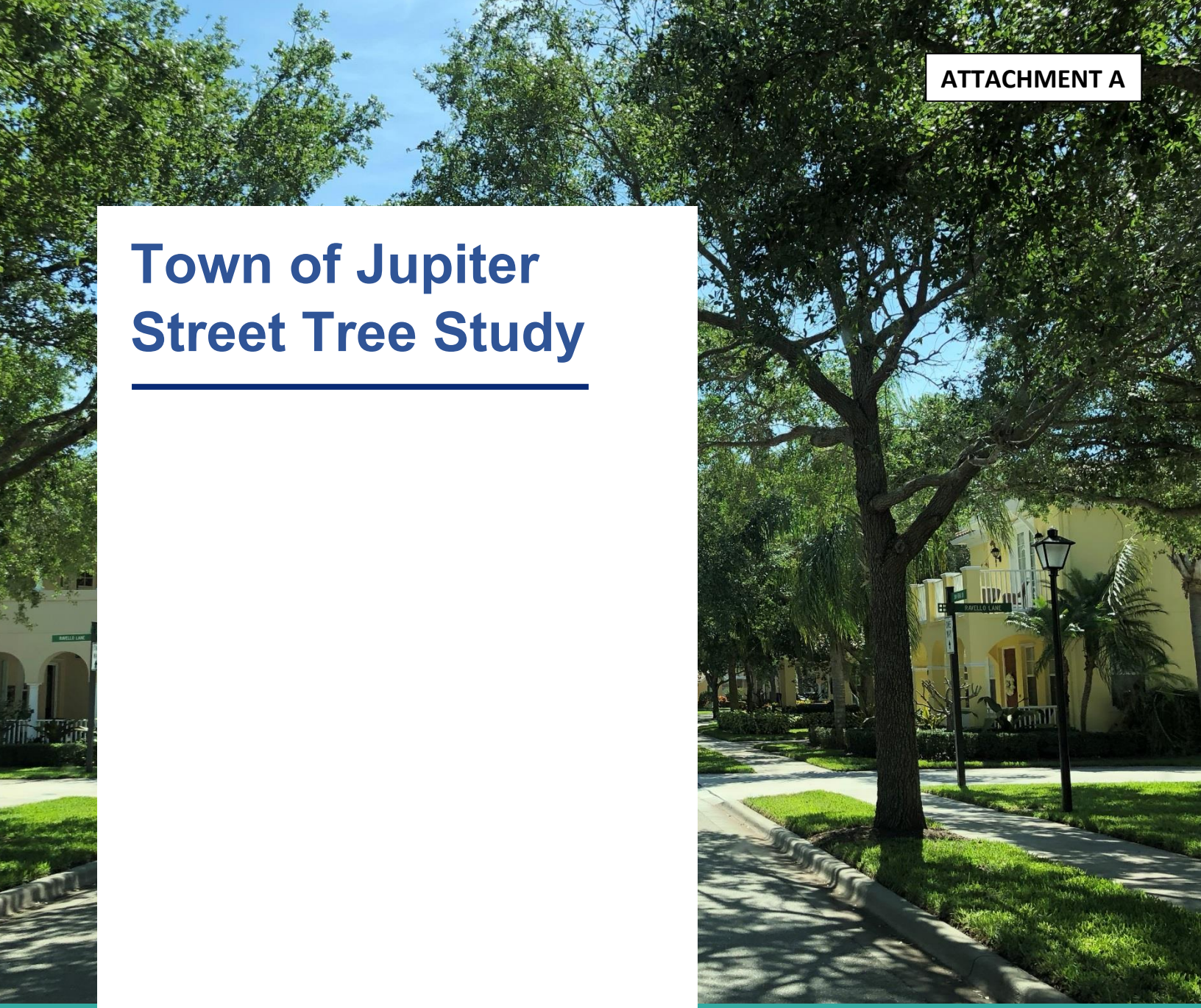
ATTACHMENT A



Town of Jupiter Street Tree Study

JANUARY 6, 2020

Gentile Glas Holloway O'Mahoney & Associates
Address: 1907 Commerce Ln, Ste. 101
Jupiter, FL 33458
Phone: 561-575-9557
Email: emily@2gho.com
Website: www.2gho.com

GENTILE GLAS HOLLOWAY O'MAHONEY
& Associates, Inc
Landscape Architects
Environmental Consultants
Planners

Contents

Decision Worksheet *under separate cover*

ATTACHMENT A

1. Purpose and Frequently Asked Questions

The purpose of this document is to assist communities in managing their street trees and the trees in other common spaces. This document, the Street Tree Management Plan Decision Worksheet, and the Suggested Tree List have been developed to assist neighborhoods in meeting the Town's Comprehensive Plan and Zoning Code while also helping to shape the individual character and aesthetics of their neighborhood.

