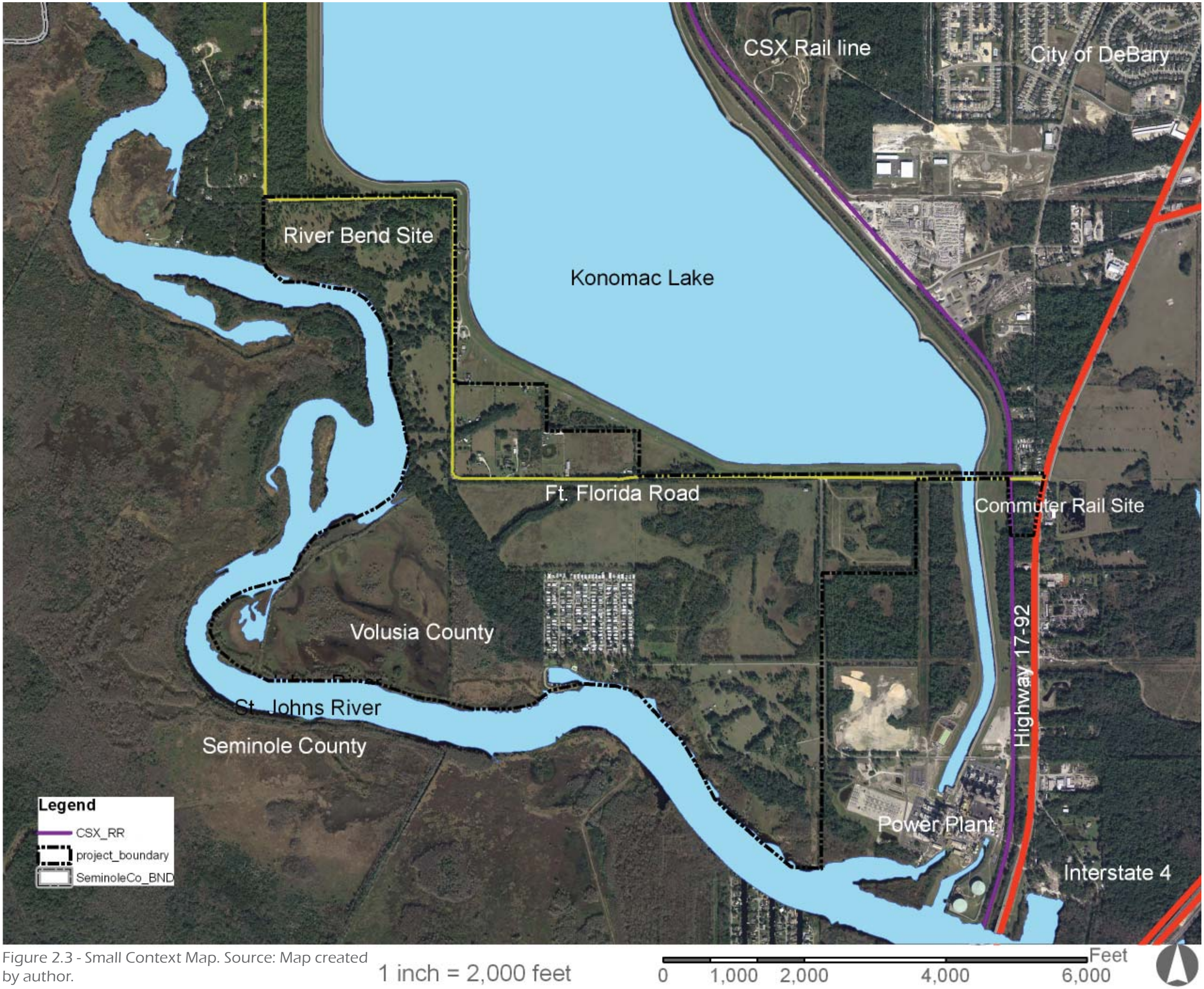


Figure 2.3 - Small Context Map. Source: Map created by author.

Project Goals and Design Intent

Listed to the right are three project goals. These goals are the main points in the thesis presented in the Introduction. The three goals are used to present the final design concepts in the Community Vision chapter. The Community Vision chapter will include plans and sketches that communicate how the proposed design solution accomplishes the three project goals.

Project Goals:

1) Propose development that follows principles of sustainable development and design at the community master plan scale.
These include:
- ecology
- economy
- social equality
- transportation
- density

2) The master planned community should establish a sense of place through human interaction with the landscape.

3) Propose development to compliment the proposed commuter rail station and public transportation.

Design Philosophy

The two diagrams on the opposite page represent the design philosophy of the project. The diagram on the left represents the idea of the natural environment and human needs intersecting to create the design solution. This interaction happens on the foundation of Sustainability Principles which represent the values of sustainable design and were found from researching sustainability as described in the Theory and Application section.

The diagram to the far right shows the components of the project's program as building blocks stacked in tiers of priority, meaning the components on the bottom need to be in place and strong for the top tiers to be strong. The place and ecology of the place must be present and strong to accommodate a healthy community and the community must be strong to support a healthy neighborhood. All of these blocks also exist within the boundaries of sustainable development. The goals of sustainability were considered in all components of the design solution.

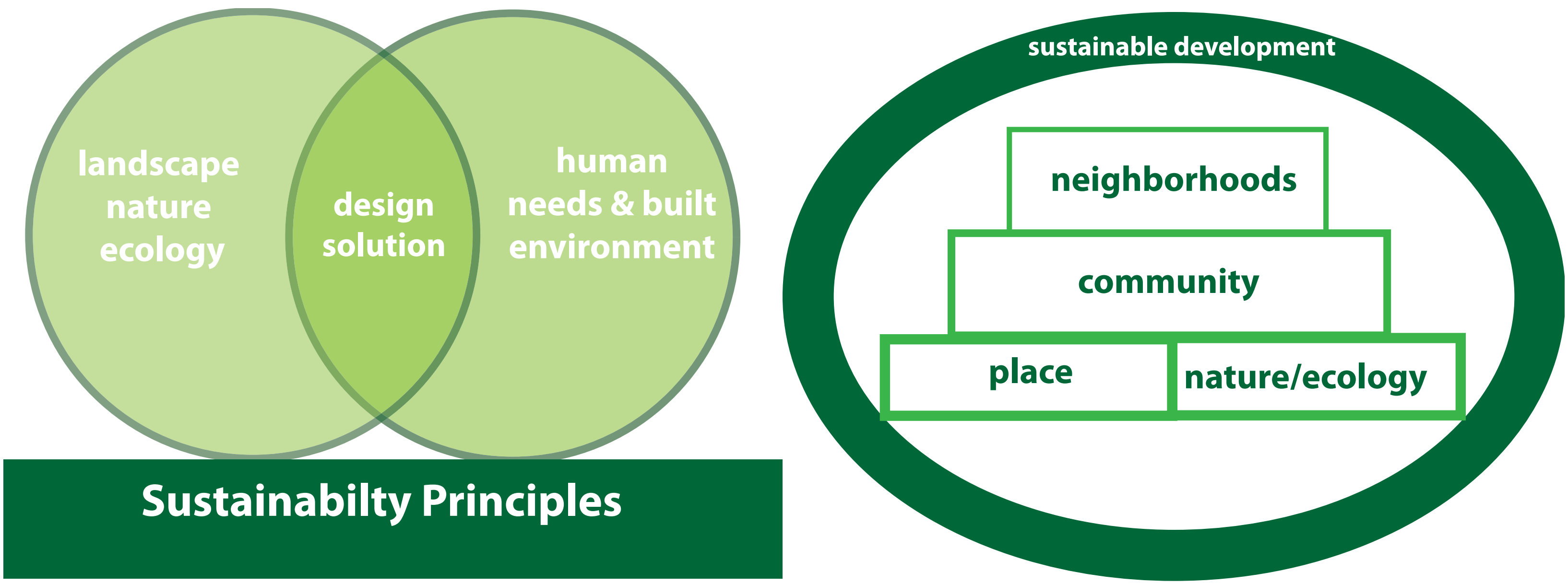


Figure 2.4 - Design Philosophy. Source: Diagram created by author.

3
Community Vision

Introduction

A goal of the Masters capstone project is to communicate a vision for a community in Central Florida that implements basic principles of sustainable design while complimenting the adjacent commuter rail station. This section presents the design proposal by outlining the three project goals and the components of the design that accomplish these goals.

Project Goals:

1) Propose development that follows principles of sustainable development and design at the community master plan scale.
These include:
- ecology
- economy
- social equality
- transportation
- density

2) The master planned community should establish a sense of place through human interaction with the landscape.

3) Propose development to compliment the proposed commuter rail station and public transportation.

Goal 1 - Sustainability

Listed to the right are the objectives for goal one. These objectives include principles of sustainable development and were defined from the Goals for Sustainability at the Community Master Plan Scale discussed in the Theory and Application section. These objectives were chosen for the project goals because they can be designed by the landscape architect at the community scale.

Goal 1

Propose development that follows principles of sustainable development and design at the community master plan scale.

Objectives include:

Ecology:
- limit human impact;
- recognize and preserve wildlife habitat;
- integrate natural environment into new community

Economy:
- challenge businesses to look at environmental and social costs not just economic profit

Social Equality:
- create community space and a sense of community;
- provide inter-generational equality;
- mix single family and multi-family neighborhoods;
- allow spaces for children

Transportation:
- reduce dependence on personal vehicles;
- encourage walking/cycling;
- reduce required parking;
- allow easy movement through all parts of community by all modes of transportation;
do not favor a particular mode of transit
- work with public transit

Density:
- propose mixed use, multi-level and denser development;
- utilize space efficiently

(Right) Figure 3.1 - Ecology as Landscape. Wetlands integrated into the site plan is a principle of sustainable design related to ecology. Source: Photograph taken by author.

Ecology

When considering the ecology of the site, the project objectives are to limit human impact, recognize and preserve wildlife habitat, and integrate the natural environment into the new community. Preserving existing wetlands on the site was a large part of the master plan to limit human impact, as shown in the land use plan to the right. Leaving these important pieces of the landscape intact provides necessary habitat for wildlife as well as maintains existing drainage channels. One third of the site is preserved wetlands and the entire site is designed to integrate stormwater management, making it a part of the community and recognizing it as an important network. Buffer areas are provided around wetlands to allow for stormwater to be treated before it flows into the wetlands.

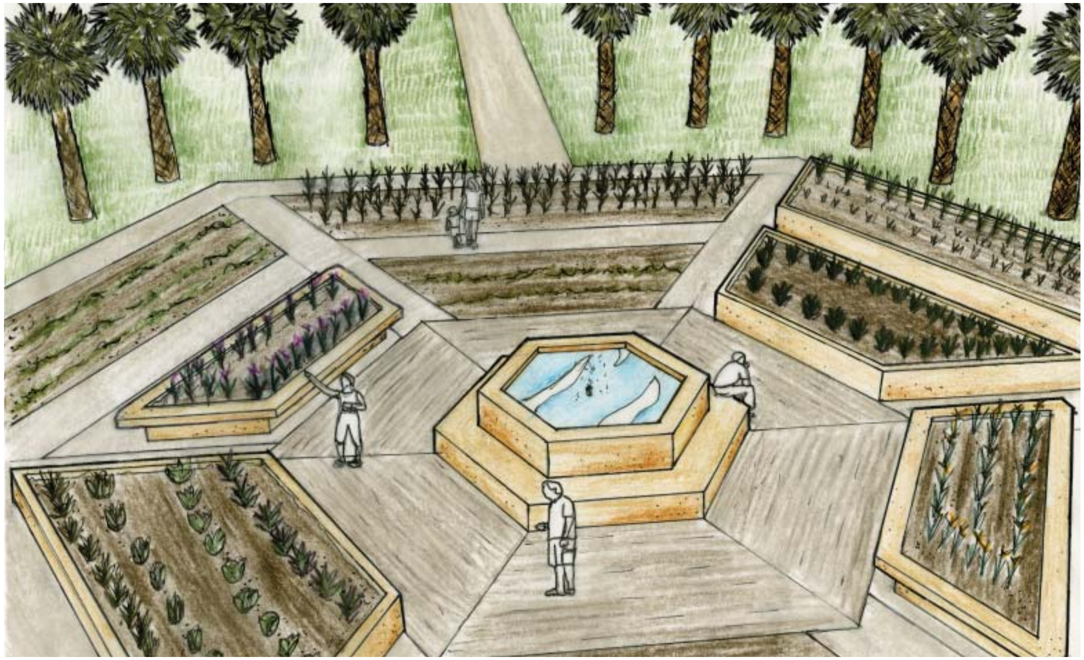
Creating opportunities for residents of the community to interact and enjoy the natural environment on the site was also an important aspect of the design. Creating pedestrian paths and preserving landscapes allow residents to enjoy the unique place as well as gain an appreciation for the natural environment. Creating a sense of place is also discussed later in this section in Goal 2.

Figure 3.2 - Land Use Plan. Source: Map created by author.

(Right) Figure 3.3 - Tapestry's Urban Neighborhood. Businesses should consider the larger goals of sustainability as equally important as economic benefit. Source: Davis 2008.

Economy

The objective related to economy is to challenge businesses to look at environmental and social costs along with economic profits resulting from development. Although this objective cannot easily be accomplished through design, the attention to the economic impacts of the proposed development were considered. Businesses that choose to develop on the site, such as those in the urban neighborhood, will be encouraged to implement sustainable business practices and compliment the sustainable goals of the community.



(Right) Figure 3.4 - Community Garden Aerial Perspective. A community garden could be an amenity for the community center and park. Source: Drawn by author.

Social Equality

One objective related to the goal of social equality is to create community space and encourage interaction among residents. This interaction and shared space will instill a sense of community pride and ownership. The objective is accomplished by providing a public community center and park which allows families and residents to interact. Social interaction maintains a healthy community and contributes to the sustainability of the community. Amenities for the community center and park include a community garden and natural play spaces as well as a community marina which highlights the St. Johns River as a public amenity. The park will also include ball fields, walking trails, and picnic areas.

Community Center and Park Amenities:

- Natural play space
- Community Garden
- Ball fields
- Community Marina
- Walking Trails
- Picnic Areas
- Farmer's Market

(Left) Figure 3.5 - Community Center and Park Detail Plan. Source: Drawn by author.

(Bottom Left) Figure 3.6 - Natural Playscape. Children's play spaces can be designed using natural elements. Source: Keeler 2008, 129.

(Bottom Right) Figure 3.7 - Walking Trail. Trails can allow residents to interact with the existing landscape. Source: Photograph taken by author.

(Right) Figure 3.8 - Urban Neighborhood Core. This neighborhood element can be enjoyed by all residents, especially students, young professionals and families similar to the activity on Park Avenue in Winter Park, FL. Source: Photograph courtesy of Dix. Lathrop & Associates.

Social Equality

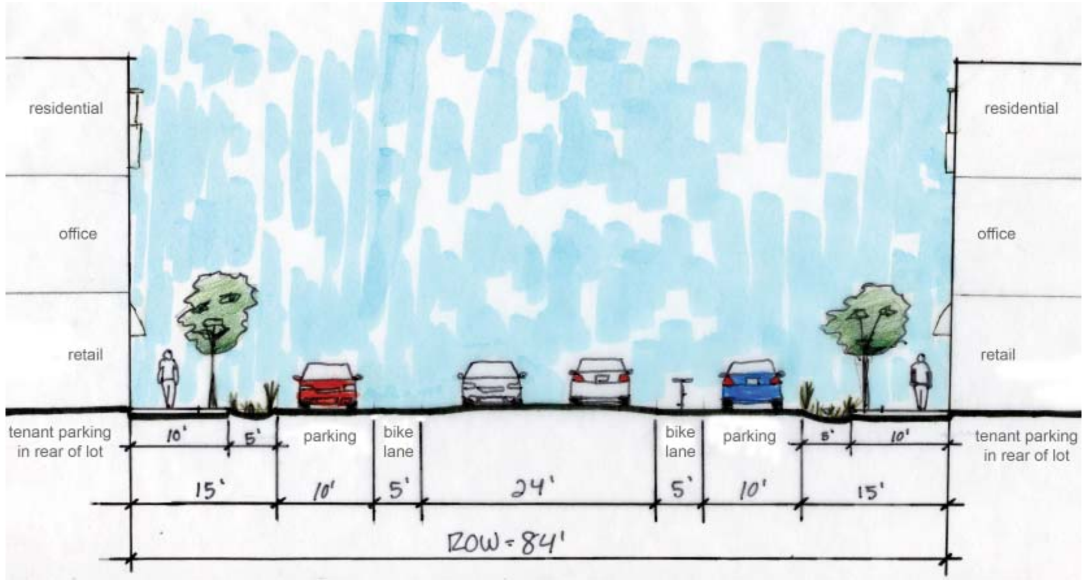
A second objective related to social equality is inter-generational equality and providing spaces for all residents in the community. This is achieved through the design of neighborhoods defined by a center or community use. Located towards the center of the site is an elementary school to accommodate population growth in the suburban community. The urban neighborhood core is designed to be an amenity for college students, young professionals, or families. Another neighborhood is marked by a senior neighborhood clubhouse with amenities such as a fitness center, pool, and garden area for active seniors.

Figure 3.9 - Land Use Plan. Source: Map created by author.

(Clockwise from upper left) Figure 3.10 - Rowhomes. An example of housing style from Tapestry in Jacksonville, FL. Source: Davis 2008.
Figure 3.11 - Apartments. An example of housing style from Rosemary Beach. Source: Sexton 2007, 111.
Figure 3.12 - Low Density Single Family. An example of low density residential housing. Source: Photograph provided by Dix.Lathrop & Associates.
Figure 3.13 - Medium or High Density Single Family. An example of medium to high density single family housing. Source: Nozzi 2007.

Social Equality

A final objective related to social equality is to design a mix of single family and multi-family neighborhoods. The land use plan on the previous page shows a variety of housing types and densities. The images on the opposite page are examples of the architectural character and densities of different housing types proposed in the land use plan.

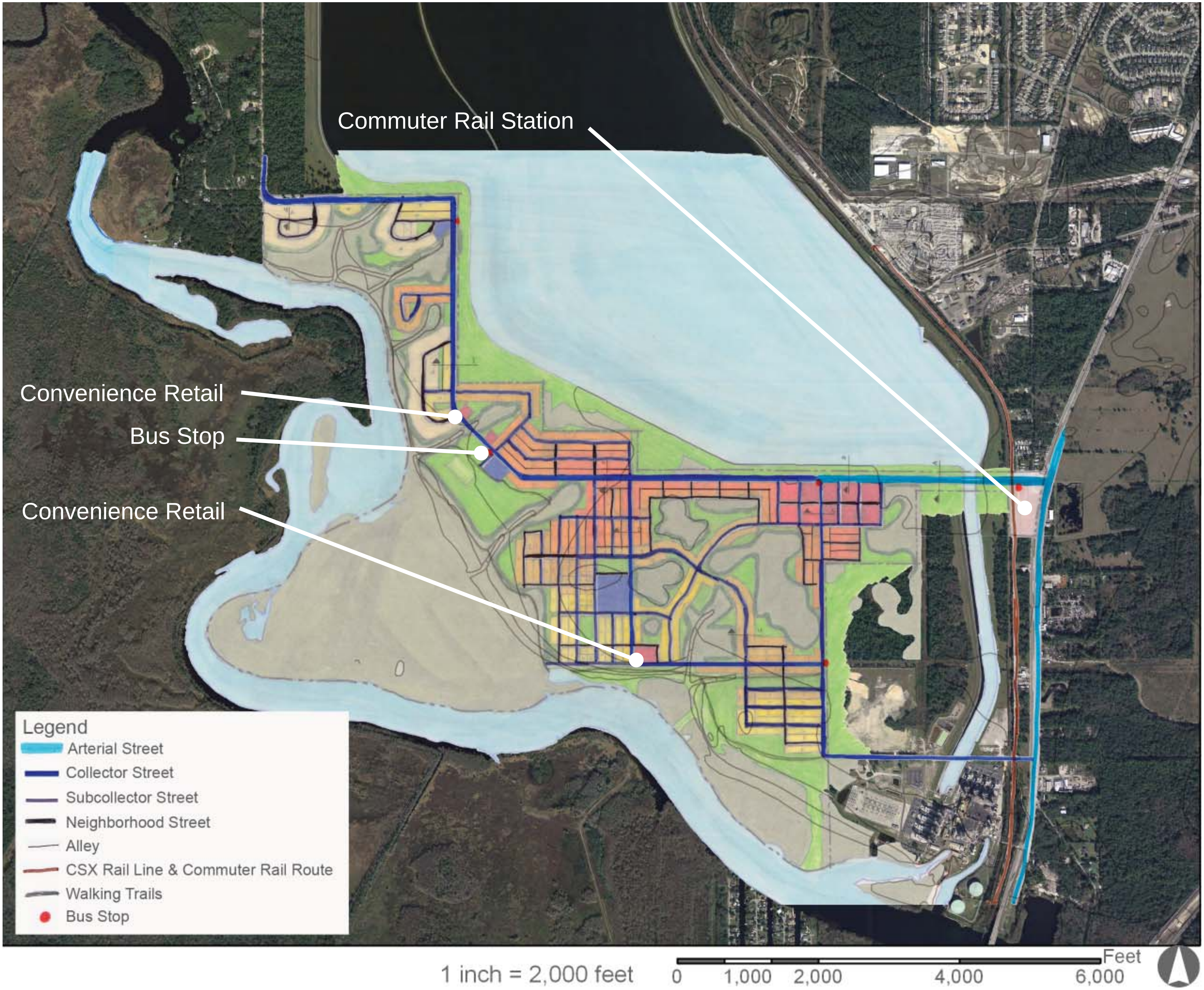


Transportation

Accomplishing project goals related to sustainability requires a well designed and integrated transportation plan. The plan to the right meets the objective of reducing dependence on personal vehicles by providing other modes of transportation, such as public transit, as well as many land uses in relatively close proximity to public transit stops. Convenience retail is provided to accommodate everyday needs of residents. Required parking is reduced in the urban core neighborhood to encourage pedestrian traffic. Allowing for easy movement through all parts of the community by all modes of transportation is an important objective related to transportation. The typical street section above demonstrates the concept of a "complete street" accommodating several modes of transportation. Creating a complete street includes providing a comfortable pedestrian environment (Complete the Streets 2005). Providing areas for walking and cycling to the community contributes to goals of sustainability.

(Above) Figure 3.14 - Complete Street Section. Source: Drawn by author.

(Right) Figure 3.15 - Transportation Plan. Source: Map drawn by author.



Commuter Rail Station
Convenience Retail
Bus Stop
Convenience Retail
Legend
Arterial Street
Collector Street
Subcollector Street
Neighborhood Street
Alley
CSX Rail Line & Commuter Rail Route
Walking Trails
Bus Stop
1 inch = 2,000 feet
0
1,000
2,000
4,000
6,000
Feet

(Left) Figure 3.16 - Neighborhood Block Aerial Perspective. Source: Drawn by author.

(Below) Table 3.1 - Density in Units Per Acre. The community incorporates a variety of housing densities to achieve the goals of sustainable development. Source: Created by author.

Color	Letter	Lot Size	Units per Acre
	A	200’ x 100’	2.2
	B	120’ x 90’	4
	C	100’ x 70’	6.2
	D	100’ x 50’	8.7
	E	100’ x 30’ (townhome)	14.5
	F	100’ x 50’ (duplex)	8.7
	G	100’ x 30’ (row house)	14.5
	H	Apartments (three story)	43.5+
	I	Mixed Use	15+

Density

Objectives related to density include proposing denser development, mixed use and multi-level development, as well as using space efficiently. The land use plan on the opposite page demonstrates the mix of uses as well as a variety of residential densities. Mixed use and multi-level development is provided in the urban neighborhood core to provide higher density development and reduce impacted land area. To achieve goals of sustainability, the community includes a variety of housing densities and a mix of land uses, as well as appropriate open space in neighborhoods.

The image above demonstrates the density of a neighborhood, variety of housing in a neighborhood, and the relationship of homes to the street. The community design allows neighbors to interact at the pedestrian level, promoting a healthy neighborhood.

Figure 3.17 - Land Use Plan. Source: Map drawn by author.

1 inch = 2,000 feet

0 1,000 2,000 4,000 6,000 Feet

Project Goals:

1) Propose development that follows principles of sustainable development and design at the community master plan scale. These include:
- ecology
- economy
- social equality
- transportation
- density

2) The master planned community should establish a sense of place through human interaction with the landscape.

3) Propose development to compliment the proposed commuter rail station and public transportation.