In simple terms, this document has been developed to answer the following questions that communities may have:

1. **Can we change out one species of tree for another?**
   All changes require Town approval unless your neighborhood has an approved Street Tree Management Plan.
2. **Can we remove street trees or trees in our common areas?**
   An approved Street Tree Management Plan or a Vegetation Removal Permit are required to remove any tree.
3. **Can we remove and replace trees before they become a problem?**
   Potentially, if this is part of the approved Street Tree Management Plan.
4. **Do we need to talk to the Town Staff prior to doing anything with street trees or common area trees?**
   Yes, they will help you understand your obligations and the requirements of the Town Code as well as the process to get the Street Tree Management Plan approved.
5. **What can we do to change the look of our community?**
   To change the look of your community using trees and plant material, follow the process to develop a Street Tree Management Plan that can be found in this document. This may require the development of a new landscape plan.
6. **Who fixes the sidewalk when there is a lift which may cause a trip hazard?**
   If the Town owns the road, then they will fix the sidewalk which may initially involve grinding down a portion of the raised concrete. If the section of sidewalk is to be removed and replaced then it will typically be in partnership with the HOA who is responsible for cutting the roots and repairing the irrigation. If the sidewalk is owned by the HOA, then it will be the sole responsibility of the HOA to fix the problem.
7. **Do we have to plant trees of a specific size?**
   The Town Code requires a minimum size for all trees which are to be installed.
8. **The leaves from our street trees are very messy. Can we make the trees smaller so there are less leaves?**
   There are specific pruning requirements referenced in the Town Code, published by the International Society of Arboriculture. Pruning must be in accordance with these standards which provide details on how to properly prune a tree as well as limiting how much of a tree's canopy can be reduced annually. Improper pruning damages the trees, creates potential hazards and may result in fines and require corrective action.

9. **Can we execute a plan over time? Do we need to come back to the Town each time we execute part of the plan?**
   Yes, you can execute a plan over time by including several different phases. The Town will require notification when you are executing part of the plan. If your community wants to change the plan, then the documents on file with the Town will need to be updated through a new application.

As communities age, some communities want to reduce conflicts that street trees cause and have them removed and/or replaced. This document provides the research and process regarding the importance of street trees to a community's health and welfare. Homeowner/Condomininium Associations should use this tool and work with Town Natural Resources staff to develop a Street Tree Management Plan (referred to as the Plan) in order to process the changes through the Town for approval.

The Town of Jupiter values its trees and native vegetation dating back to the 1970's with the enactment of the first landscaping and vegetation protection ordinances. For over twenty years, the Town of Jupiter has been designated as a Tree City USA by the Arbor Day Foundation. The Town has long recognized the public health and welfare benefits provided by trees that include:

- Promoting energy conservation through the creation of shade;
- Reducing heat gain in and on buildings or paved areas;
- Providing physical and psychological benefits with people enjoying the outside by
  - being physically active (walking and exercising), and;
  - encouraging social interaction, and;
- Increasing land values since street trees are a capital asset.

The Town's street trees, open space properties, and waterways are all different components of the overall "green" infrastructure. The Town also has a network of "gray" infrastructure such as sidewalks, curbs, roadways, and underground pipes and utilities. Unfortunately, where "green" infrastructure meets "gray" infrastructure, conflicts arise. A common problem is sidewalk uplift due to intrusion from roots of adjacent street trees. Uneven sidewalks are a trip hazard and a potential liability. This report, with the Community Examples in the Appendix, explores options of removal or replacement of targeted street trees in specific situations as they become a problem by lifting sidewalks or as a pre-emptive move. The thought process and action items found here can then be applied to your neighborhood within the Town with similar situations.

Why are street trees important in a community? Street trees add benefits to the community and personal health. Outlined in the table below is a way to measure and understand the value and benefits of street trees in achieving a more sustainable community. The table provides a list of goals (environmental, infrastructure, social and economic) that may be considered by a neighborhood contemplating a change to their street trees. Goals were established with the subsequent action needed to obtain the desired result as relates to street trees. Use these goals to help prioritize the desire of your neighborhood:

ATTACHMENT A

COMMUNITY GOALS

ENVIRONMENTAL GOALS	ACTION	RESULT
Increase Resilience of trees	Avoid structurally weak tree species.	Less debris from storm clean-up; trees remain standing after a storm.
Increase Shade	Encourage high percentage of canopy cover over roadways & pedestrian spaces.	Lowers ambient temperature, reduces glare, reduces heat island affect.
Increase Biodiversity	Encourage tree species diversity.	Resilience against effect of disease or climate change decimating the canopy cover.
Adapt to Urban Soil Conditions	Encourage hardy & adaptable species.	Resilience against the harsher conditions in the built environment.
Encourage/Increase Carbon Sequestering	Encourage high percentage of canopy coverage.	Improves air quality & slows climate change.
Reduce Stormwater Run-Off	Encourage high percentage of canopy coverage.	Reduces first flush stormwater run-off, increasing water absorption vs. run-off.

INFASTRUCTURE GOALS	ACTION	RESULT
Sidewalk Replacement Sustainability	Explore various materials & methods for sidewalk replacement.	Increase resiliency of sidewalks to root destruction with minimum root removal.
Assure Sidewalk Use	Do not remove any sidewalks (per Comprehensive Plan).	Pedestrian mobility to walk places, for health and the reduction of automobile use.

SOCIAL & CULTURAL GOALS	ACTION	RESULT
Improve Community Interaction	Encourage high percentage canopy coverage to mitigate heat and direct sun.	Healthier communities physically and socially through creating useable outdoor spaces.
Enhance Safety & Security	Regular maintenance – proper tree trimming, etc. New planting – right tree, right place.	No street trees blocking lights, no trip hazards.
Improve Health & Wellness	Encourage high percentage canopy coverage to mitigate heat and direct sun.	Healthier communities physically and socially through increased outdoor activity.

ECONOMIC GOALS	ACTION	RESULT
Reduce need for Future Sidewalk Repairs	Use root barrier, use right size tree, remove offending roots or tree, if needed.	Less need for sidewalk repairs moving forward.
Liability – Trip and Fall	Remove trip hazards quickly.	Minimizes lawsuits.
Energy Savings	Encourage high percentage canopy coverage to mitigate building sun exposure.	Reduces energy costs.

The goal for each community will be to create a **Street Tree Management Plan**, approved through the site plan amendment process with the Town to address:

1. What tree(s) are to be removed and the timeline;
   a. Whether the tree is to be replaced, or;
   b. Selection of tree replacement options, or;
   c. Justification for no replacement.
2. What tree(s) are missing per Town Code;
   a. Selection of tree options, or;
   b. Justification for no planting;
3. Proposed alterations to existing sidewalks (other than direct replacement) which may, now or in the future, create a liability issue, while maintaining a specific tree;
   a. Rerouting of the sidewalk if there is room, or;
   b. Bridge sidewalk over root zone (maintaining ADA compliance).

The Tree Decision Worksheet will help guide the design decisions. There are many options that can be used to achieve full canopy and minimize conflicts. For a brief overview, please find the following:

1. Change out a specific amount of large canopy trees for specific amount (may be different quantity) of smaller species.
2. Rotate out street trees once they reach a certain defined diameter, replacing like for like but with a new one.
3. Remove alternate street trees (when an overlapping canopy exists) which will reduce the number of conflicts while allowing the remaining to achieve a full canopy.
4. Explore alternate paving materials for sidewalk replacement to achieve a longer life. The Town is continuously exploring these items and will be a good resource as to the current trends. This may include but is not limited to:
   a. Stronger concrete
   b. Pervious materials
   c. Premanufactured units locked together
5. Rely on canopy trees outside the road right-of-way to provide the street tree canopy.

Moving forward, the balance between the trees and sidewalk/utility repairs, needs to be accepted as a common goal of the neighborhood and Town. As trees mature, the aesthetics of the individual neighborhood changes. It is more than just the need to identify issues and resolve them. Neighborhood leaders must look closely at their communities and identify what are the important issues and goals they may desire for their community and for the future.

THE URBAN TREE

As noted in this document, street trees and trees in general hold many benefits for the community and the environment. When we are talking about street trees we are referring to trees planted primarily in the linear strips of green between the roadway and the sidewalk. This is considered an urban condition and is not as ideal as a spacious park or natural area. There can be root limitations and canopy limitations. In Jupiter, due to soil conditions with an especially high water table, tree roots tend to grow in a shallow, horizontal manner, very close to the surface which leads to lots of conflicts with sidewalks and curbs. By the same token, our trees do not get as tall as trees in other parts of the country, usually maxing out at about 35-40 feet in height. The chart below indicates the general stages of street tree development for non-palm species. The more limiting the soil conditions and size of the green space, the slower the tree will grow. The primary factor which has the potential to indicate the imminent onset of sidewalk lift appears to be the diameter of the trunk.

Table. URBAN TREE STAGES OF GROWTH

Stage	Age	Diameter	Canopy	Trimming
YOUNG	1-5 years	2” To 6”	Canopy spread within green space	Lift, structural pruning
TEENAGE	6-20 years	5” to 16”	Canopy spread into walks and cars	Lifting required
ADULT	12+	16” to 36”	Canopy spread over the road/sidewalks	Professional thinning, lifting, corrective pruning
SIDEWALK LIFTING		16”+		

2. How to Make a Neighborhood Decision on Street Trees

The goal for each neighborhood is to create a **Street Tree Management Plan (the Plan)**, approved through the site plan amendment process with the Town. This section addresses the process of how to execute such a plan.

UNDERSTANDING THE ISSUES & DESIRES

- HOA Board and/or Neighborhood Committee starts the process by identifying issues and setting goals.
- Use the Town as a resource and partner with them to get the best results.
- Determine if you have private roads or public roads.
- Research the different options to address your issues (see Worksheet & Appendix)
- Research the different street trees species (see Appendix).
- Familiarize yourself with the Site Plan amendment process (see Flow Chart & Town staff liaison).

PRIORITIES FOR THE COMMUNITIES

The priorities of a community should be set by that community through a process of research to understand the value of street trees and the inherent problems (some material enclosed), inventory and analysis of the street trees, along with community survey options to find out what the residents want.