Goal 2 - Sense of Place

Listed to the right are the objectives for goal two regarding establishing a sense of place in the community. These objectives were defined to ensure the community would stand apart from other developments as well as allow residents to take pride in their community because it is unique to the area. These objectives were also chosen as elements that fall under the scope of landscape architectural services.

Goal 2

The master planned community should establish a sense of place through human interaction with the landscape.

Objectives:

-place an emphasis on the natural environment and uniqueness of the site, the value of open space, both natural and existing, as well as developed parks and open space

-integrate stormwater management into community master plan

-create neighborhoods defined by community or public spaces

(Left) Figure 3.18 - Interaction With Landscape. Residents can interact with the natural environment as an amenity which helps to establish the community as a place. Source: Drawn by author.

Sense of Place

An objective related to establishing a sense of place through landscape is to emphasize the natural environment as well as utilize this existing feature to demonstrate the uniqueness of the site. Valuing open space, both existing and designed, and incorporating it into the community also accomplishes this objective. The master plan is designed to allow the landscape to become part of the community. Much like architecture can contribute to the aesthetic character of a particular place, landscapes unique to a region can contribute to the visual identity of the community. As mentioned in goal one, wetland buffers are designed to protect the ecologically sensitive area and treat stormwater. This objective is addressed further on the following pages.

Neighborhoods

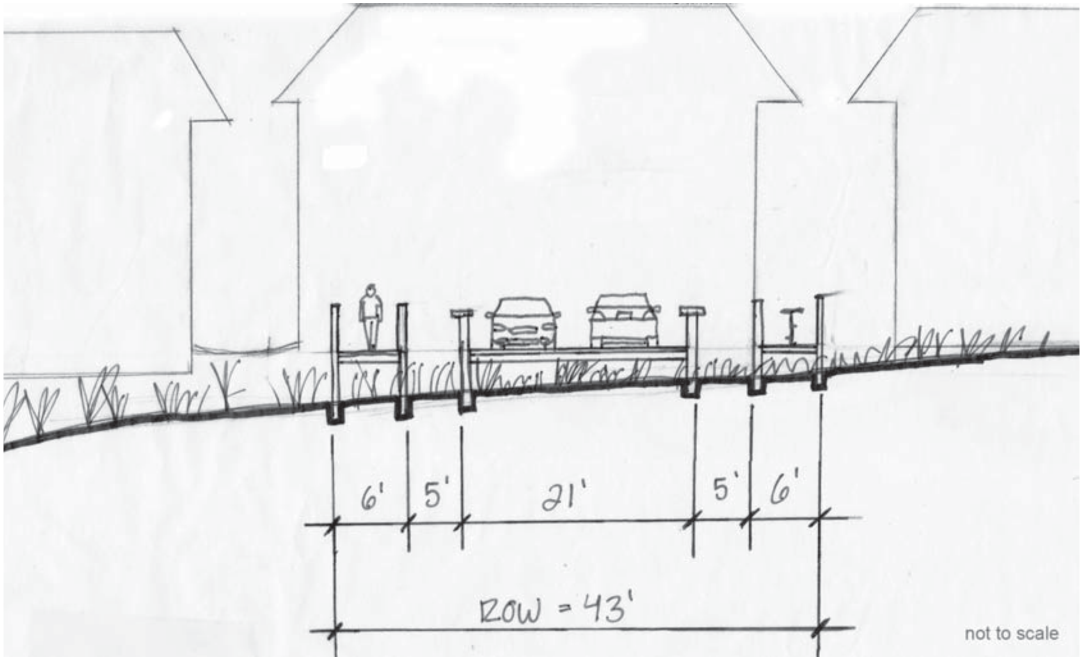
Another important objective that shapes a community as a unique place is to define neighborhoods within the community by public spaces and community uses. The land use map to the right identifies neighborhoods that are defined by public spaces where residents can take ownership of public buildings and landscapes. A diagram of the neighborhoods is explained on pages 48 and 49.

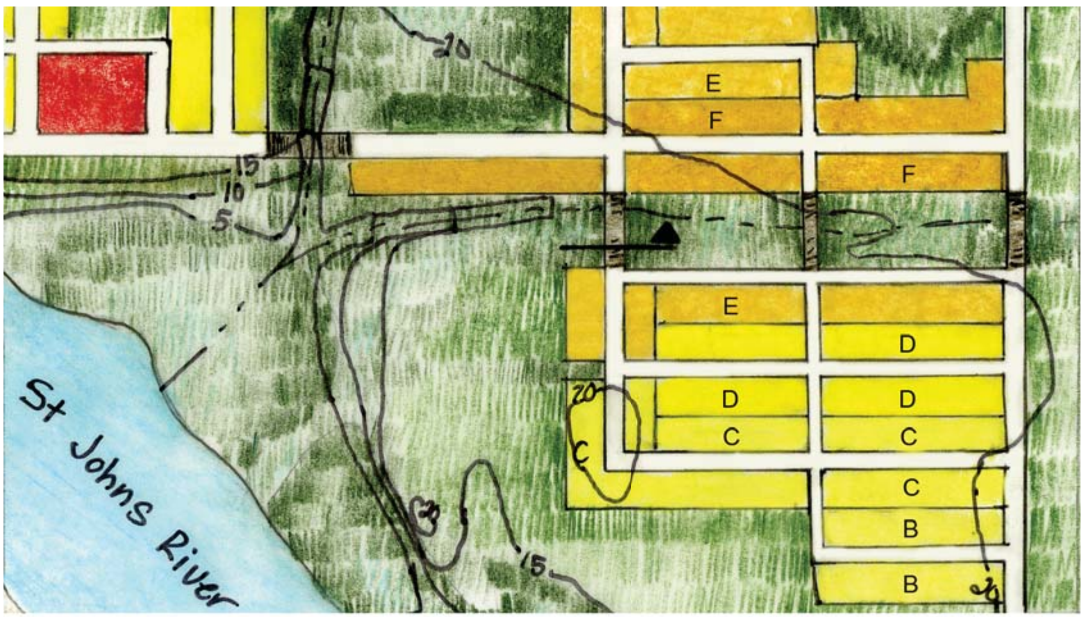
Figure 3.19 - Land Use Plan. Source: Plan drawn by author.

(Right) Figure 3.20 - Pedestrian Trail Bridge. Natural drainage systems and trails can intersect at different levels much like in Celebration, Florida. Source: Photograph taken by author.

Stormwater Management

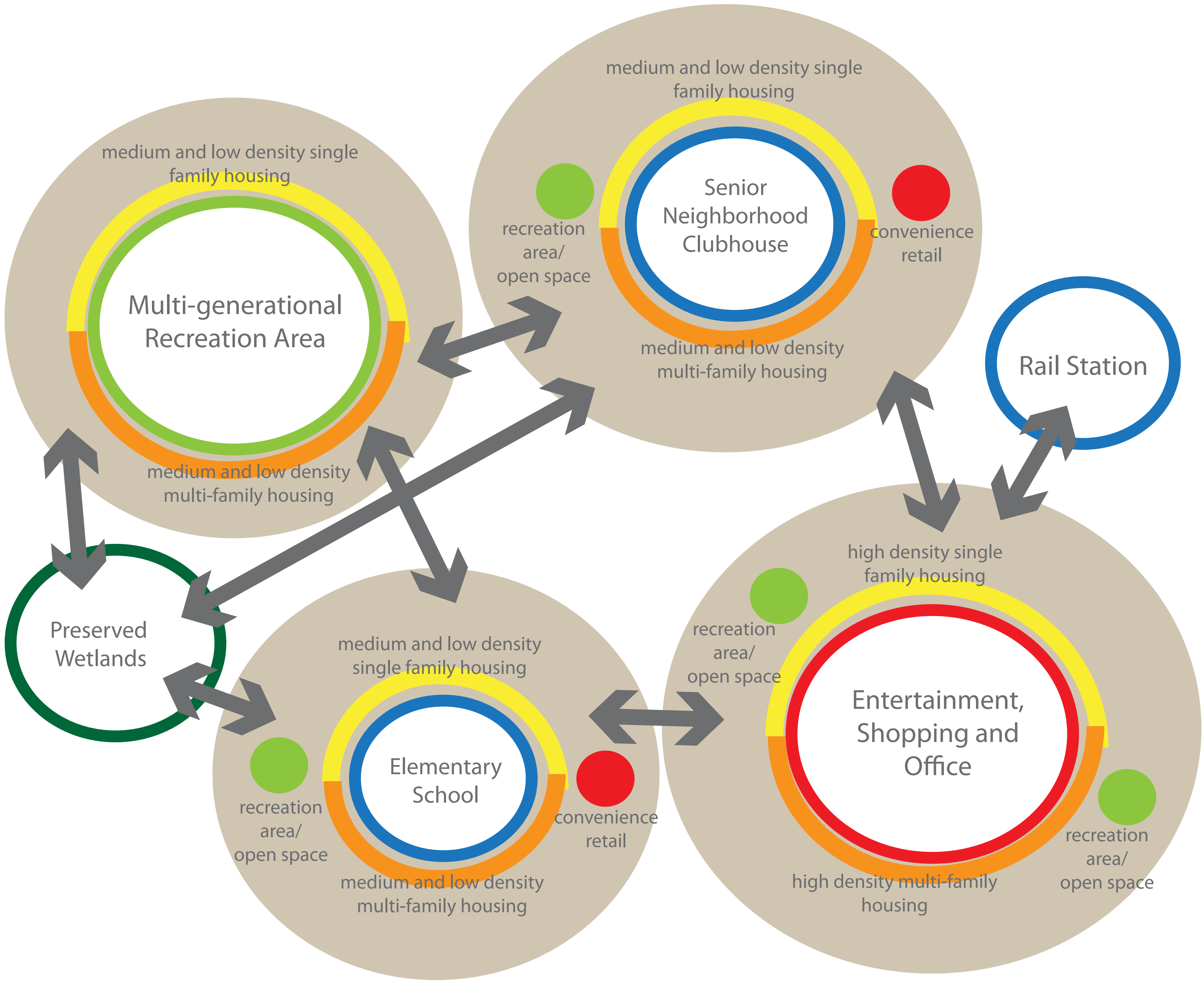
Integrating stormwater management into the fabric of the community is the last important objective related to goal two. The network of open space dedicated to managing stormwater is meant to be a visible, respected network and as integral to the community as the street network or the architecture. By maintaining existing drainage patterns, and adding buffer areas to wetlands, the site can treat and carry stormwater in a more natural way. As shown in the section sketch on the opposite page, networks can intersect at different levels to accommodate the needs of each. By utilizing bridges over low drainage areas, the community achieves the goal of sustainability as well as emphasizing the importance of integrated stormwater management.





(Top) Figure 3.21 - Drainage Section. Maintaining natural drainage patterns and building over them contributes to sustainability. Source: Drawn by author.

(Bottom) Figure 3.22 - Drainage Detail Plan. Maintaining natural drainage patterns is an element of sustainable design. Source: Drawn by author.


medium and low density single family housing
Multi-generational Recreation Area
medium and low density multi-family housing
medium and low density single family housing
recreation area/ open space
Senior Neighborhood Clubhouse
convenience retail
medium and low density multi-family housing
Rail Station
Preserved Wetlands
medium and low density single family housing
recreation area/ open space
Elementary School
convenience retail
medium and low density multi-family housing
high density single family housing
recreation area/ open space
Entertainment, Shopping and Office
recreation area/ open space
high density multi-family housing

Neighborhood Relationships

A critical objective that provides a sense of place to the Central Florida community is to define neighborhoods by public spaces and community uses. The diagram to the left illustrates the neighborhoods within the community and the land uses that define them. Residents and visitors of the community will identify this development as a distinct place because of the unique, one of a kind community spaces and relationships between them.

(Left) Figure 3.23 - Neighborhoods Diagram. Source: Drawn by author.

Project Goals:

1) Propose development that follows principles of sustainable development and design at the community master plan scale. These include:
- ecology
- economy
- social equality
- transportation
- density

2) The master planned community should establish a sense of place through human interaction with the landscape.

3) Propose development to compliment the proposed commuter rail station and public transportation.

Goal 3 - Public Transit

Listed to the right are the objectives for goal three regarding complimenting the commuter rail station and public transportation. These objectives were defined to ensure the community accommodated multiple modes of transit and encouraged residents to reduce the use of their personal vehicles.

Goal 3
Propose development to compliment the proposed commuter rail station and public transportation.

Objectives:

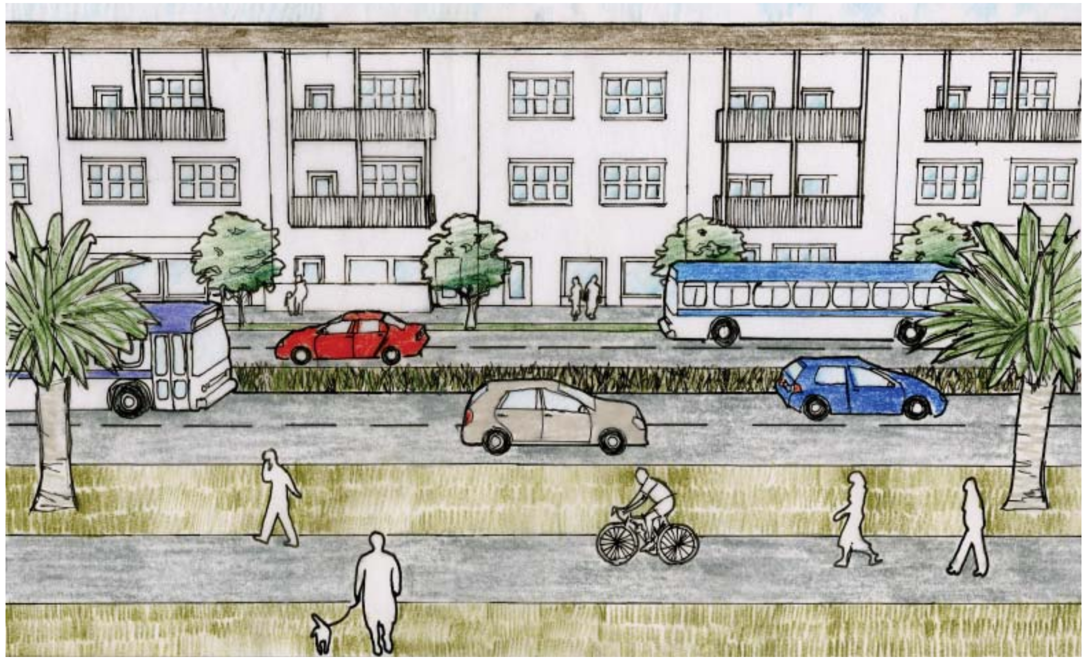
-place an emphasis on the use of multiple modes of transportation including public transit

-design complete streets or corridors that include pedestrian only and pedestrian-friendly routes;

-create a hierarchy of streets and corridor uses; allow for regional versus local traffic and pedestrian networks such as walkways and bikeways

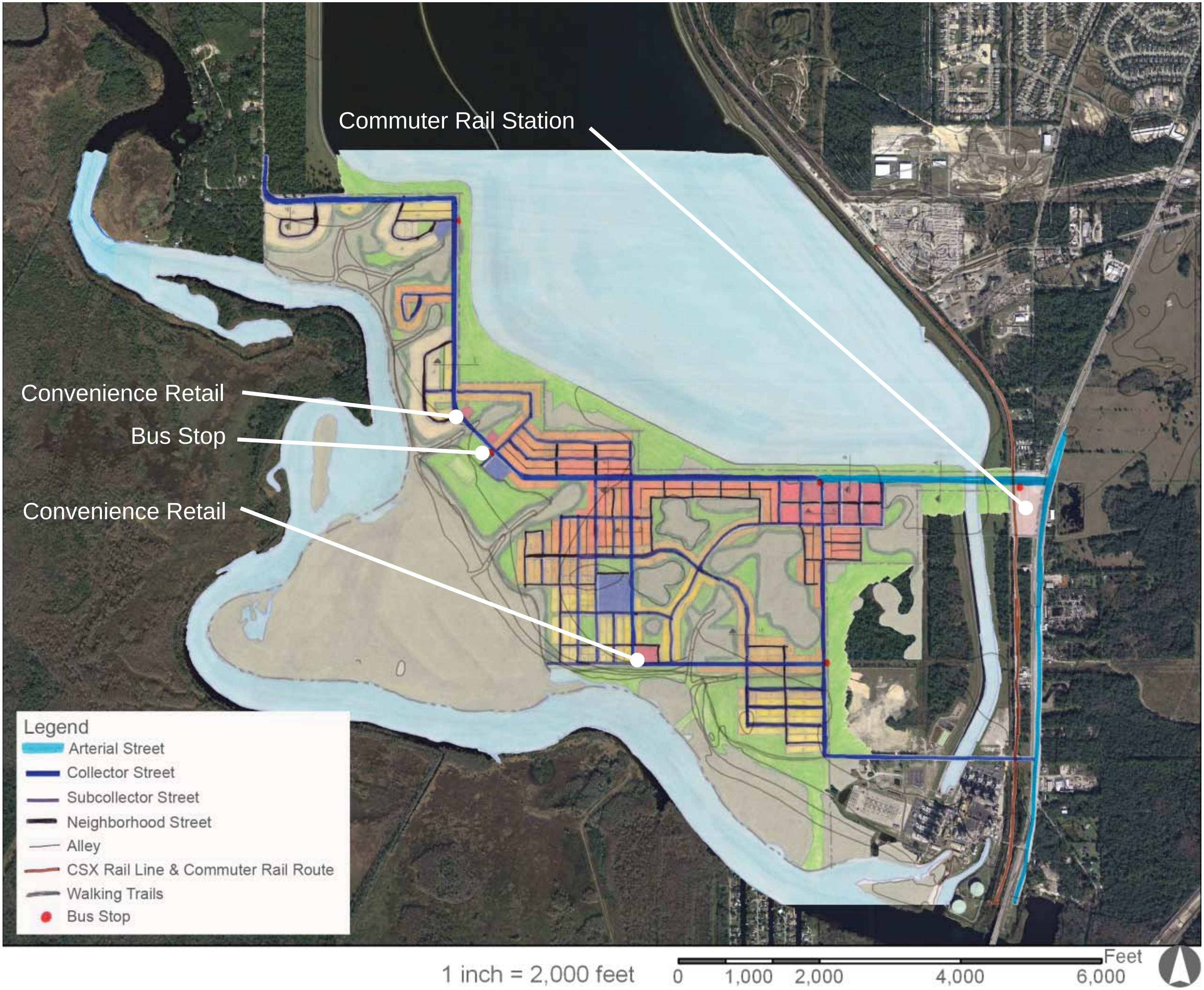
(Right) Figure 3.24 - Multiple Modes of Transit. Source: Drawn by author.

(Opposite Page) Figure 3.25 - Transportation Plan. Source: Plan drawn by author.



Modes of Transportation

To accomplish the project goal of complimenting the commuter rail development and public transportation, objectives were established related to placing an emphasis on the use of multiple modes of transportation including public transit as well as designing a hierarchy of streets and corridor uses. The map to the right illustrates the hierarchy of streets and corridors in the community. Each corridor has spaces designated for personal vehicles, bicycles and pedestrian uses as well as drainage ways for stormwater. A hierarchy of uses allows streets to be separated by the amount of traffic that would travel on a particular street. Providing spaces for several modes of transit encourages residents and visitors to utilize more than one option to move from place to place. The sketch above demonstrates the implementation of multiple modes of transportation in an arterial corridor. When appropriately designed, alternatives to a personal vehicle can become popular modes of transit in the community.



Commuter Rail Station
Convenience Retail
Bus Stop
Convenience Retail
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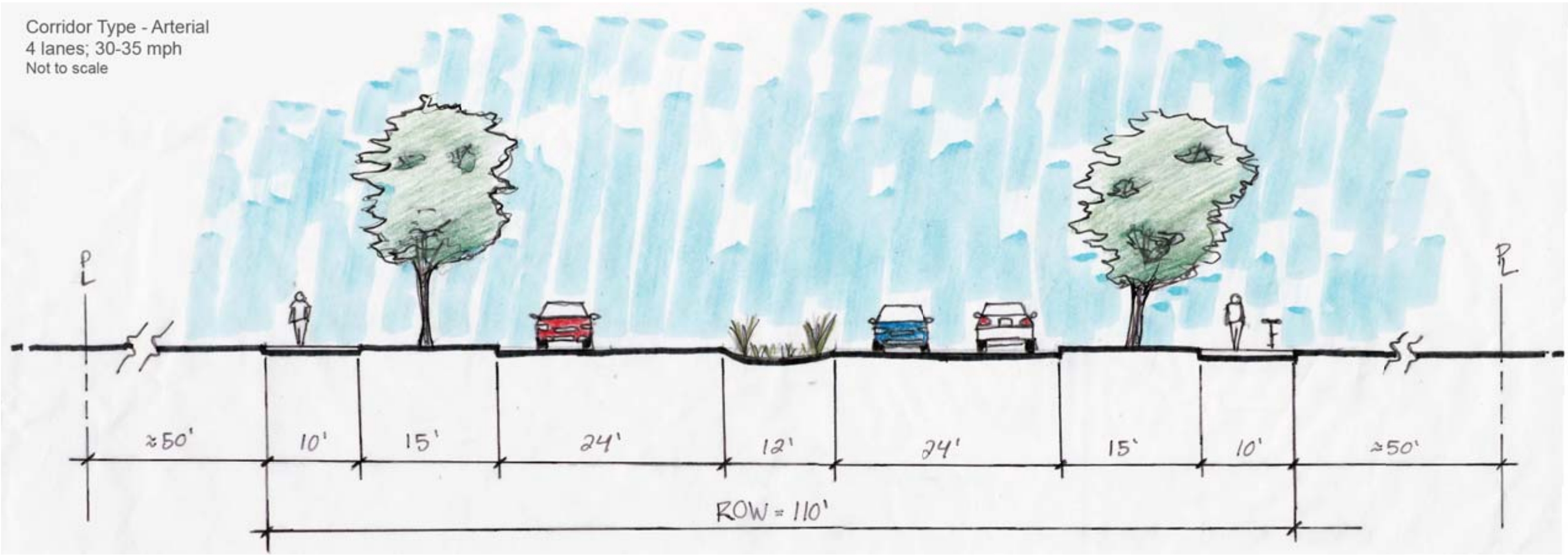


Figure 3.26 - Arterial Street Section. Source: Drawn by author.

Complete Streets

Another objective to goal three is to design complete streets that include pedestrian only and pedestrian-friendly routes. This attention to corridor design emphasizes the need to accommodate multiple modes of transportation, allowing residents to choose the best mode to utilize inside or outside the community.

The sections shown above and on the opposite page illustrate the design of corridors at different hierarchies in the transportation plan. Each corridor incorporates space for personal vehicles, bicycles and pedestrians on foot as well as space for bioswales or rain gardens which collect and treat stormwater.

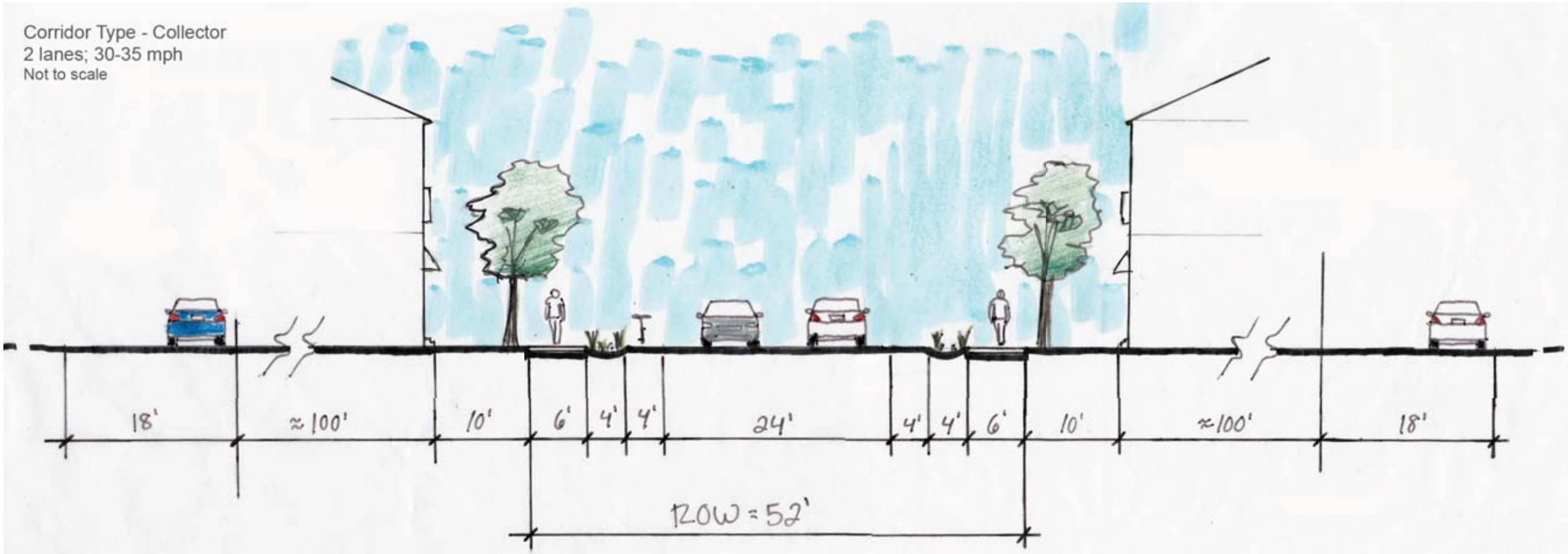


Figure 3.27 - Collector Street Section. Source: Drawn by author.