INVENTORY (use Worksheet provided to assist)

- Amount of shade – Calculated in the percentage of coverage for the whole community.
- Types of curbing, if any.
- Typical location dimension – Width of space in which the tree is planted.
- Sidewalk lifting – Safety. (Are your sidewalks lifting? Have they been fixed or replaced by the Town or Association? How long has this been a problem?)
- Vitality of trees – Are they a healthy color? Are they full? Are there soil issues or maintenance issues?
- Real estate values – Assuring street trees increase the value of real estate, not detract.
- Cleanliness/orderliness – Level of maintenance required to offset the goals of the community as to its appearance.

GET INPUT FROM THE NEIGHBORHOOD

The Plan needs to be a reflection of the specific community. Asking for input from the stakeholders (residents) informs and directs the Committee who are developing the Plan. One easy way to reach out to residents of the neighborhood is to develop an online survey using one of many free online survey sites. Holding a townhall-type meeting is another option. The annual meeting is an excellent venue to give an update on the status of the Plan for that year.

USE OF THE STREET TREE MANAGEMENT PLAN DECISION WORKSHEET

Use the Worksheet to inventory and analyze the street trees and to think through the design options available. Refer to the Appendix for additional material which may support a design decision direction.

1. Fill out the Street Tree Management Plan Decision Worksheet (Worksheet) to understand your community and issues.
2. The Worksheet will guide you through several stages, especially the design options.
3. Review all the information and examples in the Appendix to make informed decisions.
4. Your Town staff liaison will be available to assist.

USE OF THE TREE SPECIES LIST

The Suggested Tree List has been developed as a list of tree species suitable for street trees in the Town. For a more diverse canopy, use this list for alternative tree options. Palms have been included for special conditions as may be approved by Town staff.

DEVELOP A COMMUNITY TREE GRAPHIC

The development of this graphic can be done in many ways and is intented to convey where and how the Plan is being designed. This can be done by hand or working within a PDF. Please see the examples in the Appendix. The graphic should have all the streets in the community on it. If the neighborhood proposes a different street tree species per street, that should be noted.

COSTS

To actually develop a management plan, costs must be understood so that associations can prepare and budget for improvements. Whether it is simply the replacement of trees which have died or changing the tree type and/or placement, there are costs associated with these decisions. The age of the community will affect the anticipated budget with the older communities needing more budget considerations due to the age of both trees and infrastructure. To get an idea of costs in today's market (2019), please see the following estimates:

Tree Removal/Planting Activity	Costs
TREE REMOVAL: to include removal of tree and debris, stump grinding, repair of irrigation and sodding over the stump grinding. Cost will depend on diameter of tree and liability.	$500-$1,800 per tree
TREE REPLACEMENT: Plant a 12-14' height, 2 ½" – 3" caliper tree with 14' root barrier 30" deep along sidewalks, irrigation bubbler, staking	$1,400 per tree

Sidewalk repairs will be Town initiated if the roadways of the community are Town owned. This means that the HOA may not have control over this and must rely on the general condition of their public amenities. They must set aside funds in reserve for unexpected repairs and replacments. The typical agreement between Town and HOA is a cost-sharing solution. Either way, the HOA should budget for their contributions to the repair costs.

Sidewalk Replacement	Costs per Issue[1]
TOWN OR HOA RESPONSIBILITY[2]: Remove sidewalk, form, add drainage rock & pour new 6" thick sidewalk	Min. $1,450.00 >80 square feet = $18 per square foot >160 square feet = $16 per square foot
HOA RESPONSIBILITY: Remove/grind roots, remove 12" soil, repair irrigation (possibly twice), finish grade at completion.	Average $650.00

As a neighborhood matures, the majority of the cost of keeping the street trees healthy and reducing liability lies in maintenance. Maintenance costs to maintain 'ADULT' sized trees with diameters of 16" plus are indicated below. The larger the quantity of trees the more cost effective the unit price per tree.

Maintenance Activity	Cost	Timing
DEPARTMENT OF TRANSPORTATION (DOT) LIFT: Trimming to lift the tree branches which are over the roadway to a minimum of 14' above the roadway.	$20-$50 per tree	Annually Checked
GENERAL PRUNNING: Clean out of dead wood and poor branching; lifting and opening of canopy.	$45-$100 per tree	As needed
CORRECTIVE PRUNING: Removal of rotting branches,	$60-$400 per tree	As needed

TIMELINE / PHASING

Develop a timeline or phasing plan in order to understand and plan for the cost of removing and replacing trees. This will be helpful for the Board in order to set budgets over multiple years to get the work done. Executing the Plan over several years will not require additional approvals from the Town. Only a change to the approved Plan, an amendment, will require an application through the Town. Any proposed phasing can be shown on the graphic in addition to within the Formal Letter Request.

FORMAL LETTER REQUEST

This document will convey the intent of the community's plan to change, remove, replace and otherwise manage the street trees. Present the case of why the changes are needed. The timeline/phasing should be addressed in this letter.

THE STREET TREE MANAGEMENT PLAN

The Street Tree Management Plan will be the end result and will be submitted to the Town for approval. The Plan will consist of three main parts that will convey the intent of the

[1] Sidewalk removal can be as small as 20 square feet upwards of 200 square feet. Volume of work affects the price also.

[2] Depends on who owns the right-of-way

neighborhood and how that it will be implemented over time (phasing plan). Your product will include the following documents:

- Decision worksheet
- Formal letter request
- Community Tree Graphic

If the community is large or complex, the Board may wish to engage a licensed professional to assist in the development and phasing of their plan.

3. Process for a Street Tree Management Plan

To better understand the process of developing and approving a Street Tree Management Plan, please refer to the Flow Chart in this section. The process is a collaboration between the neighborhood representatives and the Town staff to ensure that the request meets the intent of the code. This specific process is designed to be simple and relatively easy for a community committee to execute. If the HOA does not have the volunteers to do this project, they may hire a licensed landscape architect to assist.

HOA COMMUNITY INITIATED

If a street tree or several street trees become an issue for the community, the Street Tree Management Plan Decision Worksheet can be used for the specific tree(s). While this form can be used for an individual tree or a small number of trees removal requests, the community should develop a full Street Tree Management Plan addressing the community holistically if the number of trees is significant or has a potential to change the character of the neighborhood. Development of a Street Tree Management Plan to address the entire community will save the community time and money in the long run, because they will not have to ask the Town for approval every single time there is an individual tree issue. The Plan, once approved by the Town, is a guidebook to follow for future work and can be implemented over time without asking the Town each time there is an issue.

SITE PLAN AMENDMENT

All communities in the Town were approved with a site plan prior to being built. The site plan or landscape plan includes street trees for projects which have been approved over the last 40 years. Ask the staff liaison for a copy of the approved plan on file. The approved plan means that street trees are a condition of approval and are required. Trees may not be removed without Town approval.

Development of the Street Tree Management Plan will include proposed changes to the approved site plan, since the plan includes the street trees. The Town will process the Plan as a request for a Site Plan Amendment. This process records the requested change (in this case: street tree locations, species, etc.) and the timeline to complete the project. Once approved, it becomes the approved plan for the street trees in the neighborhood.

Each community should plan on the following meetings with Town staff:

1. Kick-off meeting
2. Pre-Application meeting

At the kick-off meeting, a Town staff member, either a Planner and/or Natural Resources person, will be assigned to your project. This person will be available to answer questions and address concerns throughout the process. Your staff liaison will help you submit the site plan amendment which will include the Street Tree Management Plan though the Town's software system. Typically the site plan amendment is administrative, which means it can be processed

by staff without having to go before the Planning and Zoning Commission or Town Council. Administrative approals usually take less time than if required to go through the public hearing process. During the review, staff will provide you with written comments either in a letter or email. The community representative will need to respond to the comments and make changes to the Street Tree Management Plan as may be necessary. After all revisions are made and the Town staff has ensured the plan meets the Town Code and Comprehensive Plan, the Town will provide an approval letter.

Often implementation of the Street Tree Management Plan occurs over a period of time. A general timeline or phasing plan should be part of the approved Plan. Your staff liaison will also help you through the execution of the plan. Approval of timelines/phasing plans usually also require that annual reports be submitted to the Town, describing the portion of the Plan or work that was completed that year, to ensure the community is following the approved Plan.

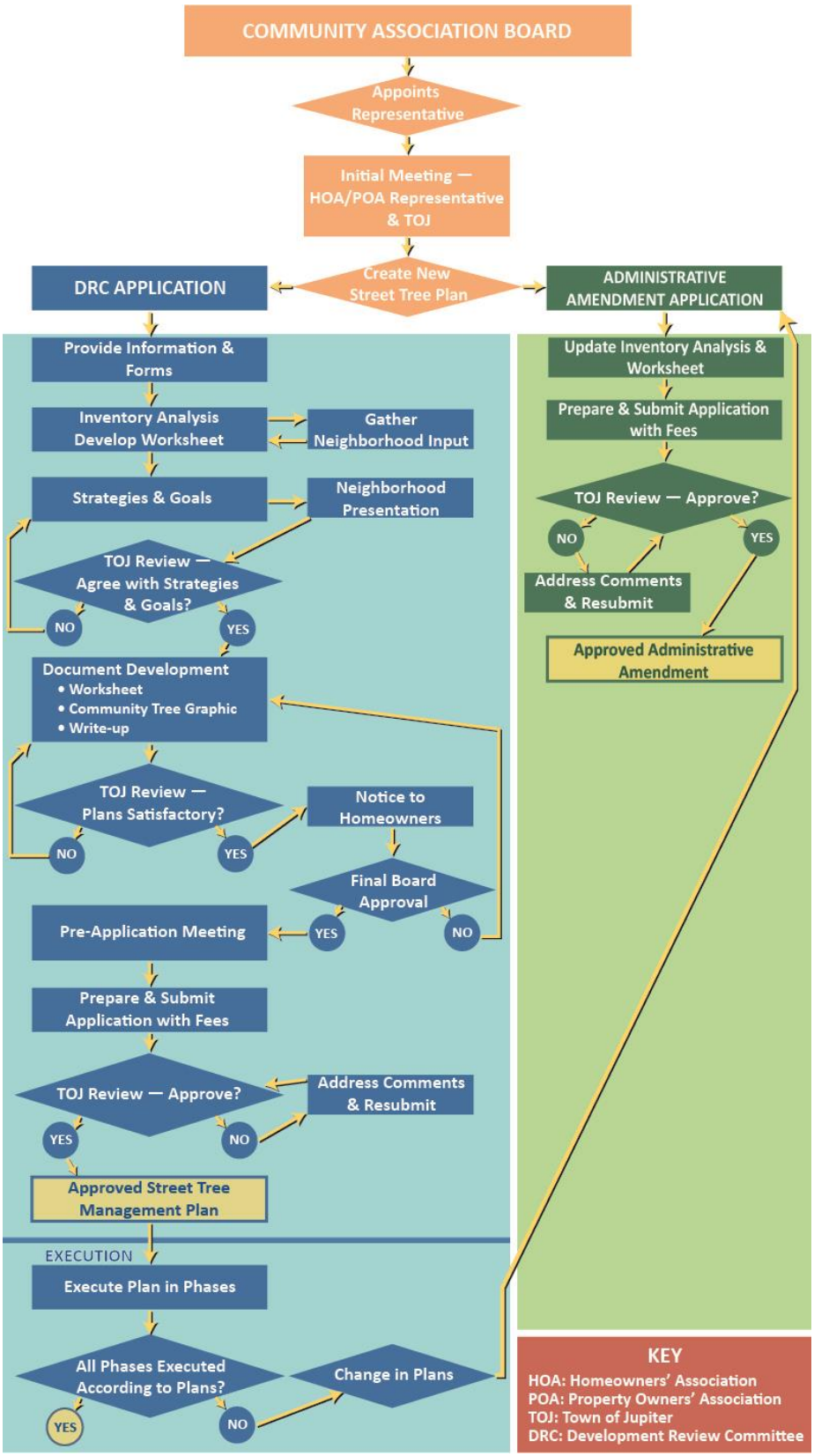
WORKING WITH THE TOWN PLANNING & ZONING STAFF