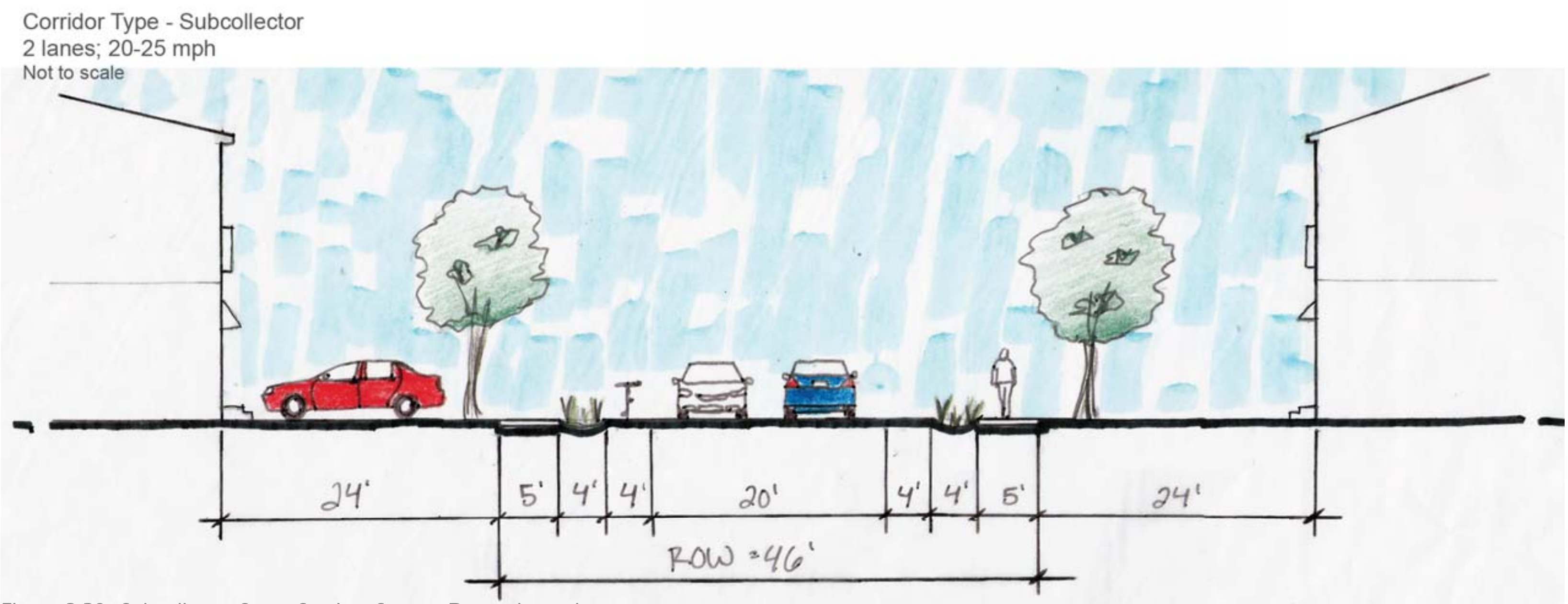


Figure 3.28 - Subcollector Street Section. Source: Drawn by author.

Final Design Intent

The final design product of the Masters capstone project can act as a master plan for this area of Central Florida and can guide the City of DeBary and Volusia County in adapting sustainable development practices to accommodate growth as a result of the proposed commuter rail.

Along with the local government, developers can also utilize principles of sustainable design in development on the site. Though the design as delineated in the project may not be built as proposed, the vision of a sustainable community can be put into practice in this region.

Design Influence

My final design product was influenced by a combination of precedent studies from community and neighborhood design that integrated sustainable development or design principles. Conclusions from literature reviews of sustainable practices, transportation, and community design theory also influenced the final design. Most influential was an inventory and analysis of the site and context which identified the opportunities and constraints of the existing site. All of these influences are discussed in the following two sections.

4
Theory & Application

Introduction

Researching theory and design applications related to project goals was essential to the successful accomplishment of project goals and a well designed product. Literature reviews and case studies were conducted to research subjects related to the project such as sustainability, transportation, and community design. The following section is a summary of these findings and how they apply to the Masters project.

Commuter Rail & Transportation Design

The potential presence of a commuter rail stop on the site called for the designer to research public transit and its potential impact on the community. An important conclusion from this research is the definition of a commuter rail and how it differs from other trains such as light rail. A commuter rail is a form of public transportation characterized by rail cars that run on existing freight lines and provide service to downtown areas over long distances (Dunphy 2004, 12). Transportation design was also researched at the neighborhood scale as opposed to the regional scale. In a neighborhood, trips should be internalized as much as possible, preventing travelers from using the regional road network (Ewing 1997, 23). Full text of literature reviews can be found in Appendix A. Information on transportation design directly influenced the community transportation plan and corridor design.

Figure 4.1 - DMU Commuter Rail Car. Commuter rail trains use DMU cars like this train in Colorado. Source: FasTracks Regional Transportation District of Denver.

Sustainability & Sustainable Development

It was important to the success of the project that the designer become familiar with the theory, definition and history of the sustainability movement. Several sources were found to define sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Edwards 2005, 17). Another popular phrase when describing sustainability is the "three Es" (ecology/environment, economy/employment, and equity/equality) or the John Elkington term "triple bottom line" (Edwards 2005, 50). Most landscape architecture work is directly associated with ecology or the environment, but should incorporate all three Es. Full text of literature reviews can be found in Appendix A. This research resulted in a list of goals for sustainability listed on the following page. These goals directly impacted the project goals during the project's design phase.

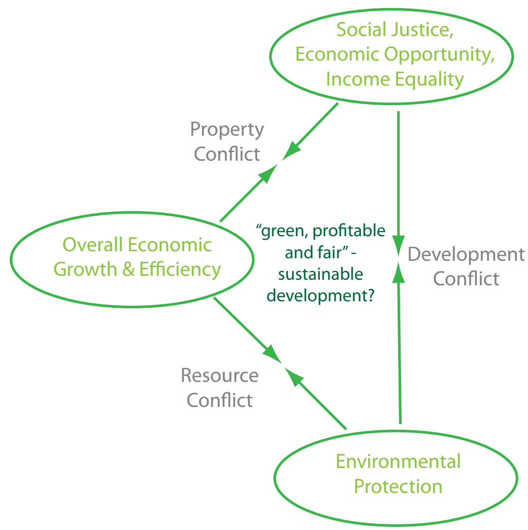


Figure 4.2 - Green Cities Triangle. The triangle shows conflicting goals for planning; sustainable development is in the center. Source: Adapted from Campbell 2005, 298.

Goals for Sustainability

The goals listed on the opposite page are summarized from sources related to sustainable development and became the goals, objectives, concepts or even specific program elements for the project.

The objectives highlighted in green were chosen to focus on for this project because they can be accomplished at the community plan scale and are in the scope of work of a landscape architect or planner.

(Right) Figure 4.3 - Goals for Sustainability. Source: Drawn by author.

Goals for Sustainability - Community Master Plan Scale

ecology

-create/preserve "urban" green space
-do not add to heat island effect
-limit human impact, do no harm
-understand indispensability of ecosystem
-think long term
-prevent unnecessary waste
-reduce material and energy consumption
-limit to level of resources each person can consume
-recognize and preserve wildlife habitat
-urban agriculture
-integrate natural environment in to new community

economy

-create jobs
-long term employment
-challenge businesses to look at environmental and social costs, not just economic profit

transportation

-energy efficient vehicles
-reduce trips
-reduce dependence on personal vehicles
-encourage walking/cycling
-reduce required parking
-easy movement through all parts of community by all modes of transportation (don't favor one)
-work with public transit

social equality

-create community space/sense of community
-well being of individual and larger community are interdependent
-inter-generational equality
-mix single family and multi-family neighborhoods
-public spaces with strong design features (water, street, furniture, playgrounds, etc.)
-allow spaces for children

self-reliance

-use of energy and materials be consistent with production
-increase community and regional self reliance to reduce dependency on "imports"

density

-denser development
-mixed use, multi-level development - work live shop
-efficient use of space

Case Studies

Several projects were studied for the accomplishment of certain project goals. The following are main ideas researched and projects that best relate to and demonstrate accomplishment of similar project goals.

Integration of Open Space

Preserving existing open space as well as integrating designed open space into the Central Florida community is an important project goal. A community that was designed so "man and nature can coexist to their mutual benefit" is Vickery in Cumming, Georgia (DPZ). This 214 acre site is an example of a green, compact design and walkable neighborhood where open space preservation was a large priority in the community design, which is also a goal of the Masters project. More information on this case study can be found in Appendix B.

(Right) Figure 4.4 - Vickery Rendered Master Plan. Source: Tunnell-Spangler-Walsh & Associates.

Stormwater Management

Integrating stormwater management in to the community design and highlighting water as a resource are also important goals of the Masters project. Heritage Park, located in Minneapolis, Minnesota, features a series of parks and open spaces organized around a boulevard with stormwater systems threaded through parks. For this project, designers aimed to make water the central feature of the development (McIntyre 2007, 52). This project demonstrates the goal of integrated stormwater management can be a defining piece of a project and aesthetically well done. More information on this case study can be found in Appendix B.

(Right) Figure 4.5 - Heritage Park Plan. Source: Barr Engineering Company.

Density

Village Green, located in San Fernando, California, is a project that exemplifies a high density single family neighborhood that integrates sustainable design principles. The 18 acre site has 186 lots that include homes equipped with photovoltaic cells to generate solar energy, providing up to 90 percent of each home's electricity demand (Porter 2000, 94-95 & 118). The developers also aimed to make these homes affordable as well as connect to a transit station across the street. Many of these project goals are similar to those of the Masters project. More information on this case study can be found in the Appendix B.

Figure 4.6 - Village Green Plan. Source: Porter 2000, 90.

Sense of Place & Visual Design

Many projects located in Florida were researched because they are visually memorable as a place, utilizing certain colors or styles of architecture. Communities such as Celebration, Rosemary Beach, Watercolor and Seaside utilize style and consistency through the community to identify the project as a unique place. This idea of creating a style and attention to design of all elements in the community is a goal of the Masters capstone project.

Figure 4.7 - Seaside Beach Pavilion. Seaside, Florida, uses distinctive art and architecture to establish a sense of place. Source: Photograph taken by author.

Figure 4.8 - Watercolor. Color, architectural style, and other unique characteristics define Watercolor, Florida, as a place. Source: Photograph taken by author.

5

Site Inventory & Analysis

Introduction

Goals of the Masters project that relate to sustainable development include limiting impact to natural systems. To accomplish these goals the designer needed to identify and understand the natural systems on and around the site, as well as the cultural systems and existing conditions, to allow for the integration of community development.

Along with the goals for sustainable development, establishing a sense of place was an important goal for the project. Accomplishing this goal requires understanding and highlighting the uniqueness of a site. The unique qualities can be identified in the physical, biological, and cultural attributes of the site which are discussed in this section.

The conclusions from the site inventory and analysis had a direct impact on the final design by identifying opportunities and constraints of the site for development.

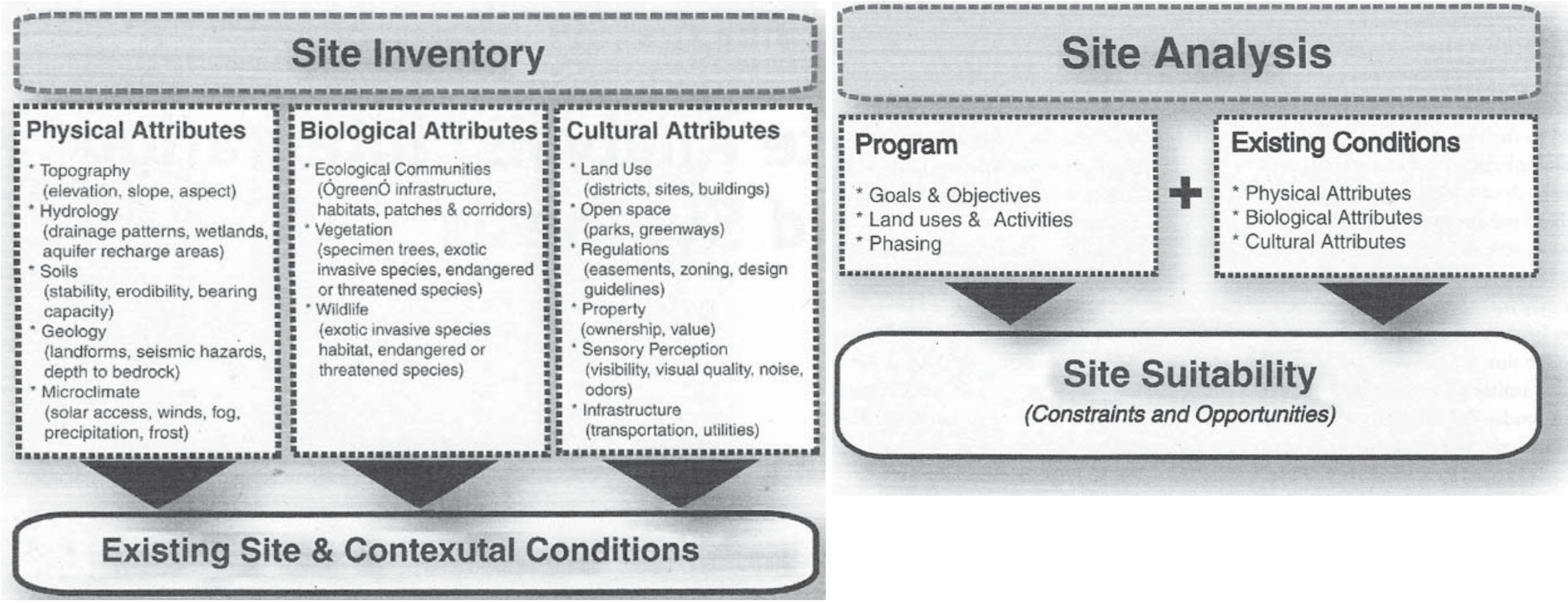


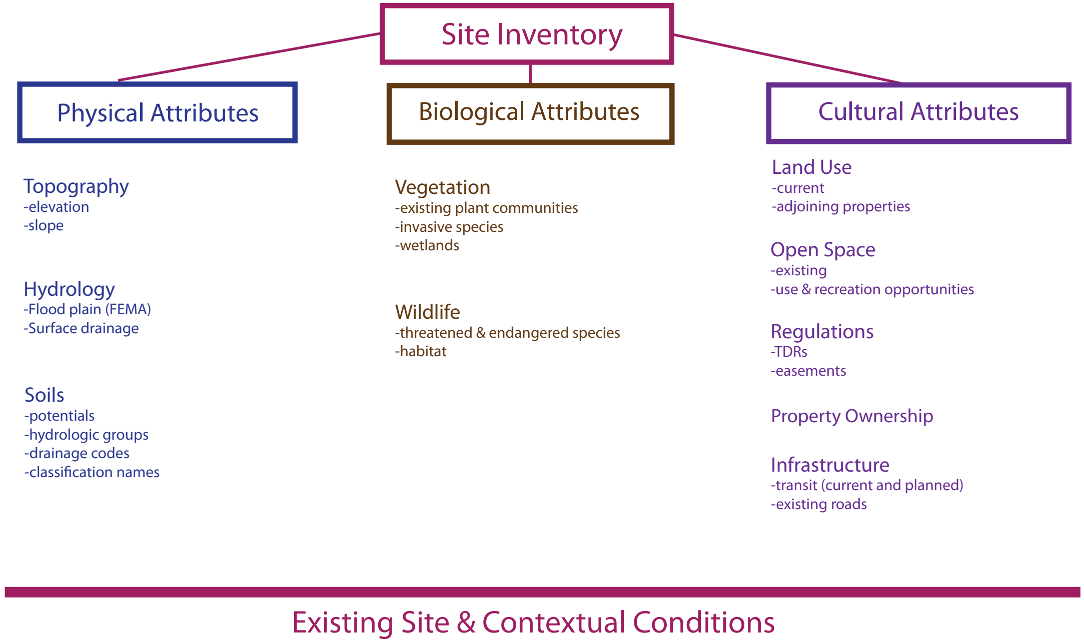
Figure 5.1 - LaGro's Site Inventory and Analysis Processes. Source: LaGro 2008, 170.

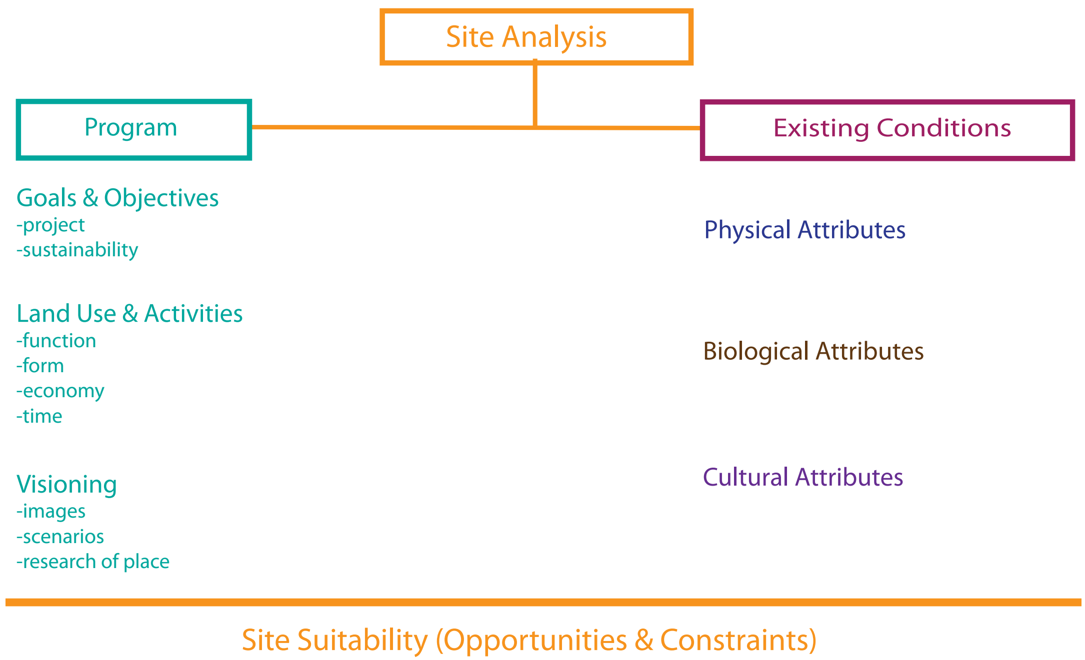
Site Analysis Process Influence

The above diagrams were taken from LaGro's Site Analysis: A Contextual Approach to Sustainable Land Planning and Site Design. These charts influenced the process by which the designer analyzed the site and determined suitable development. LaGro inventories the site in three main categories: physical, biological, and cultural attributes. The sum of these attributes results in the existing site and contextual conditions. These conditions, along with the program of the site, result in conclusions regarding the suitability of the site for the certain types of development in a program (LaGro 2008, 170).

Inventory & Analysis Process

The diagrams to the right illustrate the author's process for site inventory and analysis conducted for the Central Florida site. The process involves inventory of attributes much like the LaGro process, however attributes to be inventoried were selected because they could be surveyed for the entire 900 acre site and would contribute to conclusions regarding opportunities and constraints for a conceptual program at a land planning scale.





(Top) Figure 5.2 - Author's Site Inventory Process. Source: Adapted from LaGro 2008; drawn by author.

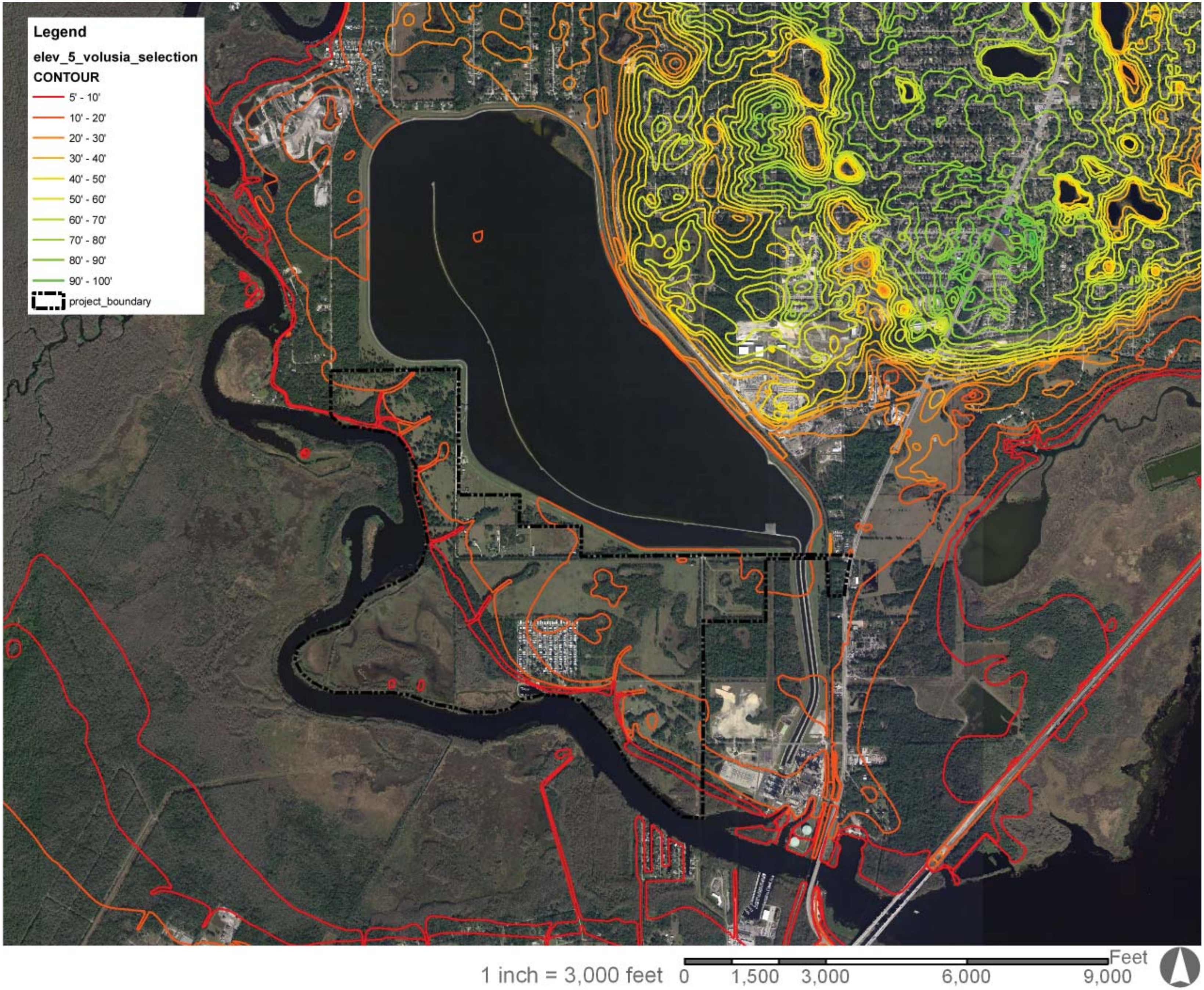
(Bottom) Figure 5.3 - Author's Site Analysis Process. Source: Adapted from LaGro 2008; drawn by author.