Things to remember:

- Your staff liaison will help you throughout the whole process.
- The Town recognizes and supports the individuality of each and every neighborhood community.
- Staff will make sure your application of a Street Tree Management Plan is consistent with the Comprehensive Plan and relevant zoning codes.

ATTACHMENT A

Please see the following Flow Chart for processing a Street Tree Management Plan:



Appendix A. Educational Choices

The appendix of this document includes parts of the Jupiter code concerning landscape, native vegetation and removing/replacing trees (see Sections 23-1, 23-2, 26-2 & 26.3). The Conservation Element of the Comprehensive Plan is also included. These should be closely reviewed by communities as they prepare their Street Tree Management Plan to understand that the Town has goals and criteria which will be used to evaluate any management plan put forward.

The following information in support of street trees (within the green lines) is from the Landscape Performance Series through the Landscape Architecture Foundation (LAF), an organization dedicated to research and developing performance metrics. Please go to www.lafoundation.org for more information. The information is based upon scientific calculations and information on the importance of trees, canopy coverage, reduction of heat gain and cooling costs, stormwater, etc.

A study in Toronto, Canada found that having 10 more street trees on a city block, on average, improves health perception in ways comparable to an increase in annual personal income of $10,000 and moving to a neighborhood with $10,000 higher median income or being 7 years younger.

Kardan, Omid, Peter Gozdyra, Bratislav Misic, Faisal Moola, Lyle J. Palmer, Tomáš Paus, and Marc G. Berman. (2015). Neighborhood greenspace and health in a large urban center. *Scientific Reports*, *5*.

Increasing the number of native mature trees preserved in new urban housing developments is an effective way to increase bird diversity, according to this study in Queensland, Australia. Streets that retained mature trees had similar species composition to urban parks but fewer total birds.

Barth, Benjamin James, Sean Ian FitzGibbon, and Robbie Stuart Wilson. (2015). New urban developments that retain more remnant trees have greater bird diversity. *Landscape and Urban Planning*, *136*, 122-129.

A five-year longitudinal study in Great Britain found that moving to a greener area not only improves people's mental health, but that the effect is sustained for a long time. Individuals who moved to greener areas had significantly better mental health in all three post-move years. Those who moved to less green areas suffered a drop in mental health in the year preceding the move but then returned to baseline.

Alcock, Ian, Mathew P. White, Benedict W. Wheeler, Lora E. Fleming, and Michael H. Depledge. (2014). Longitudinal effects on mental health of moving to greener and less green urban areas. *Environmental Science & Technology*, *48*(2), 1247-1255.

The monetary benefits of urban trees outweigh their maintenance and other associated costs. In a study of five U.S. cities, each dollar invested in urban trees returned between $1.37 and $3.09 in benefits. Benefits measured include energy savings, atmospheric CO2 absorption, air quality benefits, stormwater runoff reduction, aesthetic and other benefits gauged by measuring increases in real estate values.

McPherson, Greg, James R. Simpson, Paula J. Peper, Scott E. Maco, and Qingfu Xiao. (2005). Municipal forest benefits and costs in five U.S. cities. *Journal of Forestry* 103(8), 411-416.