Land Use	Criteria	Attributes used to Determine Sustainability
Commuter Rail Station	already determined by FDOT	(na)
Convenience retail/commercial for transit	close proximity to transit stop 1/4 mile walking distance 1/2 mile biking distance located near existing road & infrastructure sites suitable for buildings	existing land use soil potential topography - elevation infrastructure - existing roads
park/open space, playground	land not suitable for buildings close proximity to homes (several sites)	existing plant communities soil potential adjoining land use
preserved natural area & wetlands	wetlands required to be preserved land not suitable for agriculture or buildings	wetland vegetation existing plant communities wildlife habitat current land use hydrology - flood plain soil potential
retail / office development	land not suitable for agriculture located near existing road and infrastructure land suitable for multi-story development	soil potential hydrology - flood plain infrastructure - existing roads adjoining land use topography - elevation
single family residential & multi-family residential	located near open spaces, public spaces sites not suitable for agriculture	infrastructure - existing roads soil potential adjoining land use topography - elevation hydrology - flood plain

(Right) Table 5.1 - Criteria & Attributes Table. Source: Drawn by author.

Criteria & Attributes Table

After refining the program for the site, general suitability criteria for each land use was identified, as shown in the table above. These criteria were mapped to create the site opportunities and constraints map on page 88. This table was used in the site analysis process when determining whether the site was suitable or unsuitable for certain land uses. In most cases the biological attributes took first priority, with the physical attributes usually a close second. Each land use was evaluated separately using specific attributes listed in the table.

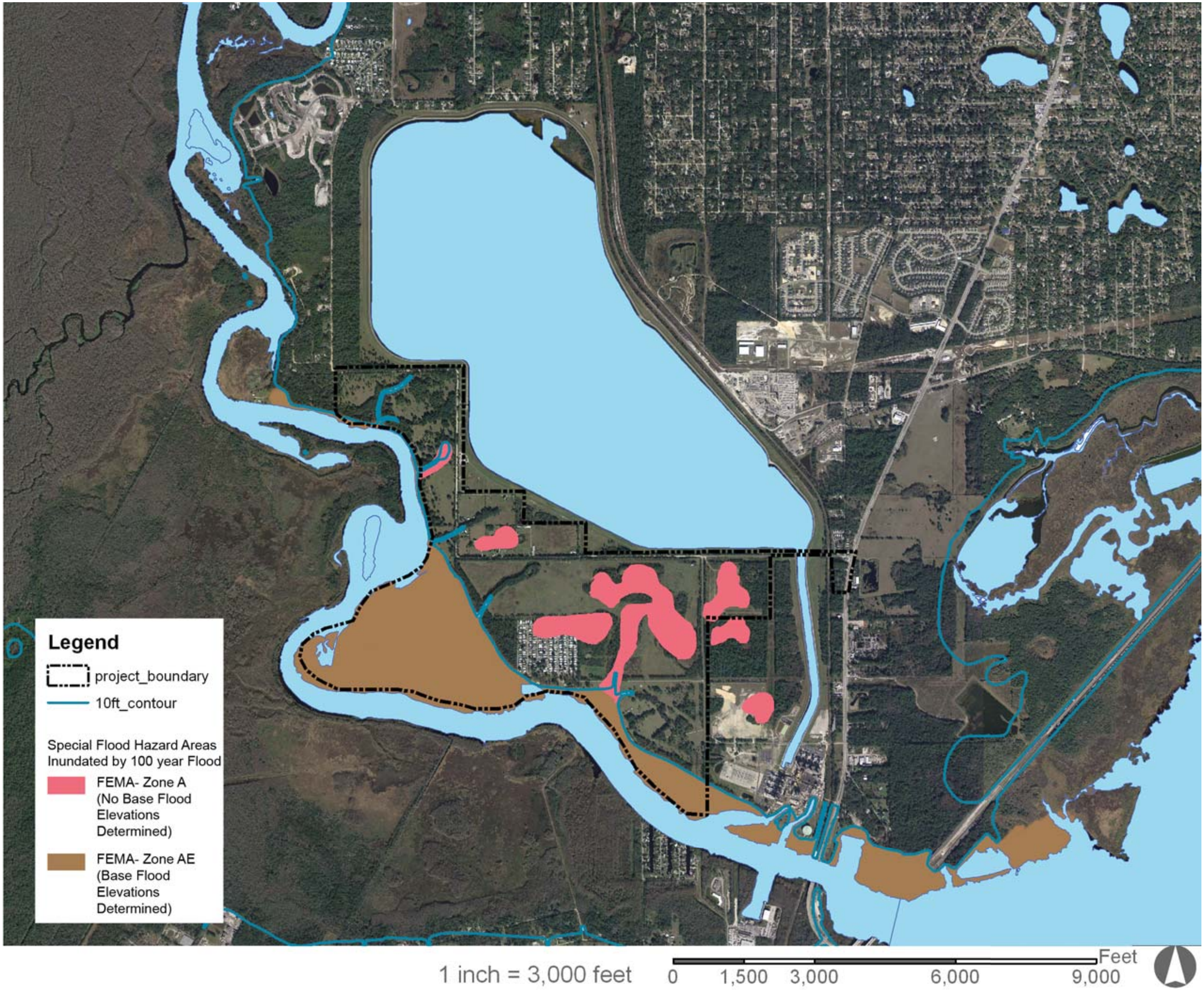

Legend
elev_5_volusia_selection
CONTOUR
5' - 10'
10' - 20'
20' - 30'
30' - 40'
40' - 50'
50' - 60'
60' - 70'
70' - 80'
80' - 90'
90' - 100'
project_boundary
1 inch = 3,000 feet
0
1,500
3,000
6,000
9,000
Feet

(Left) Figure 5.4 - Topography Five Foot Contours.
Source: Map drawn by author.

Site Inventory: Physical Attribute - Topography

The map to the left illustrates the topography for the site at five foot intervals. The topography map gives a general sense of the slope of the site, drainage patterns and hydrology related to the St. Johns River. Steeper slopes occur towards the river, while more shallow areas occur near Fort Florida Road. The lowest contour on this map is five feet and occurs closest to the river which is near sea level.

The inventory of topography was used in the site suitability analysis to identify areas that were suitable for different types of development. Areas with shallower slopes were considered better suited for denser building development and parking areas, needing minimal disturbance of the existing grade. Steeper slopes were considered suitable for lower density residential housing or open space to minimize the impact of existing grade. For design purposes, the nine foot contour is considered in the FEMA 100 year flood plain although building development was proposed above the ten foot contour, more information on hydrology is listed on the following pages.

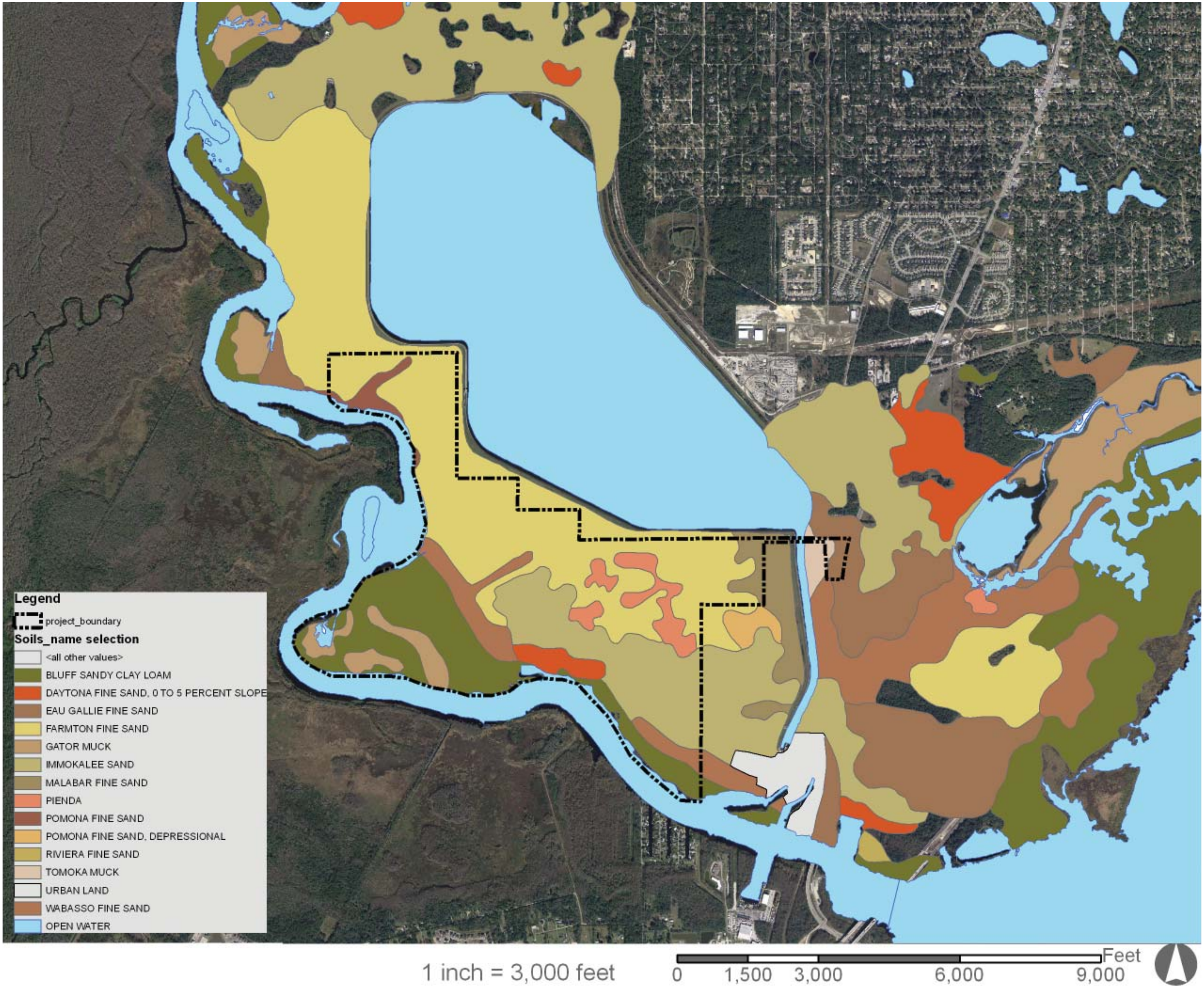

Legend
project_boundary
10ft_contour
Special Flood Hazard Areas
Inundated by 100 year Flood
FEMA- Zone A
(No Base Flood
Elevations
Determined)
FEMA- Zone AE
(Base Flood
Elevations
Determined)
1 inch = 3,000 feet
0
1,500
3,000
6,000
9,000
Feet

(Left) Figure 5.5 - Hydrology. Source: Map drawn by author.

Site Inventory: Physical Attribute - Hydrology

The map on the opposite page illustrates existing water bodies and the areas identified by FEMA as being within the 100-year flood plain. The map also shows areas identified by FEMA in which the base flood elevation is not determined but would still be inundated by a 100 year flood. All other areas in the project site boundary are outside the 500 year flood plain. According to maps obtained from FEMA, the nine foot contour is within the 100 year flood zone, the ten foot contour shown is a buffer for proposed development.

The information regarding hydrology was used to identify areas on and around the site that were not suitable for dense building development due to the possible impact by a 100 year storm event. The hydrology information was also used to identify areas that were vulnerable to a storm event and would require careful planning of potential development.

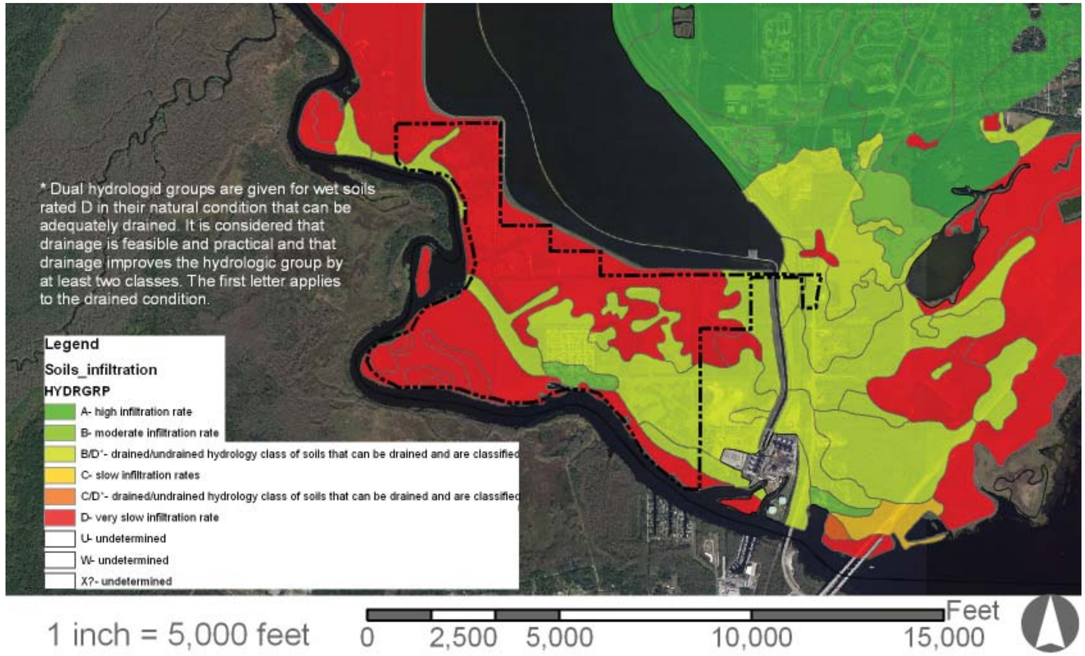

Legend
project_boundary
Soils_name selection
<all other values>
BLUFF SANDY CLAY LOAM
DAYTONA FINE SAND, 0 TO 5 PERCENT SLOPE
EAU GALLIE FINE SAND
FARMTON FINE SAND
GATOR MUCK
IMMOKALEE SAND
MALABAR FINE SAND
PIENDA
POMONA FINE SAND
POMONA FINE SAND, DEPRESSIONAL
RIVIERA FINE SAND
TOMOKA MUCK
URBAN LAND
WABASSO FINE SAND
OPEN WATER
1 inch = 3,000 feet
0
1,500
3,000
6,000
9,000
Feet

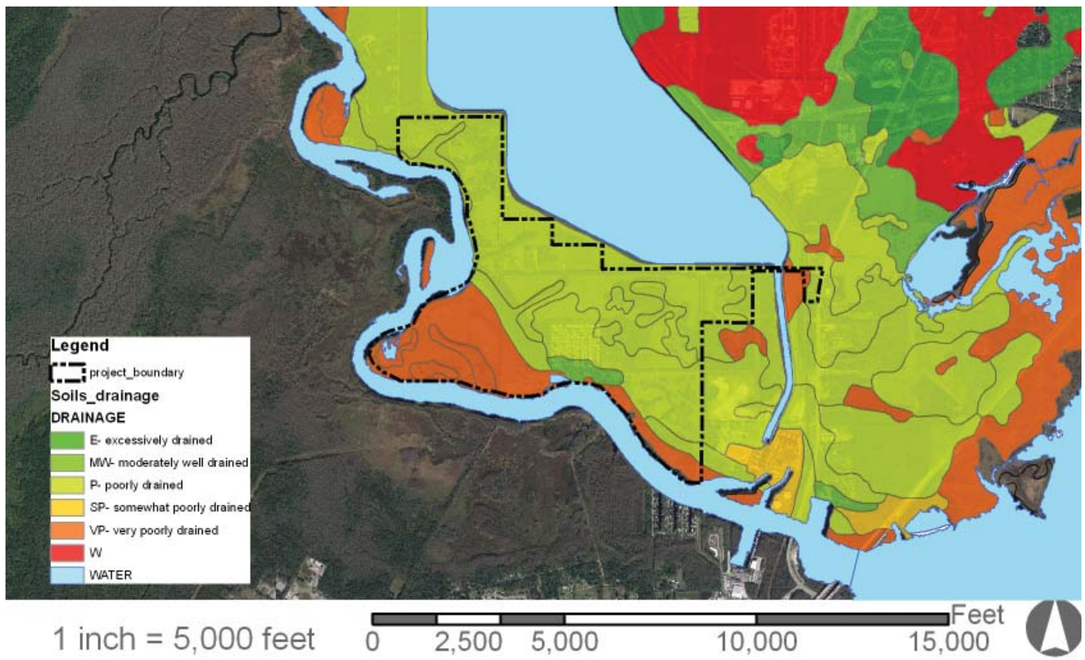
Site Inventory: Physical Attribute - Soils

The figure on the opposite page is a map of soil names and classifications. This map was used as a reference to compare other attributes such as vegetation.

The figure on the top right maps soil infiltration rates. Soils with a very slow infiltration rate are mapped as red while green areas represent soils with high infiltration rates.

Soil drainage codes are displayed in the figure to the bottom right. Soil drainage codes are mapped to show areas that are very poorly drained (orange) to moderately well drained (light green).

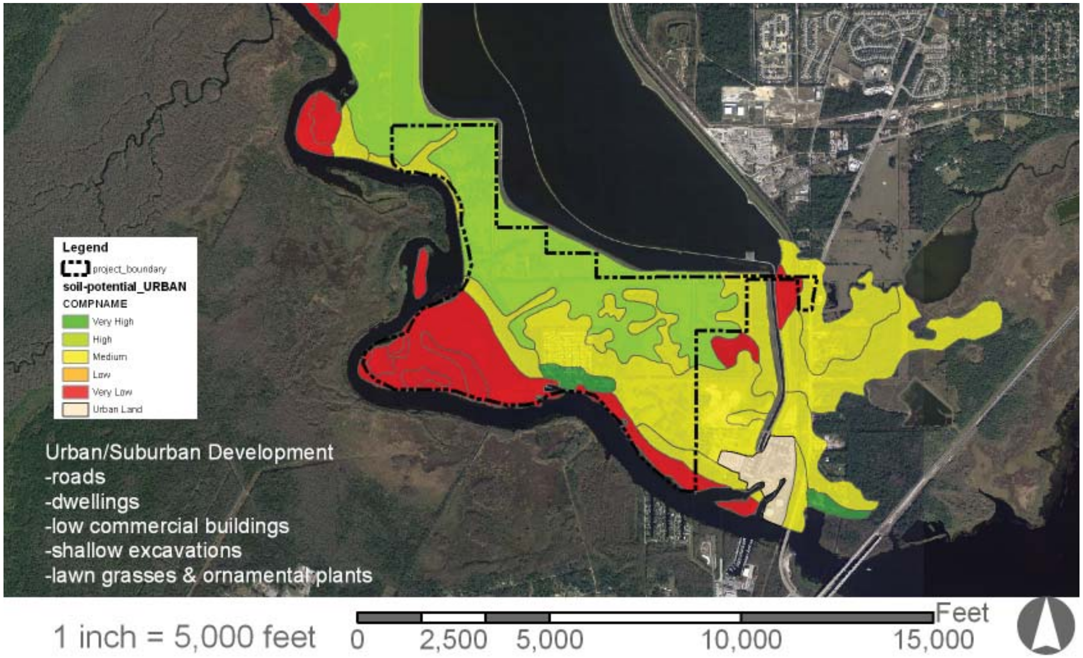


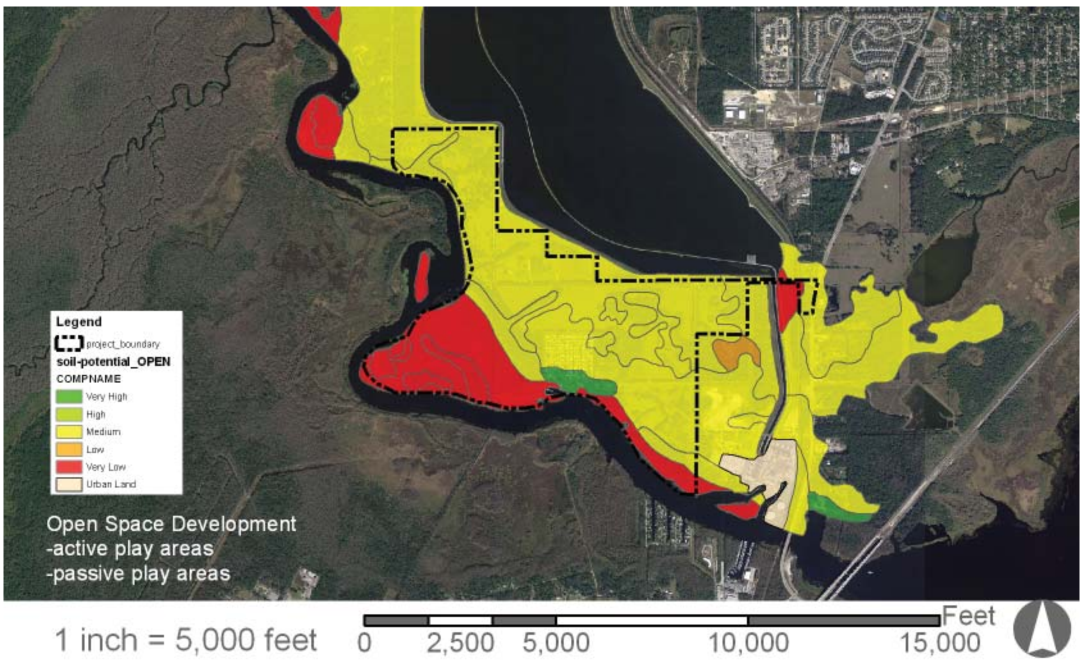


(Left) Figure 5.6 - Soil Names. Source: Map drawn by author.

(Top Right) Figure 5.7 - Soil Infiltration Rate. Source: Map drawn by author.

(Bottom Right) Figure 5.8 - Soil Drainage Code. Source: Map drawn by author.





Site Inventory: Physical Attribute - Soils

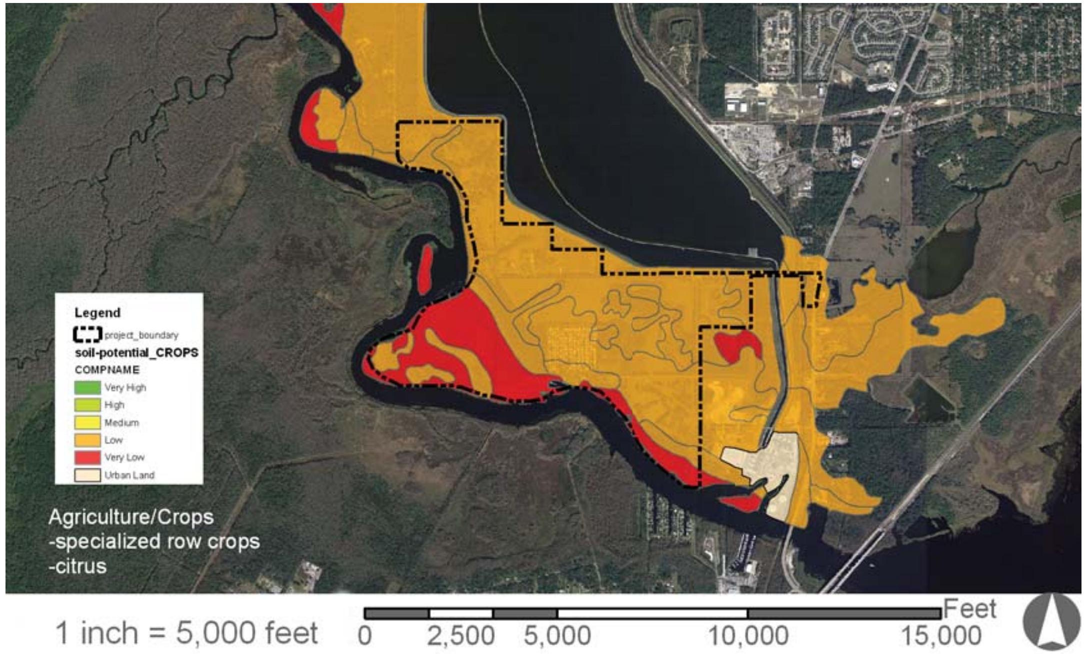
Soil potentials were obtained from the Volusia County Soils Survey Supplement and Vegetative Analysis. This document rated each soil name with a potential to accommodate 14 different types of development; 11 relevant types were chosen based on the schematic program elements and mapped using the same 5-tier rating system from the Volusia County Soils Survey Supplement and Vegetative Analysis, showing very high potential as green and very low potential as red. These 11 maps were then compiled into 4 maps that took the specific development types and grouped them into more generalized uses that better reflected the conceptual program for the project. The four maps shown are the interpretation of a combination of maps. For example, the Urban/ Suburban Development map identifies soils with the highest potential for this type of development based on several factors such as potential for dwellings or roads. In many cases, areas that were rated very low potential for one use was rated very low for a similar use.