A Modesto, California study found that asphalt on streets shaded by large canopy trees lasts longer than asphalt on unshaded streets, reducing maintenance costs by 60% over thirty years.

McPherson, E. Gregory, and Jules Muchnick. (2005). Effects of Street Tree Shade on Asphalt Concrete Pavement Performance. *Journal of Arboriculture*, 31(6), 303-310.

Research in Tel Aviv determined that the presence of trees cooled the air from between 0.5°F on a heavily trafficked street to 2°F in a small (0.37 acre) garden. The study also found that the cooling effects could be felt up to 330 feet from the site.

Shashua-Bar, L., and M. E. Hoffman. (2000). Vegetation as a climatic component in the design of an urban street: an empirical model for predicting the cooling effects of green urban areas with trees. Energy and Buildings. 31(3). 221-235.

The following are considerations and information that will be helpful to the homeowner association in making decisions. The process is outlined further in the report but generally to be kept in mind:

1. The community applicant will work with a staff member in the planning department to assure that their individual street tree master plan will meet the criteria of the Town's Comprehensive Plan & Zoning Code (see Appendix).
2. The community applicant will need to inventory and analyze their street trees. The sample communities chosen provide an example of the basic information needed. The six communities analyzed include:
    a. Botanica & Seaplum
    b. Charleston Court
    c. The Hamptons
    d. New Haven
    e. The Island
    f. Tuscany

3. The community applicant will come up with a design strategy.
4. The community applicant will fill out the application for a minor site plan modification and the Street Tree Management Plan forms.

CANOPY:

Tree canopy coverage is very important to the quality of life in the hot Florida neighborhoods. People are out walking, children are playing and dogs are being walked at all times, even in the hottest of weather, due to the shade provided by these trees. Pathways will be chosen with the most shade in sight. *Town Code: Landscape Sections 23-1, 23-2 (1), (3), (4) and (5): Native Vegetation Section 26-2 and 26-3 (1), (2) and (3)*.

The shade provided is just one of the benefits. Trees remove carbon monoxide, nitrogen dioxide, ozone, particulate matters less than 2.5 microns, sulfur dioxide, and sequester carbon dioxide annually which is a health benefit to the residents and the Town as a whole. It can be argued that it helps in climate control worldwide.

The existing canopy of each community was estimated using the i-Tree criteria (https://canopy.itreetools.org) which is a general calculation based upon outlining the parcel. The percent canopy ranged from a low of 41% (Botanica) to a high of 58% (Charleston Court). Many cities around the country are trying to achieve 45-50% tree canopy.

LAYOUT | LOCATION:

For the past four decades, the Town has promoted the inclusion of street trees in all the new developments. When many of Jupiter's communities were built it was commonly accepted that the minimum green strip could be five feet. In accordance with the most current, best management practices, a minimum of eight-foot wide tree planting area is suggested and supported by today's Town code. As Live Oaks are the primary street tree in the majority of communities and Live Oaks can easily achieve a three-foot diameter trunk over time with a wider root flare, conflicts between green and gray infrastructure occur. It is important to use the right tree in the right place. Smaller species of trees would be planted smaller spaces. If large species of trees are planted in small spaces, the management of that tree must be taken into consideration, with possible planned removals once a certain caliper is reached.

BIODIVERSITY:

Biodiversity in tree species is important to the resilience and sustainability of the Town's canopy in mitigating the effects of global warming where we are seeing the lost and/or shifting of species. Additionally, biodiversity provides a good armor against diseases which could decimate a whole species. *Town Code: Vegetation and Environmental Preservation 26-3 (1)(j)*

Of the six communities studied, it is estimated that 96% of the street trees are Live Oaks. Biodiversity in our street trees helps mitigate the devastating effects of invasive insect pests and diseases, as when many elm tree-lined streets in North America were denuded during the latter half of the 20th century due to the fatal fungus known as Dutch Elm disease. More recently, invasive beetles in the northeast have caused the loss of ash and maples trees both in forested woodland settings as well as urban areas, including total loss of street trees in some neighborhoods. A neighborhood that has biodiversity among its street trees helps to protect it

against total loss of canopy coverage should a pest or disease issue arise for a given tree species. Biodiversity in trees also attracts a broader range of wildlife as different trees provide a variety of food sources, nesting and roosting areas for birds, and flowering species help promote a healthy population of butterflies and pollinators.

SOILS & ROOT DEVELOPMENT:

What happens underground may be more important than what we see aboveground. Giving trees an adequate amount of planting space improves their vitality. The Town recognized this and changed the codes to require a minimum of eight-foot wide planting area in any direction. In addition, in more urban situations, special treatment of the soil is required to assure vitality. *Town Code: Landscape Sections 23-70 (3)c.2,*

Certain tree species are more forgiving in harsher urban situations with compacted soils and tight locations. As trees and their canopy are so beneficial, it is imperative that we find a tree that will work in challenging situations.