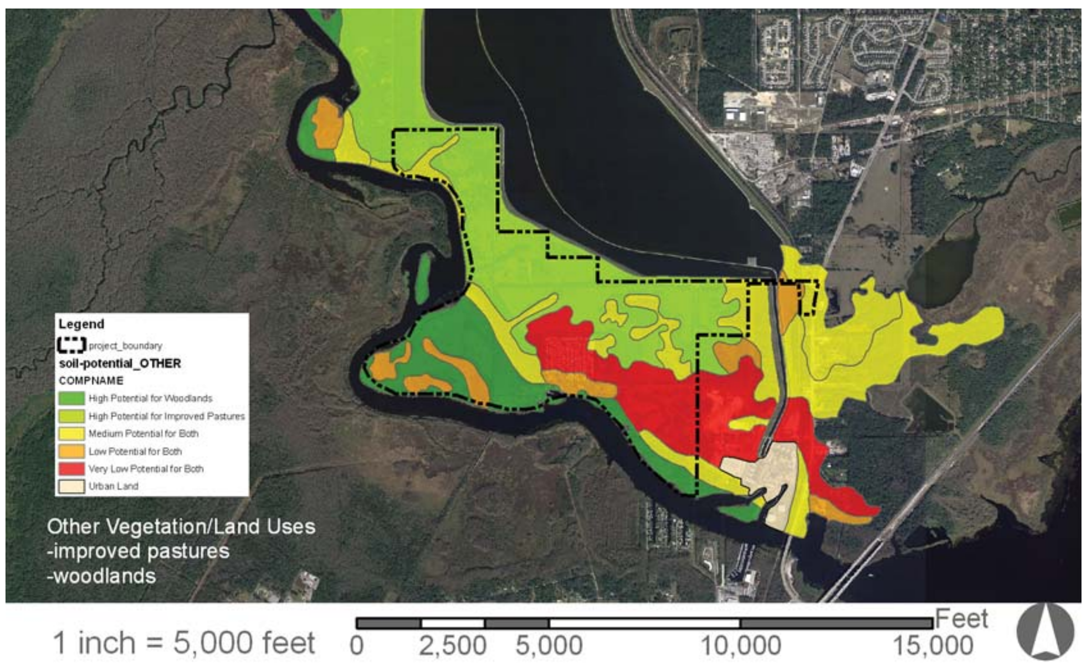
Discrepancies in soil potential were resolved based on adjacent soils and total area of the soil. It should be noted, bias may have been given to areas using preconceived design solution scenarios. In most cases, all factors were given equal weight in determining the final soil potential rating.

Soil potential information was a large consideration in the site analysis process. Because the Volusia County Soils Survey Supplement and Vegetative Analysis provided a thorough analysis of soils for certain land uses, the conclusions from the soils potential mapping process done by the author heavily influenced the analysis of all site attributes. The hydrologic groups, drainage codes, and classification names were not used in the site suitability analysis because of the clear findings from the potential ratings as well as the unclear interpretation of the information.

(Top Left) Figure 5.9 - Urban/Suburban Soil Potential. Source: Map drawn by author.
(Bottom Left) Figure 5.10 - Open Space Development Soil Potential. Source: Map drawn by author.

(Top Right) Figure 5.11 - Agriculture Soil Potential. Source: Map drawn by author.
(Bottom Right) Figure 5.12 - Other Vegetation or Land Use Soil Potential. Source: Map drawn by author.





Site Inventory: Biological Attributes - Vegetation

A map illustrating vegetation locations and names can be found in Appendix C. Although this map was not the most important resource related to the analysis of the site, it was referred to when researching wildlife. It should be noted the information presented in the vegetation map shows a majority of the site is generalized agriculture. Also important to the inventory was classifying wetland vegetation. Inventory of wetlands on the site was found from several sources. The map on the opposite page illustrates the most variety of vegetation classified as wetlands. Other maps delineating wetlands can be found in Appendix C.

The inventory of wetland vegetation was considered in the site suitability analysis while the map of vegetative communities was not. The location of designated wetland vegetation (or non-upland) areas was considered not suitable for any type of dense building development. Also, the regulations of wetlands appeared to be project specific and it was determined that, because of the goals of sustainability, any wetland vegetation should not be disturbed.

Site Inventory: Biological Attributes - Wildlife

To inventory wildlife on the site, lists of threatened and endangered species were obtained from both national and state sources. Both of these lists can be found in Appendix C. Although the designer was unable to locate suitable maps to communicate location of species on site, the Volusia County Soils Survey Supplement and Vegetative Analysis contains information on vegetative communities and lists the percent of rare and endangered wildlife on the site. The information on vegetation was compared to the vegetative names and wetland vegetation information to establish a general idea of what vegetative communities exist on the site. The information in the Volusia County Soils Survey Supplement and Vegetative Analysis regarding the presence of endangered or threatened species in a specific community then became valuable to determine the presence of certain animals species on the site.

An area with a greater chance of threatened or endangered species was considered unsuitable for dense development. The vegetative communities previously mentioned were mapped by name and compared to the table from the Volusia County Soils Survey Supplement and Vegetative Analysis. From a quick comparison, the designer could conclude more threatened or endangered species occur in vegetative communities that are considered wetlands by other sources and should be preserved to protect the vegetation and wildlife.

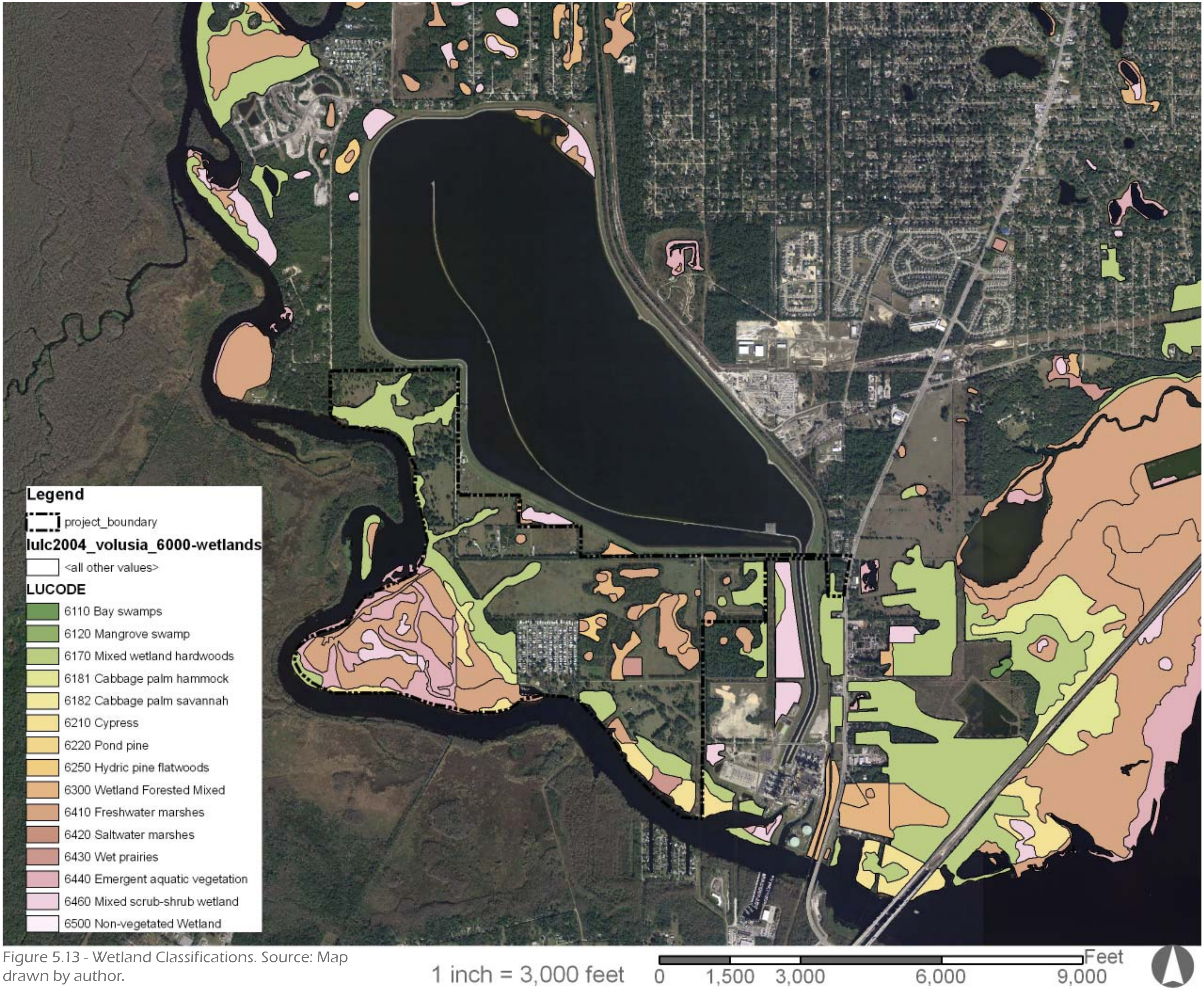


Figure 5.13 - Wetland Classifications. Source: Map drawn by author.

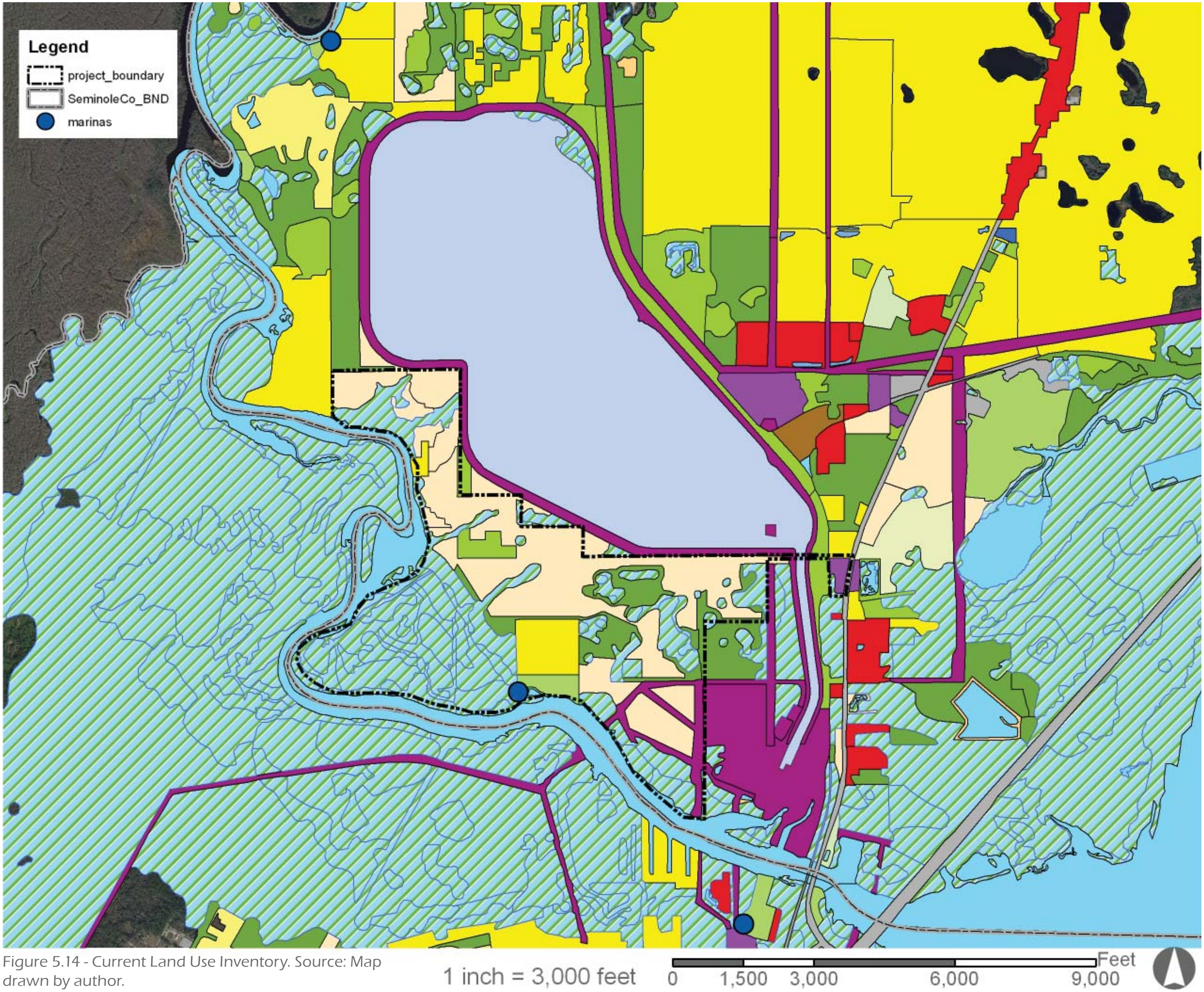


Figure 5.14 - Current Land Use Inventory. Source: Map drawn by author.

Legend

LULC2004_volusia

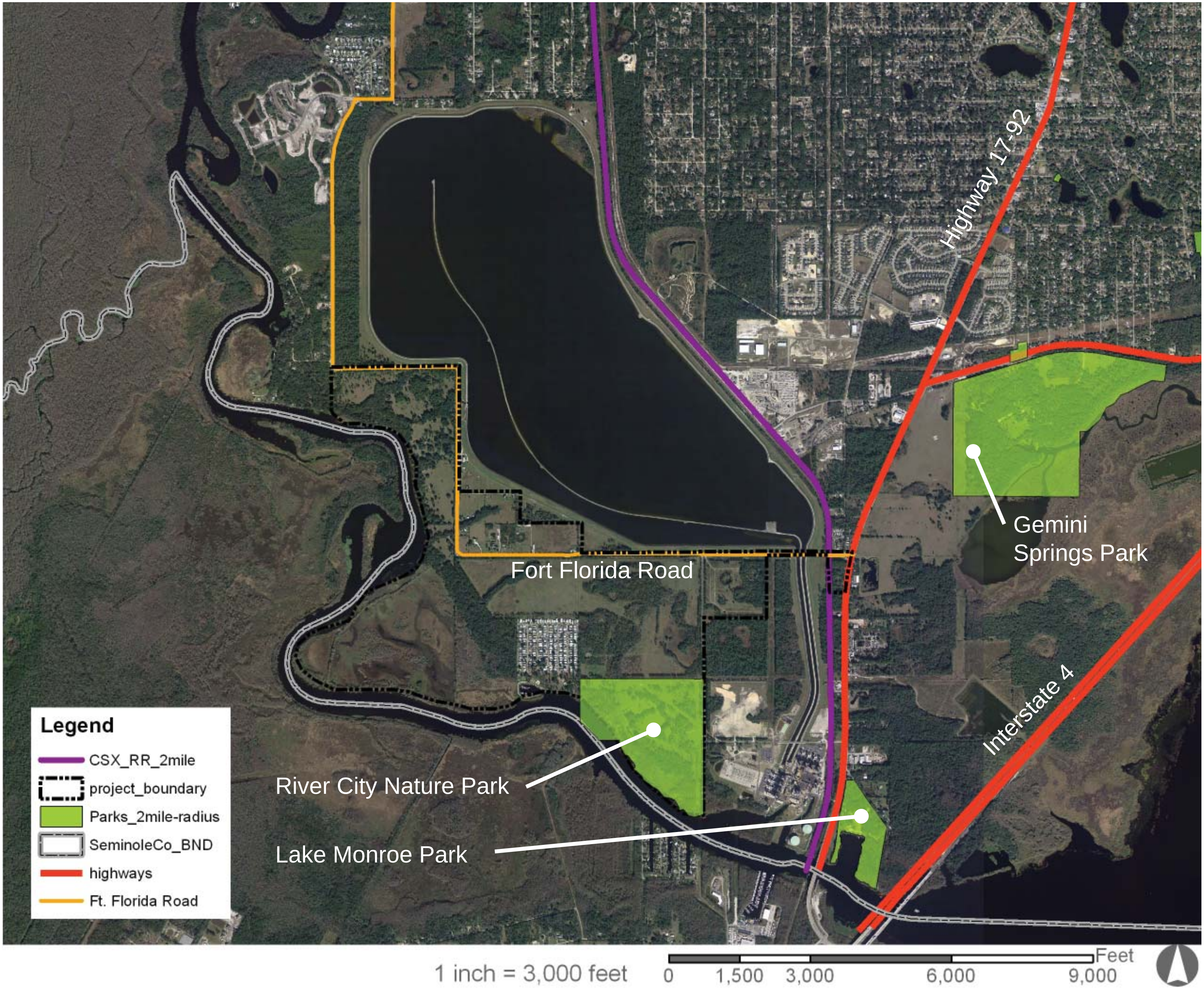
LUCODE

- 1100-Residential, Low Density
- 1180-Residential, Rural
- 1200-Residential, Med. Density
- 1290-Med. density under construction
- 1300-Residential, High Density
- 1400-Commercial and Services
- 1490-Commercial and services under construction
- 1550-Other light industry
- 1560-Other heavy industrial
- 1620-Sand and gravel pits
- 1700-Institutional
- 1800-Recreational
- 1840-Marinas and fish camps
- 1900-Open Land
- 2110-Improved pastures
- 2120-Unimproved pastures
- 2130-Woodland pastures
- 2150-Field crops
- 3100-Herbaceous Upland Nonforested
- 3200-Shrub and Brushland
- 4110-Pine flatwoods
- 4130-Sand pine
- 4210-Xeric oak
- 4340-Upland mixed coniferous/hardwood
- 4410-Coniferous pine
- 4430-Forest regeneration
- 5100-Streams and waterways
- 5200-Lakes
- 5300-Reservoirs
- 6110-Bay swamps
- 6170-Mixed wetland hardwoods
- 6181-Cabbage palm hammock
- 6210-Cypress
- 6250-Hydric pine flatwoods
- 6300-Wetland Forested Mixed
- 6410-Freshwater marshes
- 6430-Wet prairies
- 6440-Emergent aquatic vegetation
- 6460-Mixed scrub-shrub wetland
- 7200-Sand other than beaches
- 7400-Disturbed land
- 7410-Rural land in transition...
- 7430-Spoil areas
- 8120-Railroads
- 8140-Roads and highways
- 8160-canals and locks
- 8310-electrical power facilities
- 8320-electrical power transmission lines
- 8370-surface water collection basins

Site Inventory: Cultural Attributes - Current Land Use

The map to the left illustrates land use and land cover information obtained from Volusia County GIS data. The map shows the site and surrounding land uses. Current uses on and near the site include industrial power generation, some low to medium density residential and former agriculture land. Most of the 900 acre site is upland or wetlands.

This map was used to finalize the project boundaries that encompass the River Bend site and the future commuter rail site. The existing land use did not have a large influence in the site suitability analysis except for the delineation of wetlands mentioned in Biological Attributes.



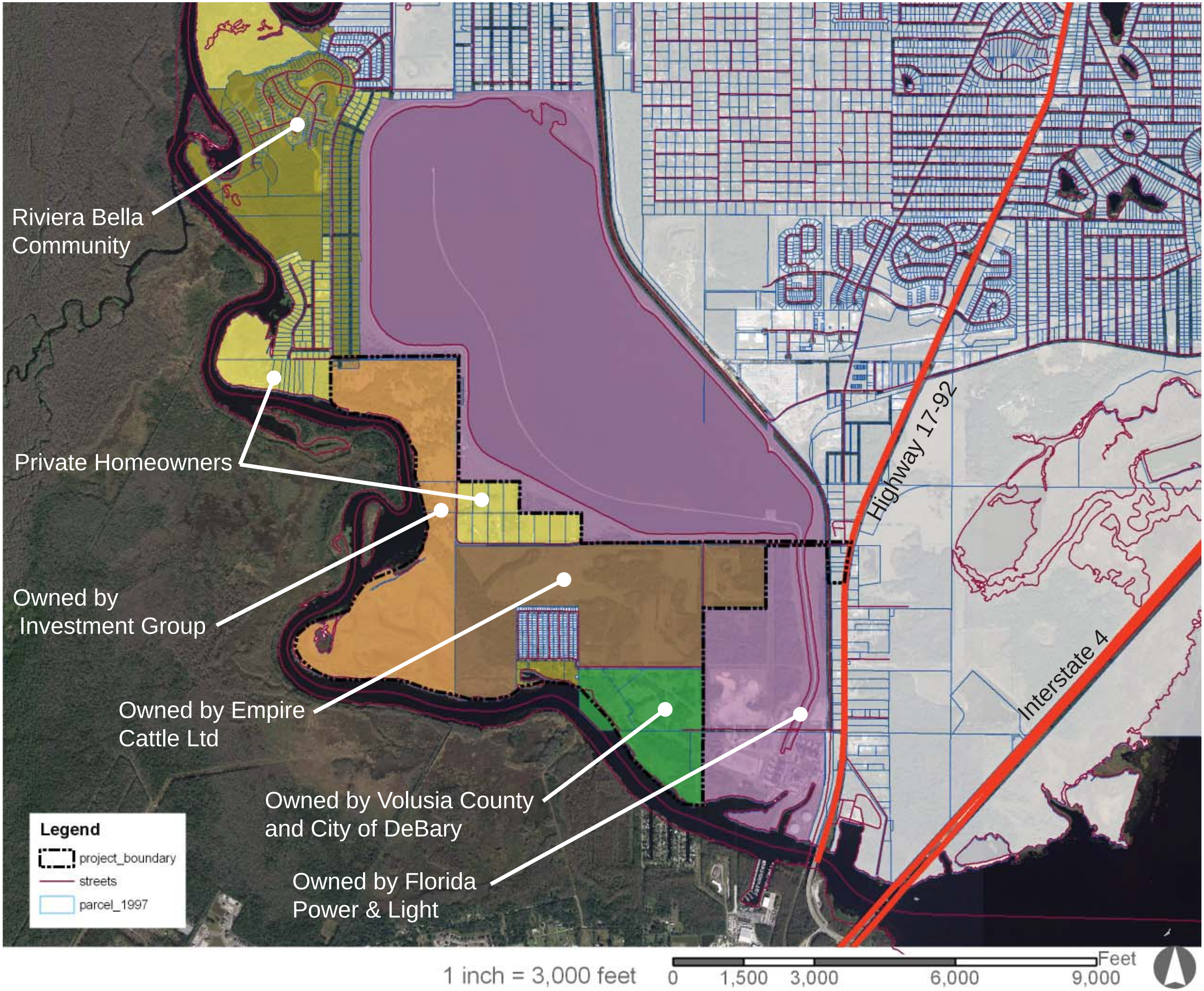
Highway 17-92
Gemini
Springs Park
Fort Florida Road
Interstate 4
River City Nature Park
Lake Monroe Park
Legend
CSX_RR_2mile
project_boundary
Parks_2mile-radius
SeminoleCo_BND
highways
Ft. Florida Road
1 inch = 3,000 feet
0
1,500
3,000
6,000
9,000
Feet

Site Inventory: Cultural Attributes - Open Space

Existing open space and parks on and near the site are delineated in the figure to the left. These parks include: Gemini Springs Park (Volusia County), River City Nature Park (City of DeBary), and Lake Monroe Park. More information on each park including descriptions of amenities can be found in Appendix C.

This information on existing open space and parks was used to determine and refine program elements and did not heavily influence site suitability analysis.

(Left) Figure 5.15 - Open Space Inventory. Source: Map drawn by author.


Riviera Bella
Community
Private Homeowners
Owned by
Investment Group
Owned by Empire
Cattle Ltd
Owned by Volusia County
and City of DeBary
Owned by Florida
Power & Light
Highway 17-92
Interstate 4
Legend
project_boundary
streets
parcel_1997
1 inch = 3,000 feet
0
1,500
3,000
6,000
9,000
Feet

Site Inventory: Cultural Attributes - Property Ownership

The map to the left delineates existing property ownership information for the site and adjacent parcels. The community to the north is Riviera Bella. To the southeast of the site is a power plant owned by Florida Power & Light. Konomac Lake is directly north of the site and serves as a cooling pond for the plant. On the eastern edge of the site is the location of the future commuter rail site. Information about the commuter rail site was obtained from Dix.Lathrop and Associates as well as the Florida Department of Transportation. The Volusia County appraiser's website was used to obtain information on property ownership. Parcel boundaries were delineated using GIS data; this parcel information was entered into the Volusia County Appraiser's database website to identify the current owner.

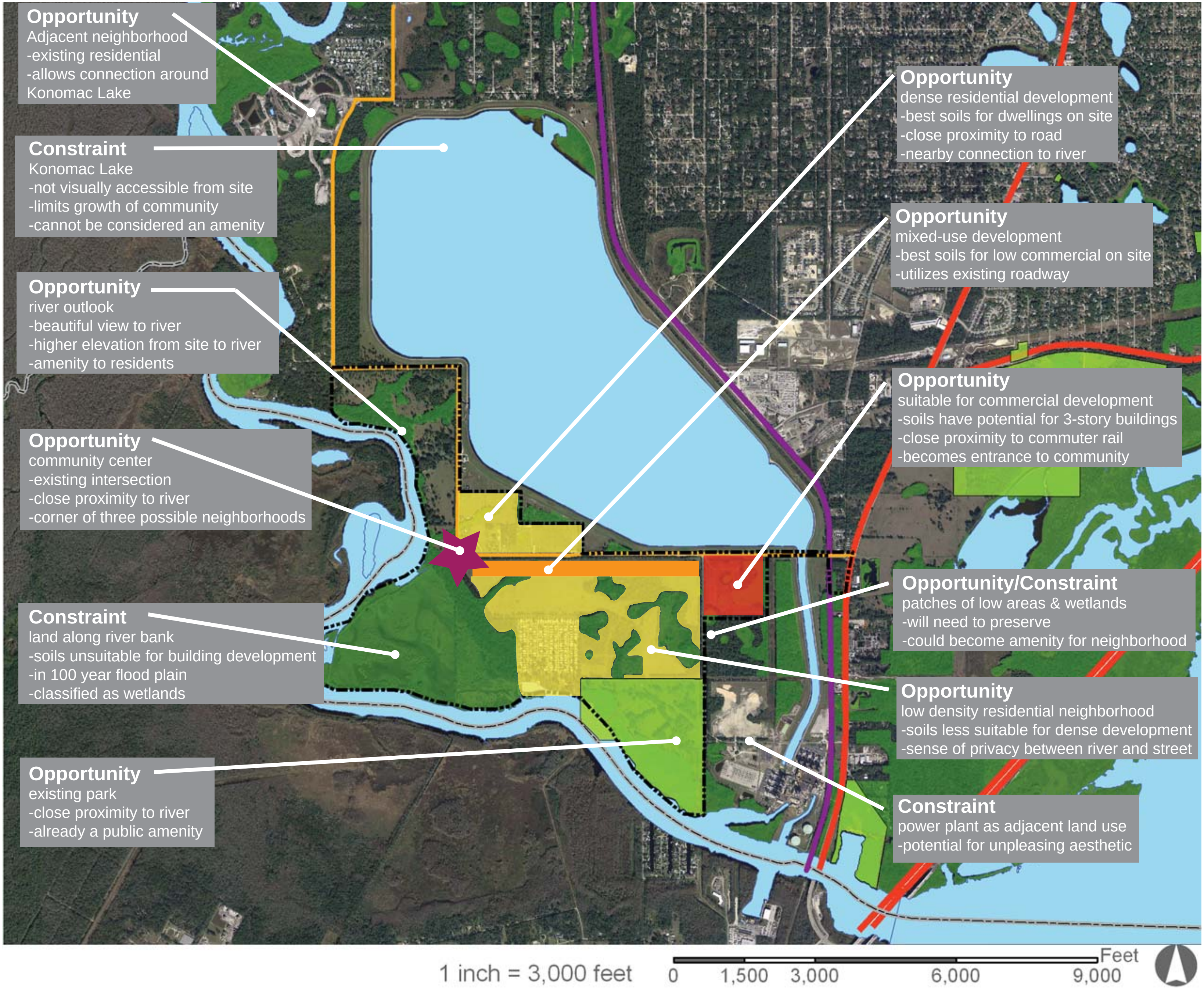
This information on property ownership was helpful in understanding the potential of site near the commuter rail site and what relationship the community would have to surrounding development.

Site Inventory: Cultural Attributes - Infrastructure

The map to the left also delineates the existing circulation and network of streets on the site and the surrounding area. Existing public transit in the Orlando metro area is provided by Lynx. GIS data obtained from Lynx showed no current or planned bus routes near the site. The only bus route into Volusia County from Seminole County was along Interstate 4.

This inventory was used to assess the areas of the site that were suitable for denser urban development. A goal of sustainability is to utilize the existing street network.

(Left) Figure 5.16 - Property Ownership and Infrastructure Inventory. Source: Map drawn by author.



Opportunity
Adjacent neighborhood
-existing residential
-allows connection around Konomac Lake
Constraint
Konomac Lake
-not visually accessible from site
-limits growth of community
-cannot be considered an amenity
Opportunity
river outlook
-beautiful view to river
-higher elevation from site to river
-amenity to residents
Opportunity
community center
-existing intersection
-close proximity to river
-corner of three possible neighborhoods
Constraint
land along river bank
-soils unsuitable for building development
-in 100 year flood plain
-classified as wetlands
Opportunity
existing park
-close proximity to river
-already a public amenity
Opportunity
dense residential development
-best soils for dwellings on site
-close proximity to road
-nearby connection to river
Opportunity
mixed-use development
-best soils for low commercial on site
-utilizes existing roadway
Opportunity
suitable for commercial development
-soils have potential for 3-story buildings
-close proximity to commuter rail
-becomes entrance to community
Opportunity/Constraint
patches of low areas & wetlands
-will need to preserve
-could become amenity for neighborhood
Opportunity
low density residential neighborhood
-soils less suitable for dense development
-sense of privacy between river and street
Constraint
power plant as adjacent land use
-potential for unpleasing aesthetic
1 inch = 3,000 feet
0 1,500 3,000 6,000 9,000
Feet

Site Analysis

The diagram to the left is a site suitability analysis and the culmination of the site inventory and analysis. The site suitability analysis diagram identifies opportunities and constraints on the site and delineates the site's suitability for specific types of development. Each opportunity or constraint is labeled and described by the factors that influence its existence. As referenced in LaGro's diagram, site analysis is the product of the program and the existing conditions together which identify opportunities and constraints for types of sustainable development (2008, 170).

(Left) Figure 5.17 - Site Suitability Analysis Diagram.
Source: Diagram drawn by author.

6
Conclusion

Conclusion

The growth of Central Florida led to the planning of a Central Florida commuter rail and a larger interest in designing communities with the environment as a priority. To accommodate population growth, the region needs to address and put in practice principles of smart growth and sustainable development beyond the implementation of a commuter rail. The intent of this Masters project is to understand and apply principles of sustainable development to the unique landscape of the site in DeBary, Florida, and propose a master plan for a community with a clear identity. A major goal of the project was to compliment the commuter rail station and its contribution to the community, therefore the project encompassed research of sustainable development and design, an analysis of the site, as well as an understanding of transportation's specific role in sustainable development.

The final design product of the Masters project is a vision for the community which utilizes principles of sustainable development, protects and highlights the ecological features of the site and creates a place unique to Central Florida as a healthy, sustainable community. The community vision is intended to act as a master plan for this area of Central Florida and serve as a guide to the City of DeBary, Volusia County, and developers in adapting sustainable development practices to accommodate growth as a result of the proposed commuter rail.

Synthesis & Reflection

Reflecting on this document as a product, items come to my mind that would have made this project a better product and ways I could have approached the project differently. First, I would have been more open minded about to looking at the larger community as a whole earlier in the project process. Specific project goals were undefined for some time and the final product was unclear during the research phase of the project. Second, I could have considered design as a larger part of the first semester's work, where design was integrated with theory and application research. This change in the project process might have resulted in a richer understanding of precedent projects and a more detailed design, tailored even more specifically to the region of Central Florida. I feel the goals addressed are general in nature and the design could demonstrate more of the site specific aspects of sustainable design.

Overall, I feel the project goals were accomplished successfully. My personal goals to better understand sustainability and community design were also accomplished. I feel the project gave me an overview of design elements and strategies that create a sustainable community. I have gained a better understanding of these areas of the profession and a confidence in design ideas by completing this Masters project.

7

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8
Glossary

Glossary

Community – Development larger than a neighborhood, includes not just residential, but commercial, office, mixed use development

Commuter Rail – Form of public transportation characterized by rail cars that run on existing freight lines; commuter rail lines provide service to downtown areas over long distances (Dunphy 2004, 12)

Congress for the New Urbanism (CNU) – the leading organization promoting walkable, neighborhood-based development as an alternative to sprawl; CNU takes a proactive, multi-disciplinary approach to restoring communities; Members are the life of the organization (planners, developers, architects, engineers, public officials, investors, and community activists); (cnu.org)

Corridor – designed pathway for movement from one destination to another; street, sidewalk or bike path

Green – environmentally-friendly, ecologically sustainable

Integrated Storm Water Management – accommodating storm water on a site by making it an amenity, non-traditional storm water management

LID (Low Impact Development) – strategies to reduce runoff, which tends to be polluted, thereby offsetting an adverse environmental effect of development" (Wishart & Lites 2007, 105)

Neighborhood – development of residential units; may include some civic uses or amenities

New Urbanism – (Traditional Neighborhood Design, neotraditional design, transit-oriented development, and the New Pedestrianism) a reaction to sprawl; growing movement of architects, planners, and developers based on principles of planning and architecture that work together to create human-scale, walkable communities

Principles of New Urbanism (newurbanism.org) –
Walkability – most things within a 10-minute walk of home and work; pedestrian friendly street design (buildings close to street; porches, windows & doors; tree-lined streets; on street parking; hidden parking lots; garages in rear lane; narrow, slow speed streets); pedestrian streets free of cars in special cases
Connectivity – interconnected street grid network disperses traffic & eases walking; a hierarchy of narrow streets, boulevards, and alleys; high quality pedestrian network and public realm makes walking pleasurable
Mixed-Use & Diversity – a mix of shops, offices, apartments, and homes on site; mixed-use within neighborhoods, within blocks, and within buildings; diversity of people of ages, income levels, cultures, and races
Mixed Housing – a range of types, sizes and prices in closer proximity
Quality Architecture & Urban Design – emphasis on beauty, aesthetics, human comfort, and creating a sense of place; special placement of civic uses and sites within community; human scale architecture & beautiful surroundings nourish the human spirit
Traditional Neighborhood Structure – discernible center and edge; public space at center; importance of quality public realm; public open space designed as civic art; contains a range of uses and densities within 10-minute walk; "Transect planning"
Increased Density – more buildings, residences, shops, and services closer together for ease of walking, to enable a more efficient use of services and resources, and to create a more convenient, enjoyable place to live; New Urbanism design principles are applied at the full range of densities

from small towns, to large cities
Smart Transport – a network of high-quality trains connecting cities, towns, and neighborhoods together; pedestrian-friendly design that encourages a greater use of bicycles, rollerblades, scooters, and walking as daily transportation
Sustainability – minimal environmental impact of development and its operations; eco-friendly technologies, respect for ecology and value of natural systems; energy efficiency; less use of finite fuels; more local production; more walking, less driving
Quality of Life – taken together these add up to a high quality of life well worth living, and create places that enrich, uplift, and inspire the human spirit

Region/Regional – several communities, area served by Ft. Florida commuter rail stop; even larger area as well, aka Orlando metro area

Sustainable – maintaining ecological balance; capable of being continued with minimal harm to environment

Sustainability – (noun) the ability to be maintained;

Sustainable Design – sustainability and ecological design; design principles and practices that focus on the interaction of architecture, people, and nature (Edwards 2005, 97-98); focus of the design professions

Sustainable Development – "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Edwards 2005, 17)

Sustainable Neighborhood Design – the act or product of creating a site of mostly residential use that integrates sustainability and ecological design principles, such as The Sanborn Principles; a successful sustainable neighborhood design should work within the larger vision of sustainable development for the community or region

Three Es – Ecology/Environment, Economy/Employment, and Equity/ [social] Equality; proposed sustainable development should look at the successful interaction of the three elements; also called Triple Bottom Line (TBL)

Transit-Oriented Development – Development within a one-quarter mile radius of a transit station; a mixed-use community within an average 2,000-foot walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents and employees to travel by transit, bicycle, foot or car (Calthorpe 1993, 56)

Triple Bottom Line – (ecology/environment, economy/employment, and equity/equality) John Elkington term (Edwards 2005, 50).

Urban sprawl / conventional suburban development (CSD) – rigorous separation of uses; lacks town center or pedestrian scale; spreads out to consume large areas of countryside even as population grows slowly; automobile use per capita is large; strip malls, auto-oriented civic and commercial buildings; subdivisions lack character (Steuteville 2004)

9
Appendix A

Contents

Design Process

The entire Masters project was completed over eight months and two academic semesters. The project began with defining the project and conducting a literature review along with precedent studies. The site analysis and programming phase concluded the first semester. Conceptual and final design was developed along with document design and drafts in the second semester.

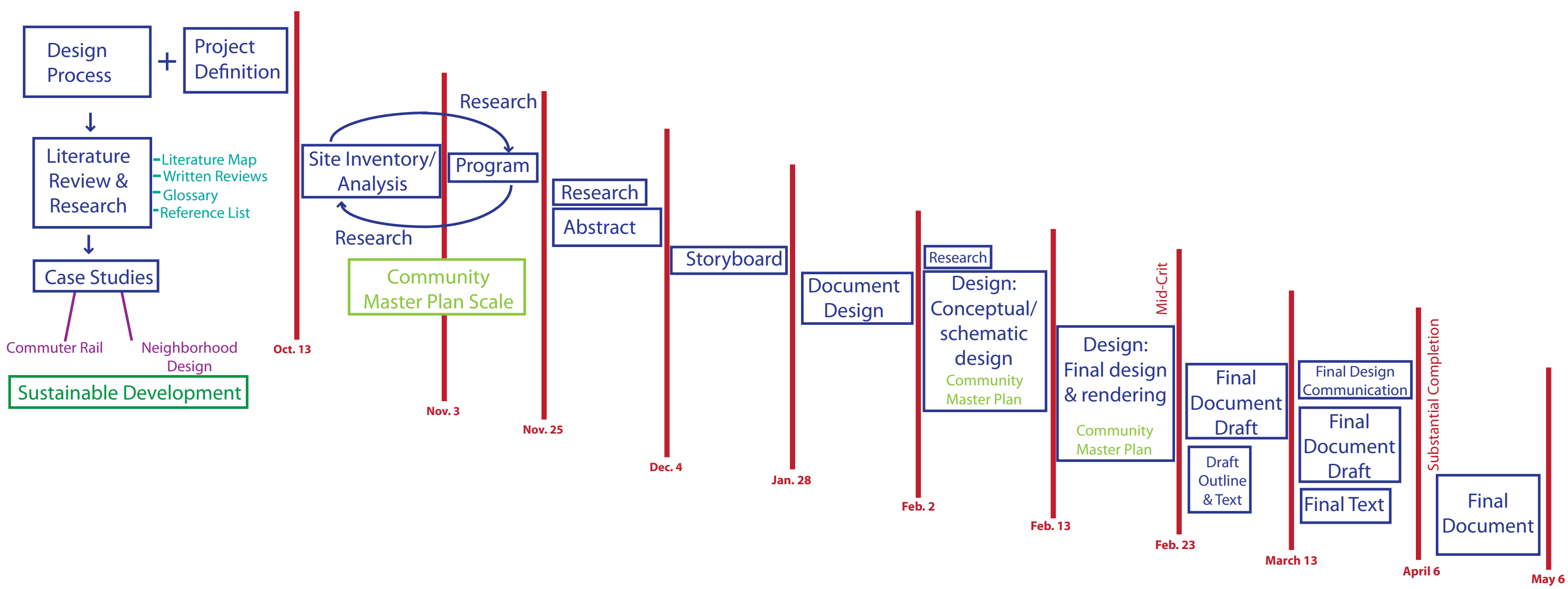

Figure A.1 - Design Process Diagram. Source: Diagram created by author.

Definition of Sustainability & Sustainable Development

For the purpose of this project it is necessary to have a clear vision and definition of sustainability. An overall understanding of the basics and history of the sustainability movement is essential. From this knowledge, definitions and goals for sustainable design can be identified at both the regional/contextual level of the project as well as the site-specific/community level. Several resources were used to establish definitions of sustainability.

One resource that explains the process is The Sustainability Revolution: Portrait of a Paradigm Shift by Andres R. Edwards. One important piece of the definition of sustainable is the publication of the Brundland report, Our Common Future, in 1987. This report defined sustainable development as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Edwards 2005, 17). This led to the notion that to evaluate any proposed initiative one must look at the interaction of three fundamental criteria: ecology/environment, economy/employment, and equity/equality. These became known as the "three Es".

Ecological sustainability includes the issues of:
-short term verses long term perspective,
-piecemeal verses systematic understanding of the indispensability of ecosystems for the viability of human existence, and
-the concept of built-in limits to the human impact that ecosystems can sustain (Edwards 2005, 21).

Economic sustainability is concerned with providing secure, long term employment without jeopardizing the health of ecosystems (Edwards 2005, 22). This means that a dynamic economy and a healthy environment can work together.

Equity and equality sustainability adds a sense of community to the existing mix of ecology based long term economic development. At a fundamental level, members of a sustainable community understand that the well-being of the individual and the lager community are interdependent (Edwards 2005, 22-23).

Edwards also adds that a fourth "E" should be education of the public regarding the need for sustainable design and the ability of the three Es to work together.

Edwards identifies 5 basic categories of sustainability principles:
1) community
2) commerce
3) natural resources
4) ecological design
5) the biosphere (Edwards 2005, 25).

The rest of the text describes these five categories. With regard to sustainability and community, the Principles of Sustainable Development for Minnesota seemed most relevant to the capstone project:
1) global interdependence
2) stewardship
3) conservation
4) indicators
5) shared responsibility (Edwards 2005, 33-34).

The principles defined by the Netherlands National Environmental Policy Plan (NEPP) also outline some goals of sustainability:
-intergenerational equity
-precautionary principle
-standstill principle
-abatement at source; harmful environmental actions shall be prevented at their source
-the polluter pays principle
-use of the best applicable technology

-prevention of unnecessary waste
-isolation, management, and control of wastes that cannot be processed
-internalization; environmental considerations are to be integrated into the actions of all responsible groups
-integrated lifecycle management; manufacturers are responsible for all environmental impacts of their products form manufacture to use to disposal
-environmental space; recognizes limit to the level of resources each person can consume if society is to be environmentally sustainable (Edwards 2005, 37-38).

All of the above principles have similar vocabulary and goals. Though these principles cannot be directly applied to the capstone project, they create a context in which a design should work to influence a region and shape a community.

The sustainable business section presents the John Elkington term "triple bottom line" (TBL). This is not necessarily a large focus for this project, but it is worth noting that the TBL is a challenge to companies to look not merely at the economic or profit aspect of their business but also the environmental and social costs (Edwards 2005, 50). The principle goal of sustainability is important to "sell" to a client, developer or even a colleague in another discipline.

Sustainability and ecological design principles examine the interdependence of human environments and ecosystems and point to the far reaching effects that design decisions have on the environment. These principles also focus on the interaction of architecture, people, and nature (Edwards 2005, 97-98). This role ecological design has in sustainability is exactly where a landscape architect fits into the puzzle. Landscape architecture is rooted in the interaction of architecture, people and nature!

Edwards presents five different sets of principles to describe sustainability and ecological design: -The Hannover Principles,
- Sim Van der Ryn and Stuart Cowan's Five Principles of Ecological Design,

-The Todds' Principles of Ecological Design,
-The Sanborn Principles, and
-USGBC's Leadership in Energy and Environmental Design or LEED.
The Hannover Principles emphasize the interdependency of humans and nature, recognizes that design has consequences, and argues that products should be created to utilize their full life-cycle and eliminate waste (Edwards 2005, 100). Sim Van der Ryn and Stuart Cowan's Five Principles of Ecological Design enforce the idea of creating a place and that design solutions come from the environment. "Knowledge and understanding of a proposed site plays a critical role in shaping the design process" (Edwards 2005, 102). Other important messages are to design with nature and make it visible. The Todds' Principles of Ecological Design "provide a biological framework that places nature at the center of the design process" (Edwards 2005, 104). Again emphasized is the recognition of the bioregion that leads to an efficient design. Also noteworthy are the principles that designs should evolve with the natural world and buildings and designs should help heal the planet (Edwards 2005, 105). The Sanborn Principles apply the design values of the Todds and Van der Ryn and Cowan to the practical needs of a community, successfully integrating social and ecological needs (Edwards 2005, 106). Because it addressed key issues related to the design of a community, the Sanborn Principles will be integrated into the definition of sustainable in terms of a community or regional scale. The LEED Green Building Rating System is focused on buildings and architecture, but plays a large role in the sustainability (Edwards 2005, 110). While LEED rating systems are useful for designing, constructing and operating buildings, it does not (as described by Edwards) best define sustainability for this project.

Edwards' book outlined the history of the sustainability movement and helped shape the definition of sustainability for the capstone project. This resource was needed to allow the researcher to understand the buzz words and create a foundation for a vision of sustainability.

An article by Scott Campbell also defines sustainable development as involving three elements of social, environmental, and economical issues. (struggle of "man verses nature" or "jobs versus the environment") He creates a diagram to illustrate the contrast and compliment between each corner of the triangle in figure 1 on page 6 (Campbell 1996, 298). Thought this article is written for and about planners, the visual is helpful in explaining the elements of sustainable development and their relationship. Understanding the perception of sustainable development from a planner can enable the landscape architect to relate this view to their goal of sustainable design. Campbell also offers insight on the movement towards and future of sustainable development. He suggests redefining sustainable development, being more precise. First, avoiding a dichotomous view of sustainability, American society should be thought of as a blend of sustainable and unsustainable moving towards sustainable practices as an evolutionary progression. Second, we should think of sustainability as the long term ability of a system to reproduce and apply this idea not only to the political and economic systems but ecological systems as well. Third, two levels of sustainability should be distinguished: specific verses general. "One might fairly easily imagine and achieve sustainability in a single sector and/or locality...to achieve complete sustainability across all sectors and/or places, however, requires such complex restructuring and redistribution that the only feasible path to global sustainability is likely to be a long, incremental accumulation of local and industry-specific advances" (Campbell 1996, 304). This definition of sustainable development emphasizes that one planner, or landscape architect for that matter, cannot do it alone. The work of a designer is just one important piece of the puzzle that is sustainable development.

Sustainable Design at the Neighborhood Scale

Donald Wishart and Bill Lites' article Greening Landscape Architecture relates to sustainable neighborhood design in Florida. They discuss the idea of low-impact development or LID. "LID incorporates strategies to reduce runoff, which tends to be polluted, thereby offsetting an adverse environmental effect of development"

(Wishart & Lites 2007, 105). Three elements of LID are: conserve and restore native vegetation; minimize the amount of impervious surfaces; and treat stormwater where it falls. Along with these elements, developing or maintaining a natural drainage system can increase the natural environment's ability to deal with changes to the natural habitat. Other benefits to LID include economic benefits such as reduction in the size of a stormwater basin and more land for development or habitat preservation. LID also has the potential to raise property values due to increased green space and reduction of unsightly infrastructure. The author's point to a community in Central Florida, Hartwood Marsh, as an example of a development implementing these ideas of LID (Wishart & Lites 2007, 105).

Another key idea in this article was reducing water demand as well as reducing the need for irrigation. Communities less depended on fresh water can contribute to the goals of sustainability. Using nonpotable water for irrigation, along with efficient irrigation systems, reduces the demand on bodies of fresh water. Plant selection also plays a role in the water demand picture; using native and drought tolerant plants specific to an ecosystem is necessary (Wishart & Lites 2007, 105-106).

Upland restoration is "the process of reintroducing native habitat and wildlife along developed waterways, is a green practice that landscape architects count on to foster biodiversity" (Wishart & Lites 2007, 106). The authors point to a development, Baldwin Park, which boast a seeded upland buffer around its two largest lakes. They are planted with aquatic, transitional plants that do not require maintenance or harmful fertilizers or other chemicals (Wishart & Lites 2007, 106).

Reducing the heat-island effect by maintaining green space, planting large native canopy trees, and creating green roofs is another goal in LID. The authors introduce the New American Home (TNAH) which has a green roof (with drought tolerant plants and pollution control fabric), pervious surfaces and shaded areas on the site, and a cistern to collect water for reuse in irrigation. Along with building specifics, the land plan can accomplish the goal of LID. Clustering buildings and creating a network of undisturbed land give resident's green spaces for recreation while protecting the native environment (Wishart & Lites 2007, 106-107).

Hardscape contributes to the heat-island effect. The authors suggest when designing these elements, the landscape architect should consider three objectives: minimize the amount of hardscape, use pervious materials where hardscape is necessary, and utilize the unique character of the area to direct the visual aesthetic incorporated into hardscape design. Along with hardscape design, the landscape architect should connect pedestrian and bike paths to the street and parks in the neighborhood. This reduces trips made by a vehicle, encouraging residents to walk (Wishart & Lites 2007, 107).

To conclude, the authors point to the pilot version of LEED for Neighborhood Development. The program "integrates principles of smart growth, new urbanism, and green building with the goal of creating livable, sustainable communities" Wishart & Lites 2007, 107). Landscape architects can contribute to the program's components of smart location and linkage, neighborhood pattern and design, and green community structure and aesthetics by offering a "holistic understanding of the project's needs" (Wishart & Lites 2007, 107).

This article is extremely helpful in identifying the definition of sustainable neighborhood design and most importantly, sustainable design in Central Florida. The principles and ideas outlined here are found in other resources, but the authors bring them together in one place and identify relevant projects in the area.

Stella Tarnay wrote an article, published in 2005, which reflects on the movement of sustainable development which began some twenty years earlier. Tarnay notes the definition of this concept was broad and it was hard to nail down what sustainable development looked like. Now there are elements of design coming together to help visualize sustainability. These include "new urbanism, smart growth, low-impact and conservation development, transit-oriented development and green building…each can only contribute to – not create – sustainable communities or regions because the scale of intervention is usually too limited… or too broad and strategy specific" (Tarnay 2005, 63). The encouraging part is that developers are intersecting all these ideas to build neighborhoods that make sustainable development a reality. Tarnay goes on to describe a suburban green neighborhood outside Atlanta, GA, as well as urban edge, cohousing neighborhoods in Colorado. The author also points out Village Homes in Davis, California which integrates "conservation development, permaculture, and solar-powered homes in a walkable, socially innovative neighborhood" (Tarnay 2005, 66). This community has shown much success with residents. The author also explains the benefits of sustainability to the developer, that those who "have invested their resources and imagination in the development of green neighborhoods are earning handsome rewards" (Tarnay 2005, 68). This view of the market and demand for green projects is encouraging.

Transportation; role in sustainable development; Commuter Rails

Transportation and land use – Regional Scale

At a regional scale, transportation defines how people live. This point is evident is Reid Ewing's book Transportation & Land Use Innovations. Ewing describes the fundamentals a city or state government can employ to shape transportation as elements of mobility planning. These include:
-visioning - allows government officials to hear from the members of the community
-land planning - relates to planning land uses. Travel is a means to get somewhere for some reason. The idea behind smart land planning is to allow people to meet their needs without traveling too far.
-street network design - is essential to an efficient transportation system. Having a hierarchy of streets that includes arterials, collectors and sub-collectors organizes traffic so the amount of space streets use is planned.
-urban design - mostly done at the street scale, not the regional scale; the streetscape, parking areas, and the like are designed 3D spaces and are different from planning activities.
-mobility tools - includes such tools as one-way streets and mixed land uses. These tools should be used together to create a large impact on a region (Ewing 1997, 9-17). Through a comprehensive plan and action plan, transportation can be planned and designed at this larger regional scale to create an efficient system. This is the hope with the implementation of the Central Florida Commuter Rail and planned public transportation outlined by FDOT.

One large concern at the regional level involves land planning with a focus on work trips (Ewing 1997, 20). The ability to create jobs and housing in regions is essential to preventing sprawl and reducing the average person's travel time to work. Ewing suggests concentrating development to a degree and balancing jobs and housing within subareas. “This combination affords the best overall accessibility, improving travel speeds while cutting regional VMT [vehicle mile of travel]” (Ewing 1997, 21).

Transportation design – Neighborhood Scale

The design of a transportation system at a community or neighborhood scale is very different from that of a regional scale. The focus here is on school trips and convenience shopping. According to Ewing, these trips should be internalized as much as possible, preventing travelers from using the regional road network (Ewing 1997, 23). Development of mixed-use communities is a way to accommodate housing, schools, and convenience shopping in a relatively small land area. Preferably every use should be within walking distance of every home.

Ewing describes best transportation practices in a previous book, Best Development Practices (Ewing 1996, 53). Of the twelve principles, most of these principles relate to the neighborhood or community scale. One practice described is the design of a street network with multiple connections and relatively direct routes (Ewing 1996, 54). The traditional grid system of streets contrasts with contemporary suburban network of curves, loops, and branches. These systems each have advantages and disadvantages, however the main point here is to create a “continuous network of internal collectors and sub-collectors; multiple entrances to subdivisions; and interconnections between subdivisions” (Ewing 1996, 54). One important practice is designing streets as narrow as possible, never more than four lanes wide. Not only do narrower streets require less asphalt and materials, they calm traffic, and are easier for pedestrians to navigate (Ewing 1996, 69).

Another practice that requires design consideration is networks for pedestrians and bicyclists that are as good as the network for vehicles. This encourages residents to walk throughout the subdivision, making sidewalk development essential. Marked and lighted crosswalks are the next essential element to the success of this principle (Ewing 1996, 77-79). Along with sidewalks, pedestrians and cyclists must be provided with shortcuts and alternatives to travel along high volume streets (Ewing 1996, 80). "Pedestrians like to follow lines of least resistance, cutting corners and keeping their routes as direct as possible. They are uncomfortable with heavy automobile traffic..." (Ewing 1996, 80).

A final practice is to incorporate transit-oriented design features. Ewing suggests communities be designed to support transit service when regional transit is available. TOD manuals favor streets to be in a grid pattern (Ewing 1996, 81-82). Ewing presents the concepts of transit corridors and transit nodes in his other book. The concepts are found in several TOD manuals and are looked at as separate strategies for transit-oriented development. Both manuals agree that medium to high density development is needed within a quarter-mile of transit stops (Ewing 1997, 44). This information about transit oriented development is useful to understand a plan for development around the commuter rail stop, however, it does not take into account the mile and a half corridor to the neighborhood site. Ewing goes on to address extending service areas. According to the author, studies show people will ride a bicycle a couple miles to a transit stop, which is eight times the typical walking distance, allowing for bike parking or bike carriers on transit will increase the use of the transit system. Park and ride lots will increase the ridership as well, as long as this lot is well designed and has proper amenities such as security, lighting, shelter, and certain conveniences (Ewing 1997, 46-47).

Transportation and Sustainability

Transportation is becoming an issue in cities because of its role in the sustainable design movement. Many have analyzed the best way to integrate transportation into a city's structure to consider it 'green'. According to Crane & Scweitzer, the goals of sustainable transport are: the preservation of environmental quality and public health and the redressing if social inequality resulting from transportation investments. The authors add these goals are not always mutually consistent, the first may argue to decrease vehicle use while the second may encourage more traveling. The paper goes on to explore the potential strategies for community design to allow for public transportation and the social implications of those strategies (Crane & Scweitzer 2003, 239). The effect of cars on the environment is clearly harmful, but some debate whether the solution is less traffic or better, cleaner cars. New Urbanists attempt to reduce the "use value of cars" by designing "compact development" (Crane & Scweitzer 2003, 240-241). The authors are skeptical that compact development and New Urbanism can be the solution to the problems associated with transportation and sustainable development. Compact development isn't necessarily sustainable (Crane & Scweitzer 2003, 248). Not when considering all three Es.

Public transportation and transit oriented development are also coming to the forefront of city's and regions. The Las Vegas Valley is one of the fastest-growing metropolitan areas in the nation (Snow 2007, 123). This growth needs to be accommodated with transportation. A system called ACE will "combine the best elements of light rail and rubber-tired buses to move people quickly and comfortably" (Snow 2007, 124). The area is confident this system will help people move about the area more effectively and perpetuate the green movement.

Commuter Rail

Robert Dunphy describes different modes of transit in Developing Around Transit: Strategies and Solutions that Work. Dunphy explains commuter rail lines provide service to downtown areas over long distances, making it relatively speedy due to stations being several miles apart. The author also generalizes commuter rail riders will travel from a wide area around a station, especially if parking is provided at the station. Stations are also usually surrounded by land uses that limit potential property value advantages such as industrial operations (Dunphy 2004, 12). Fortunately this is not the case for the Central Florida Commuter Rail stop near the project site. Dunphy also writes about who uses transit, pointing out that transit provides mobility for people with no other form of transportation. Thus it makes sense "poor people and minorities make up a disproportionate share of daily riders…people from low-income households, African-Americans, and Hispanics combined account for 73 percent of bus riders, 35 percent of urban-rail riders, and [only] 31 percent of commuter rail passengers" (Dunphy 2004, 13). The most common trip using transit is to and from work. The author also points out "commuter-rail lines like the Long Island Rail Road or Philadelphia's SEPTA tend to serve people living in upper-income suburbs…local buses and express buses or light rail often serve different markets" (Dunphy 2004, 13). These facts and views on transit make designing the corridor between the site and commuter rail more feasible.

Central Florida is accommodating growth by designing a commuter rail transit (CRT) which will run on existing CSXT tracks already in the region (FDOT 2008). This system will impact the region in several ways. New development around the rail stops on greenfield sites can further the sustainability goals with smart development practices and principles. "The Florida Department of Transportation has been working closely with our local community partners to envision new development and redevelopment opportunities in and around proposed station stops" (FDOT 2008). The counties of the region and the city of Orlando are taking a big step towards sustainable development. With public and private sector working together, Central Florida's transportation system can become green.

Austin, Texas, is another community that is implementing a commuter rail system. In an article published in Cite: The Architecture and Design Review of Houston, Christof Spieler explains Austin is not following in Dallas and Houston's footsteps, having rejected the proposal for light rail. Spieler also explains how the commuter rail system is flawed because it can only go where the rail lines already exist, having no connection to the Capitol or the University of Texas. However one benefit of this solution is it will cost less than Houston's light rail. A large hope in some Austin residents is that if the commuter rail is successful it will lead to more rail lines. The author points out that growth in the area was expected and even planned for, but some did not want growth. Austin has sprawled and may be spending more money to expand the highway network for personal vehicles rather than spending money for public transportation (Spieler 2005, 11). This article not only presents a commuter rail situation in another state, but clearly shows the work of social, economic, and environmental issues trying (but not necessarily succeeding) to work together for the 'greater good'.

10

Appendix B

Contents

.

Project Name: Vickery

Project location: Cumming, Georgia (outside Atlanta)

Date designed/planned: 2000

Project size: 214 acres

Designers: Duany Plater-Zyberk & Company; Tunnell-Spangler-Walsh & Associates

Client: developed by Hedgewood Properties (Pam Sessions and Don Donnelly)

Physical Content and Site Analysis: site located 30 miles north of Atlanta, GA; suburb community; site is wooded and hilly

Project background and history: site is former agricultural land; husband and wife team developers owned 20 acres of site and made it a family home; they "wanted to create an environmentally responsible, walkable community that we ourselves would want to live in..." (Tarnay 2005, 64).

Program elements and their quantity/size/area/characteristics: village center, community green, small shops, restaurants, offices, YMCA, townhomes, condos above retail space, live/work spaces, single family homes (2-6 homes per acre); 600 homes; one third of land is being preserved for green space and recreation areas

Application of planning and design principles, standards and conventions: intended to be a community that utilizes most advanced town planning and ecological principles; narrow streets, New Urbanist feel; "basic premise of Vickery is that man and nature can co-exist to their mutual benefit, provided that the pattern of habitation follows a traditional system of compact settlements set apart by the natural landscape" (DPZ); homes are sited to take advantage of the terrain and solar gain, sidewalk paths move easily between housing, parks, and the denser mixed-use core, preserved natural trees and landscape are integrated throughout the project. Network of sidewalks and paths connects residents in the neighborhood to conservation areas and parks, active recreation areas, the village core, and schools. "Parks are located around old-growth trees and natural features, such as site's two ponds, creek and wetlands form the spine of conservation area, located safe distance from commercial core (Tarnay 2005, 64-65). Care was taken to avoid building on the most difficult slopes and to preserve natural greenways (DPZ). Largest parking area located behind buildings, not visible from street.

Significance and uniqueness of the project: This community development boasts elements of a green neighborhood. Not only compact design and the ability to walk to any amenity, but the community has homes designed to be energy efficient. Builders are taking care to be environmentally friendly in the construction process as well. The community purposely has smaller lot sizes but offers many community amenities.

Relevance/application to your capstone project: This project is an example of a green, compact design and walkable neighborhood in a suburban location. This project also makes open space and preservation a priority, which will be a large goal in the capstone project. A last important piece of this project is the proportion of land uses, open space verses single family residential integrated with a small proportion of mixed use or multifamily residential.

Contents

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Project Name: Heritage Park

Project location: Minneapolis, Minnesota

Date designed/planned: late 90s/early 2000s

Project size: 145 acres

Designers: Landscape Architects/urban design: SRF Consulting Group Inc.; Barr Engineering Company; Wenk and Associates; Close Landscape Architecture

Client: Darrell Washington and Lois Eberhart, ASLA, City of Minneapolis, Community Planning and Economic Development

Physical Content and Site Analysis: land was developed in late nineteenth century over swamps and former creek bed; poor soil conditions caused houses, streets, and sidewalks to become unstable; by the 1960s the neighborhood was mostly public housing in superblocks; in 1993 area residents settled a lawsuit with the city, who would begin the process of redeveloping the site;

Project background and history: (see physical content and site analysis)

Program elements and their quantity/size/area/characteristics: master plan featuring a series of open park spaces concentrated in areas on the site where housing construction would be most difficult, parks organized around boulevard with stormwater systems threaded through parks; designers aimed to make water the central feature of the development creating a "spine"; 900 housing unit development – 440 rental, 360 for sale and 100 public housing units for the elderly; types will include single-family homes, duplexes, garden apartments, townhouses and carriage houses

Application of planning and design principles, standards and conventions:
-highlight stormwater as an aesthetic feature – designers aimed to make water the central visual feature, also emphasizing the "City of Lakes" theme
-remove sediment from stormwater on site – there are a series of bmps that form a 'treatment train' whose objective is to remove 70% of the storm water's

suspended solids
-promote fast infiltration for effective treatment and plant health – poor soil in the basins was replaced with engineered soil to encourage fast infiltration and healthy plant growth; native and drought tolerant plants are used in the basins
-harvest water from adjacent sites – site also handles stormwater from nearly 300 acres of adjacent land
-engage the public with art – art which plays into nature of place and uniqueness of the area
-use materials, including those found on site, with integrity and aesthetic interest – designers reused large limestone chunks found on site for dry creek bed
-plan ahead for good maintenance – landscape architects wrote high qualification requirements into their bid requests for native plants, a company was hired that was familiar with local flora to plant and maintain the plantings for three years
-educate the public – resident's moving into project are given brochure that explain how components work

Significance and uniqueness of the project: This project is an excellent example of integrating stormwater into a site and making it the aesthetic jewel. The value of open space and a more holistic approach to design is a great benefit to the residents.

Relevance/application to your capstone project: relatively same size area; capstone site has issues with stormwater and will need careful design of best management practices; stormwater can be dealt with in an aesthetically pleasing way.

Contents

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Project Name: Village Green

Project location: San Fernando, California

Date designed/planned: not clear, late 90s ('98?); article published Oct. 2000

Project size: 18 acres;

Designers: development architects – Van Tilburg, Banvard & Soderbergh

Client: The Lee Group and Braemar Urban Ventures (joint venture) developers, home builders

Physical Content and Site Analysis: Surrounded by other residential developments; neighbors a Metrolink rail line transit stop; surrounding community has child care center next to transit station, elementary school and regional park within a half mile, three elementary schools and a high school within a mile, two libraries & post office within a mile, several retail clusters on main streets

Project background and history: site was being farmed and not developed in the 1940s and 50s even though development swept through San Fernando Valley area; homes around the site were "scaled-back model homes" (Porter 2000, 91) and gradually became home to a Latino population; by 1990, over half the households in the area were low income; site owners were waiting for right offer to come along; "challenge was to design appealing development that complemented the neighborhood's assets and helped to overcome its infrastructural differences" (Porter 2000, 92)

Program elements and their quantity/size/area/characteristics: small lot (approx. 3,000 sq. ft.) single family homes (about 186 lots), 20-28 ft wide streets

Application of planning and design principles, standards and conventions: Sidewalks and trees along one side of street to be pedestrian friendly, design of central village retained link from north to south, allowing access to Metrolink station; to achieve a fit with surrounding neighborhoods, homes along the site edge were designed to reflect the scale and style of Southern California models and homes turned outward rather than inward. Homes are constructed with several green practices, from using steel framed wall components and environmentally-friendly cellulose insulation to gas powered HVAC systems and energy efficient appliances. Almost all the homes will be equipped with photovoltaic cells to generate solar energy, providing up to 90 percent of each home's electricity demand (Porter 2000, 94-95 & 118).

Significance and uniqueness of the project: This project is significant because of its relationship to the transit stop next door. The site not only recognizes this as an important destination to residents, but the site plan allows a connection to the transit station from the surrounding neighborhoods. This project is an example of a green neighborhood that is affordable, targeted towards working class families. The integration of eco-friendly architecture is also notable.

Relevance/application to your capstone project: This project relates to the capstone project because of the similarities in goals for neighborhood design and sustainable practices. Village Green is an excellent precedent for why it is important for a neighborhood to recognize public transportation and encourage citizens to utilize it. While the scales are different and relationships between neighborhood and transit are different, there are elements of sustainable neighborhood design in the Village Green site plan that can be applied to the capstone project.

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Appendix C

Contents

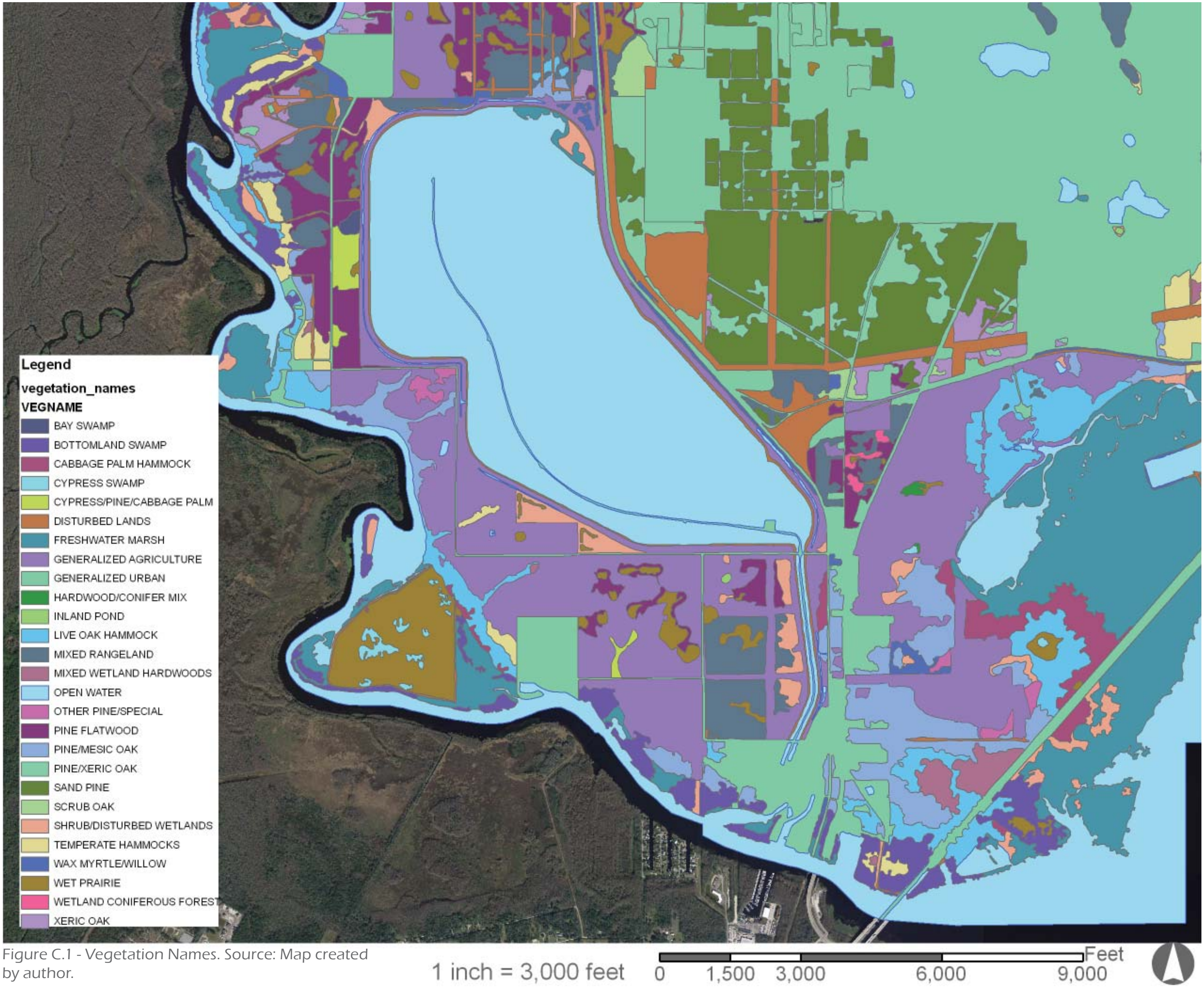

Figure C.1 - Vegetation Names. Source: Map created by author.

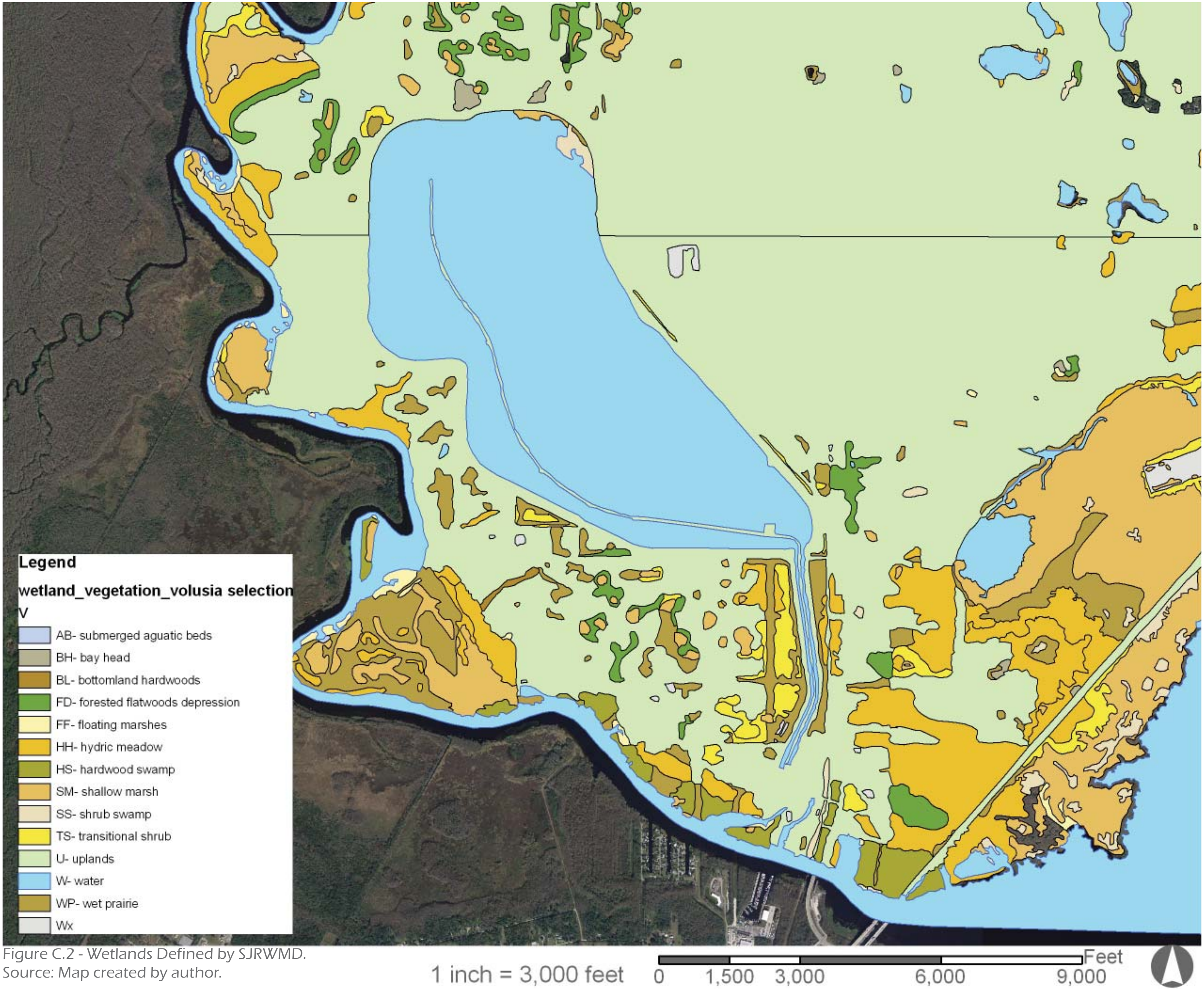

Figure C.2 - Wetlands Defined by SJRWMD.
Source: Map created by author.

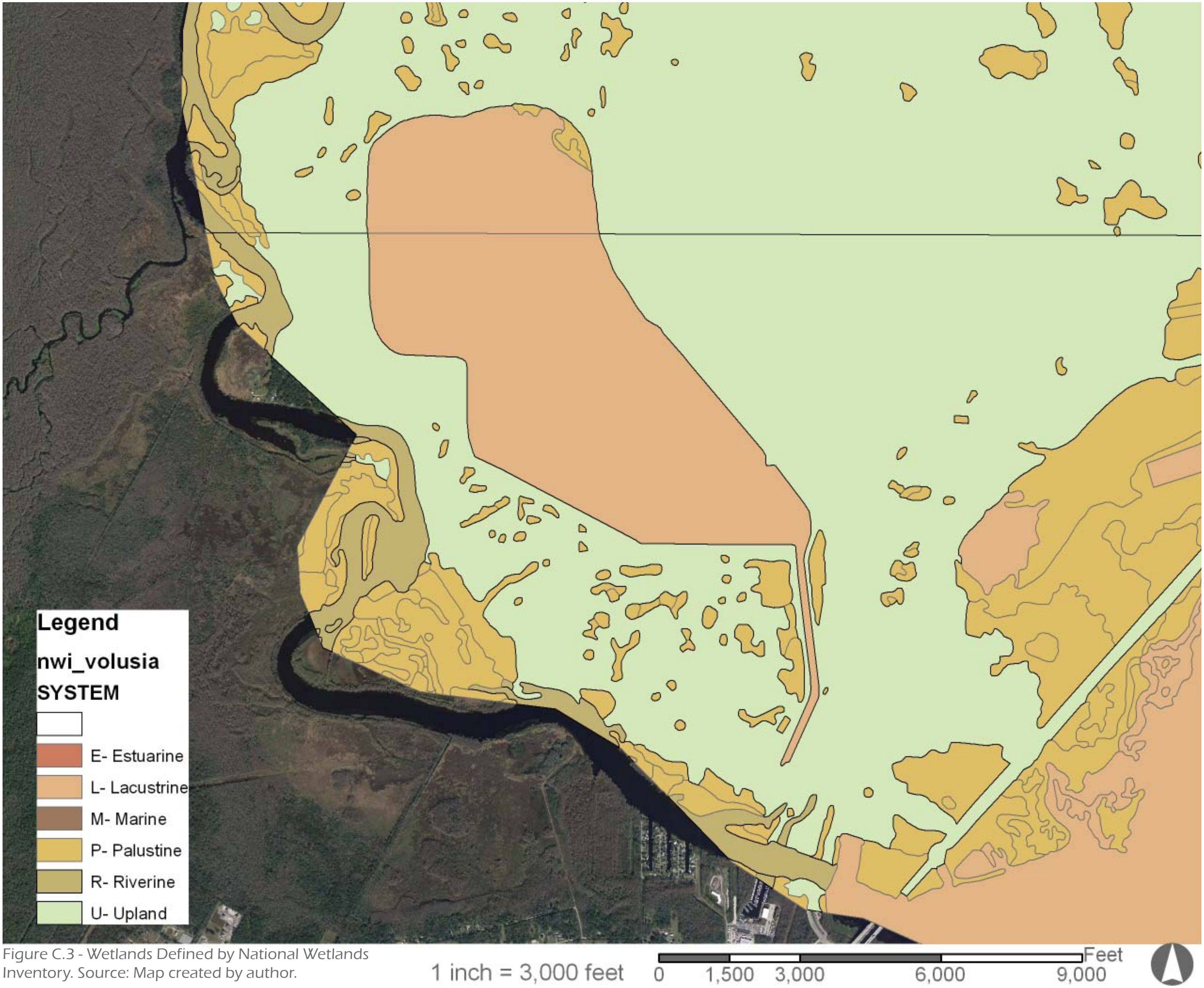

Figure C.3 - Wetlands Defined by National Wetlands Inventory. Source: Map created by author.

Threatened and Endangered Species

List Obtained from U.S. Fish & Wildlife Service - Florida

Notes:
This report shows the listed species associated in some way with this state.
This list does not include experimental populations and similarity of appearance listings.
This list includes non-nesting sea turtles and whales in State/Territory coastal waters.
This list includes species or populations under the sole jurisdiction of the National Marine Fisheries Service.

Listings and occurrences for Florida -- 114 listings
- 109 occurring in Florida
- 5 not occurring in Florida
- 1 species listed in some other state occurring in Florida

Animals -- 59 listings
- 55 occurring in Florida
- 4 not occurring in Florida
- 1 species listed in some other state occurring in Florida

Status	Species Listed in this state that occur in this state
T	Bankclimber, purple (mussel) (Elliptoideus sloatianus)
E	Bat, gray (Myotis grisescens)
E	Butterfly, Schaus swallowtail (Heraclides aristodemus ponceanus)
T	Caracara, Audubon's crested FL pop. (Polyborus plancus audubonii)
T	Coral, elkhorn (Acropora palmata)
T	Coral, staghorn (Acropora cervicornis)
T	Crocodile, American FL pop. (Crocodylus acutus)
E	Darter, Okaloosa (Etheostoma okaloosae)
E	Deer, key (Odocoileus virginianus clavium)
E	Kite, Everglade snail FL pop. (Rostrhamus sociabilis plumbeus)
E	Manatee, West Indian (Trichechus manatus)
E	Moccasinshell, Gulf (Medionidus penicillatus)
E	Moccasinshell, Ochlockonee (Medionidus simpsonianus)
E	Mouse, Anastasia Island beach (Peromyscus polionotus phasma)
E	Mouse, Choctawhatchee beach (Peromyscus polionotus allophrys)
E	Mouse, Key Largo cotton (Peromyscus gossypinus allapaticola)
E	Mouse, Perdido Key beach (Peromyscus polionotus trissyllepsis)
T	Mouse, southeastern beach (Peromyscus polionotus niveiventris)
E	Mouse, St. Andrew beach (Peromyscus polionotus peninsularis)
E	Panther, Florida (Puma (=Felis) concolor coryi)

Status	Species Listed in this state that occur in this state
E	Pigtoe, oval (Pleurobema pyriforme)
T	Plover, piping except Great Lakes watershed (Charadrius melodus)
E	Pocketbook, shinyrayed (Lampsilis subangulata)
E	Rabbit, Lower Keys marsh (Sylvilagus palustris hefneri)
E	Rice rat lower FL Keys (Oryzomys palustris natator)
T	Salamander, frosted flatwoods (Ambystoma cingulatum)
E	Sawfish, smalltooth (Pristis pectinata)
T	scrub-jay, Florida (Aphelocoma coerulescens)
E	Sea turtle, green FL, Mexico nesting pops. (Chelonia mydas)
T	Sea turtle, green except where endangered (Chelonia mydas)
E	Sea turtle, hawksbill (Eretmochelys imbricata)
E	Sea turtle, Kemp's ridley (Lepidochelys kempii)
E	Sea turtle, leatherback (Dermochelys coriacea)
T	Sea turtle, loggerhead (Caretta caretta)
E	Seal, Caribbean monk (Monachus tropicalis)
T	Shrimp, Squirrel Chimney Cave (Palaemonetes cummingi)
T	Skink, bluetail mole (Eumeces egregius lividus)
T	Skink, sand (Neoseps reynoldsi)
T	Slabshell, Chipola (Elliptio chipolaensis)
T	Snail, Stock Island tree (Orthalicus reses (not incl. nesodryas))
T	Snake, Atlantic salt marsh (Nerodia clarkii taeniata)
T	Snake, eastern indigo (Drymarchon corais couperi)
E	Sparrow, Cape Sable seaside (Ammodramus maritimus mirabilis)
E	Sparrow, Florida grasshopper (Ammodramus savannarum floridanus)
E	Stork, wood AL, FL, GA, SC (Mycteria americana)
T	Sturgeon, gulf (Acipenser oxyrinchus desotoi)
E	Sturgeon, shortnose (Acipenser brevirostrum)
T	Tern, roseate Western Hemisphere except NE U.S. (Sterna dougallii dougallii)
E	Three-ridge, fat (mussel) (Amblema neislerii)
E	Vole, Florida salt marsh (Microtus pennsylvanicus dukecampbelli)
E	Whale, finback (Balaenoptera physalus)
E	Whale, humpback (Megaptera novaeangliae)
E	Whale, right (Balaena glacialis (incl. australis))
E	Woodpecker, red-cockaded (Picoides borealis)
E	Woodrat, Key Largo (Neotoma floridana smalli)

Status	Species listed in this state that do not occur in this state
E	Beetle, American burying (Nicrophorus americanus)
E	Curlew, Eskimo (Numenius borealis)
E	Pelican, brown except U.S. Atlantic coast, FL, AL (Pelecanus occidentalis)
E	Wolf, gray Lower 48 States, except where delisted and where EXPN. Mexico. (Canis lupus)

Threatened and Endangered Species

Status	Listed species occurring in this state that are not listed in this state
E	Wolf, red except where EXPN (Canis rufus)

Plants -- 55 listings
- 54 occurring in Florida
- 1 not occurring in Florida
- 0 species listed in some other state occurring in Florida

Status	Species listed in this state and that occur in this state
E	Aster, Florida golden (Chrysopsis floridana)
E	Beargrass, Britton's (Nolina brittoniana)
E	Beauty, Harper's (Harperocallis flava)
E	Bellflower, Brooksville (Campanula robinsiae)
T	Birds-in-a-nest, white (Macbridea alba)
E	Blazingstar, scrub (Liatris ohlingerae)
T	Bonamia, Florida (Bonamia grandiflora)
T	Buckwheat, scrub (Eriogonum longifolium var. gnaphalifolium)
T	Butterwort, Godfrey's (Pinguicula ionantha)
E	Cactus, Key tree (Pilosocereus robinii)
E	Campion, fringed (Silene polypetala)
E	Chaffseed, American (Schwalbea americana)
E	Cladonia, Florida perforate (Cladonia perforata)
E	Fringe-tree, pygmy (Chionanthus pygmaeus)
T	Gooseberry, Miccosukee (Ribes echinellum)
E	Gourd, Okeechobee (Cucurbita okeechobeensis ssp. okeechobeensis)
E	Harebells, Avon Park (Crotalaria avonensis)
E	Hypericum, highlands scrub (Hypericum cumulicola)
E	Jacquemontia, beach (Jacquemontia reclinata)
E	Lead-plant, Crenulate (Amorpha crenulata)
E	Lupine, scrub (Lupinus aridorum)
E	Meadowrue, Cooley's (Thalictrum cooleyi)
E	Milkpea, Small's (Galactia smallii)
E	Mint, Garrett's (Dicerandra christmanii)
E	Mint, Lakela's (Dicerandra immaculata)
E	Mint, longspurred (Dicerandra cornutissima)
E	Mint, scrub (Dicerandra frutescens)
E	Mustard, Carter's (Warea carteri)
E	Pawpaw, beautiful (Deeringothamnus pulchellus)
E	Pawpaw, four-petal (Asimina tetramera)

Status	Species listed in this state and that occur in this state
E	Pawpaw, Rugel's (Deeringothamnus rugelii)
T	Pigeon wings (Clitoria fragrans)
E	Pinkroot, gentian (Spigelia gentianoides)
E	Plum, scrub (Prunus geniculata)
E	Polygala, Lewton's (Polygala lewtonii)
E	Polygala, tiny (Polygala smallii)
E	Prickly-apple, fragrant (Cereus eriophorus var. fragrans)
E	Rhododendron, Chapman (Rhododendron chapmanii)
E	Rosemary, Apalachicola (Conradina glabra)
E	Rosemary Etonia (Conradina etonia)
E	Rosemary, short-leaved (Conradina brevifolia)
E	Sandlace (Polygonella myriophylla)
T	Seagrass, Johnson's (Halophila johnsonii)
T	Skullcap, Florida (Scutellaria floridana)
E	Snakeroot (Eryngium cuneifolium)
E	Spurge, deltoid (Chamaesyce deltoidea ssp. deltoidea)
T	Spurge, Garber's (Chamaesyce garberi)
T	Spurge, telephus (Euphorbia telephioides)
E	Torreya, Florida (Torreya taxifolia)
E	Warea, wide-leaf (Warea amplexifolia)
E	Water-willow, Cooley's (Justicia cooleyi)
T	Whitlow-wort, papery (Paronychia chartacea)
E	Wireweed (Polygonella basiramia)
E	Ziziphus, Florida (Ziziphus celata)

Status	Species listed in this state that do not occur in this state
E	Pondberry (Lindera melissifolia)

Threatened and Endangered Species

List Obtained from Florida Fish and Wildlife Conservation Commission

Common Name	Scientific Name	Status
FISH		
Atlantic sturgeon (Gulf sturgeon)	Acipenser oxyrinchus	SSC (1)
shortnose sturgeon	Acipenser brevirostrum	E
shoal bass	Micropterus cataractae	SSC (1,2)
Suwannee bass	Micropterus notius	SSC (1)
rivulus (mangrove rivulus)	Rivulus marmoratus	SSC (1)
Lake Eustis pupfish	Cyprinodon variegatus hubbsi	SSC (1)
blackmouth shiner	Notropis melanostomus	E
bluenose shiner	Pteronotropis welaka	SSC (1,2)
saltmarsh topminnow	Fundulus jenkinsi	SSC (1)
key silverside	Menidia conchorum	T
crystal darter	Crystallaria asprella	T
harlequin darter	Etheostoma histrio	SSC (1)
okaloosa darter	Etheostoma okalossae	E
Southern tessellated darter	Etheostoma olmstedi maculaticeps	SSC (1)
key blenny	Starksia starcki	SSC (1)
AMPHIBIANS		
flatwoods salamander	Ambystoma cingulatum	SSC
Georgia blind salamander	Haideotriton wallacei	SSC (1,2)
pine barrens treefrog	Hyla andersonii	SSC (1)
Florida bog frog	Rana okaloosae	SSC (2)
gopher frog	Rana capito	SSC (1,2)
REPTILES		
American alligator	Alligator mississippiensis	SSC (1,3)
American crocodile	Crocodylus acutus	E
key ringneck snake	Diadophis punctatus acricus	T
Eastern indigo snake	Drymarchon corais couperi	T
red rat snake	Elaphe guttata	SSC1 (1)
Atlantic salt marsh water snake	Nerodia clarkii taeniata	T
Florida pine snake	Pituophis melanoleucus mugitus	SSC (2)
short-tailed snake	Stilosoma extenuatum	T
Florida brown snake	Storeria dekayi victa	T1
rim rock crowned snake	Tantilla oolitica	T
Florida ribbon snake	Thamnophis sauritus sackeni	T1

Common Name	Scientific Name	Status
REPTILES		
bluetail mole skink	Eumeces egregius lividus	T
Florida Key mole skink	Eumeces egregius egregius	SSC (1)
sand skink	Neoseps reynoldsi	T
gopher tortoise	Gopherus polyphemus	T
Barbour's map turtle	Graptemys barbouri	SSC (1,2)
alligator snapping turtle	Macroclemys temminckii	SSC (1)
striped mud turtle	Kinosternon baurii	E1
Suwannee cooter	Pseudemys concinna suwanniensis	SSC (1,2)
loggerhead seaturtle	Caretta caretta	T
green seaturtle	Chelonia mydas	E
leatherback seaturtle	Dermochelys coriacea	E
hawksbill seaturtle	Eretmochelys imbricata	E
Kemp's ridley seaturtle	Lepidochelys kempii	E
BIRDS		
piping plover	Charadrius melodus	T
snowy plover	Charadrius alexandrinus	T
American oystercatcher	Haematopus palliatus	SSC (1,2)
brown pelican	Pelecanus occidentalis	SSC (1)
black skimmer	Rynchops niger	SSC (1)
least tern	Sterna antillarum	T
roseate tern	Sterna dougalli	T
limpkin	Aramus guarauna	SSC (1)
reddish egret	Egretta rufescens	SSC (1,4)
snowy egret	Egretta thula	SSC (1)
little blue heron	Egretta caerulea	SSC (1,4)
tricolored heron	Egretta tricolor	SSC (1,4)
white ibis	Eudocimus albus	SSC (2)
Florida sandhill crane	Grus canadensis pratensis	T
whooping crane	Grus americana	SSC (5)
wood stork	Mycteria americana	E
roseate spoonbill	Platalea ajaja	SSC (1,4)
burrowing owl	Athene cunicularia	SSC (1)
crested caracara	Caracara cheriway	T
peregrine falcon	Falco peregrinus	E
Southeastern American kestrel	Falco sparverius paulus	T
osprey	Pandion haliaetus	SSC2 (1,2)
snail kite (Everglades snail kite)	Rostrhamus sociabilis plumbeus	E
Florida scrub jay	Aphelocoma coerulescens	T
Cape Sable seaside sparrow	Ammodramus maritimus mirabilis	E

Threatened and Endangered Species

Common Name	Scientific Name	Status
BIRDS		
Florida grasshopper sparrow	Ammodramus savannarum floridanus	E
Scott's seaside sparrow	Ammodramus maritimus peninsulae	SSC (1)
Wakulla seaside sparrow	Ammodramus maritimus juncicolus	SSC (1)
white-crowned pigeon	Columba leucocephala	T
Kirtland's warbler	Dendroica kirtlandii	E
Bachman's warbler	Vermivora bachmanii	E
ivory-billed woodpecker	Campephilus principalis	E
red-cockaded woodpecker	Picoides borealis	SSC
Marian's marsh wren	Cistothorus palustris marianae	SSC (1)
Worthington's marsh wren	Cistothorus palustris griseus	SSC (1)
MAMMALS		
Florida panther	Puma concolor coryi	E
Florida black bear	Ursus americanus floridanus	T3
Everglades mink	Mustela vison evergladensis	T
key deer	Odocoileus virginianus clavium	E
Lower Keys marsh rabbit	Sylvilagus palustris hefneri	E
Big Cypress fox squirrel	Sciurus niger avicennia	T
Sherman's fox squirrel	Sciurus niger shermani	SSC (1,2)
Eastern chipmunk	Tamias striatus	SSC (1)
Sanibel Island rice rat	Oryzomys palustris sanibeli	SSC (1,2)
silver rice rat	Oryzomys argentatus	E
Key Largo woodrat	Neotoma floridana smalli	E
Key Largo Cotton Mouse	Peromyscus gossypinus allapaticola	E
Choctawhatchee beach mouse	Peromyscus polionotus allophrys	E
Southeastern beach mouse	Peromyscus polionotus niveiventris	T
Anastasia Island beach mouse	Peromyscus polionotus phasma	E
St. Andrews beach mouse	Peromyscus polionotus peninsularis	E
Perdido Key beach mouse	Peromyscus polionotus trissyllepsis	E
Florida mouse	Podomys floridanus	SSC (1)
Florida mastiff bat	Eumops glaucinus floridanus	E
gray bat	Myotis grisescens	E
Indiana bat	Myotis sodalis	E
Florida saltmarsh vole	Microtus pennsylvanicus dukecampbelli	E
Sherman's short-tailed shrew	Blarina carolonensis	SSC (2)
Homosassa shrew	Sorex longirostris eionis	SSC (2)
sei whale	Balaenoptera borealis	E

Common Name	Scientific Name	Status
MAMMALS		
fin whale (finback whale)	Balaenoptera physalus	E
North Atlantic right whale	Eubalaena glacialis	E
humpback whale	Megaptera novaeangliae	E
sperm whale	Physeter macrocephalus	E
Florida manatee	Trichechus manatus latirostris	E
INVERTEBRATES		
CORALS		
pillar coral	Dendrogyra cylindrus	E
CRUSTACEANS		
Panama City crayfish	Procambarus econfinae	SSC (1)
sims sink crayfish	Procambarus erythrops	SSC (1)
black creek crayfish	Procambarus pictus	SSC (1)
INSECTS		
Miami blue butterfly	Cyclargus thomasi bethunebakeri	E
Schaus' swallowtail butterfly	Heraclides aristodemus ponceanus	E
MOLLUSKS		
Florida tree snail	Liguus fasciatus	SSC (1)
Stock Island tree snail	Orthalicus reses	E

List Abbreviations
FWC = Florida Fish and Wildlife Conservation Commission
E = Endangered
T = Threatened
SSC = Species of Special Concern

Parks and Open Space Descriptions

Gemini Springs Park

37 Dirksen Drive
DeBary

Open daily Sunrise to sunset
Admission: Free

The 210-acre Gemini Springs was purchased in 1994 through the combined efforts of Volusia County, the Trust for Public Lands, the St. Johns River Water Management District and the Florida Communities Trust. Approximately 6.5 million gallons of sparkling fresh water bubble up from the two springs each day.

Gemini Springs is between the town of Enterprise, which was a busy center of commerce and government in the early days of the Florida frontier, and the city of DeBary. The land passed through several hands before it was purchased by its last private owners, Saundra and Charles Gray, in 1969.

Farming operations at Gemini Springs in the 1800's included timber, citrus and tapping longleaf pine trees for turpentine. John H. Padgett, who bought the land around the turn of the century, is believed to have built the two story farmhouse and barn we see today. The Padgett family raised cattle and grew sugar cane, operating a cane press and selling sugar juice to passengers on the trains as they passed by on the railroad to Enterprise.

The Gray family gave Gemini Springs its name and raised prize-winning Santa Gertrudis cattle on the property. Under their ownership, the earthen dam and reservoir were built, along with the arched bridges, the stone barbeque building and the Spring House.

Walking and Bike Riding
- Nature Trail -- 3/4 mile
- Bike Trail -- 1 mile (loop from entrance road to bicycle rack to exit road).
- Sidewalks -- 651 feet from east parking lot to Springhouse; 907 feet from west parking lot to Springhouse
- Bridge loop -- 1/4 mile

Swimming is not permitted until further notice.
Fishing is allowed only on the fishing dock. You must have a valid, freshwater fishing permit.
Canoes are available for rent at the canoe launch area near the fishing pier during regular park hours.
Picnic pavilion reservations

River City Nature Park

200 Barwick Road
DeBary

Hours: Sunrise to Sunset
Admission: Free

The Park is a 100-acre triangular-shaped property that abuts the St. Johns River for a distance of about 2300 feet on its south side and will provide public access to the natural environment of the St. Johns River. The City plans to create a new outdoor conservation and recreation area in the form of a passive waterfront park, with family picnic shelters, fishing pier, playground, and nature walks with interpretive signs describing natural communities and habitats. A wide variety of birds inhabit the area, such as the egret. Clusters of Live oak, Southern Magnolia, Cypress, Sweetgum, and slash pine are interspersed with areas of open pasture. For information and to reserve for parties, call (386) 456-5150.

Lake Monroe Park

975 U.S. Highway 17-92
DeBary

Hours: Sunrise to Sunset
Admission: Free

RV camping rates: RV costs are $24.64 including taxes and electric.
Prices are subject to change.

The following amenities are available:
Boardwalks, Boat ramps, Camping, Fishing docks, Pavilion Picnic areas, Nature trails, Playground, Restrooms, Volleyball court

Lake Monroe Park is one of Volusia County's oldest and most popular parks. The park reopened to the public in July 2004 after a major $1.2 million renovation and improvement project. The project included new restrooms, renovations to the entrance road, floating docks, picnic pavilions, improved parking and a trailhead for the Lake Monroe-Gemini Springs-DeBary Hall trail. We invite you to visit this beautiful park on Lake Monroe. Take advantage of free entrance to the park and a $2 fee to launch your boat. You also can enjoy one of the beautiful camp sites.

The growth of Central Florida led to the planning of a Central Florida commuter rail and a larger interest in designing communities with the environment as a priority. A site suitable for sustainable development is located in DeBary, Florida, in the northern Orlando metropolitan area. The nine hundred acre site includes a commuter rail station and is located along the St. Johns River, a major river in Florida. The intent of this study was to understand and apply principles of sustainable development to the unique landscape of the site and propose a master plan for a community, creating a sense of place.

A major goal of the project was to compliment the commuter rail station and its contribution to the community. The project encompassed research of sustainable development and design, an analysis of the site, as well as an understanding of transportation’s specific role in sustainable development.

The result of the study is a master plan of the community which utilizes principles of sustainable development, protects and highlights the ecological features of the site and creates a place unique to Central Florida as a healthy, sustainable community.