While the Oak Trees are the predominant species of tree that are causing sidewalk lifting with their roots, it is not primarily the species that is the cause. Any large tree would have the potential to do the same thing within these communities due to local soil conditions that lead to shallow root systems that could include high or perched water tables, hardpan, overly irrigated, and compacted soils from construction. A common construction practice is compacting soils across the job site including planting areas where trees are going to ultimately end up. The Town's code requires 30-inch deep clear of any construction debris. This is typically met but during the process of construction there is a high amount of traffic compacting the soils on either side of the road where the trees will end up. Even if the soil is replaced with in the 30-inch there will be a compacted layer which will make the roots less likely to penetrate deeper. When the trees are then placed in the five-foot tree lawn there are typically walks and drives that intersect the planting area. This in turn leaves a contained area for the roots to develop horizontally due to the compacted vertical soil profile. The roots have nowhere to go except to uplift sidewalks and curbs. Changing the species of tree to a medium or small variety is one option that can lessen the probability of sidewalk lifting.

DIAMETER OF TRUNK:

The diameter of the street trees in this study vary from two inches to 30-inches or more. It appears that when the Oaks get to be above 18" diameter is when the probability for sidewalk lifting (by roots) is greater in the narrower (less than five-feet) tree lawns. If trees are to be replaced prior to sidewalk damage it should be scheduled when the subject tree is at the 18" diameter when planted in five-foot tree lawns. Trees in eight-foot tree lawns and planted in the center can gain 30-inch diameter and not cause problems.

CARBON SEQUESTERING:

Carbon sequestering is the removing of carbon from the atmosphere and has been shown to be a benefit to a community by helping clean the air for people to enjoy the outside and live healthier lives. In addition, increasing levels of carbon have been held responsible for the rising temperatures across the globe. Sequestering carbon is a positive benefit for the community and for the world. The Town supports canopy through codes and earning a Tree City USA

designation for over twenty years. *Town Code: Landscape Section 23-2, (3): Native Vegetation Section 26-3 (1)a*

The chart below shows the shows the carbon sequestering of a couple samples from the time they are planted to a period many years later. A Live Oak will sequester .05 tons per year at time of planting versus 12.1 tons thirty years later. That is 48 times the increase! It is 15 times for an oak that has been planted for 20 years.

Within each of the Community Examples, the i-Tree Canopy Tree Benefit Estimates was utilized, which puts an annual dollar value on canopy of the community based upon removal or carbon sequestering. This is without the societal and psychological benefits of trees and their canopy. The numbers below have been run for a single tree, three different typical species, at different ages. Note the expediential value in carbon sequestering.

A. Species Characteristics (Refer to Table 1)			B. Tree Age (From Planting)	C. Number of Age 0 Trees Planted	D. Survival Factor (Refer to Table 2)	E. Number of Surviving Trees (C X D)	F. Annual Sequestration Rate (lbs./tree) (refer to Table 2)	G. Carbon Sequesterd (lbs) (E x F)	Total Pounds of Carbon Sequestered (per 100 Trees)	Total Pounds of Equivalent CO2 Sequestered (x 3.67)	Equivalent CO2 Sequestered in Short Tons /2000
Name	Tree Type (H or C)	Growth Rate (S, M or F)									
Live Oak Tree	H	F	0	1	0.873	1	2.7	2.7	270.0	990.9	0.5
Live Oak Tree	H	F	1	1	0.798	1	4.0	4.0	400.0	1468.0	0.7
Live Oak Tree	H	F	5	1	0.658	1	10.1	10.1	1010.0	3706.7	1.9
Live Oak Tree	H	F	10	1	0.589	1	19.3	19.3	1930.0	7083.1	3.5
Live Oak Tree	H	F	20	1	0.474	1	41.0	41.0	4100.0	15047.0	7.5
Live Oak Tree	H	F	30	1	0.383	1	65.9	65.9	6590.0	24185.3	12.1
Live Oak Tree	H	F	50	1	0.218	1	122.7	122.7	12270.0	45030.9	22.5
Southern Magnolia	H	M	0	1	0.873	1	1.9	1.9	190.0	697.3	0.3
Southern Magnolia	H	M	1	1	0.798	1	2.7	2.7	270.0	990.9	0.5
Southern Magnolia	H	M	5	1	0.658	1	6.1	6.1	610.0	2238.7	1.1
Southern Magnolia	H	M	10	1	0.576	1	11.2	11.2	1120.0	4110.4	2.1
Southern Magnolia	H	M	20	1	0.462	1	23.2	23.2	2320.0	8514.4	4.3
Southern Magnolia	H	M	30	1	0.373	1	36.8	36.8	3680.0	13505.6	6.8
Southern Magnolia	H	M	50	1	0.232	1	67.8	67.8	6780.0	24882.6	12.4
Slash Pine	C	F	0	1	0.873	1	1.4	1.4	140.0	513.8	0.3
Slash Pine	C	F	1	1	0.798	1	2.2	2.2	220.0	807.4	0.4
Slash Pine	C	F	5	1	0.658	1	6.4	6.4	640.0	2348.8	1.2
Slash Pine	C	F	10	1	0.589	1	13.2	13.2	1320.0	4844.4	2.4
Slash Pine	C	F	20	1	0.474	1	30.8	30.8	3080.0	11303.6	5.7
Slash Pine	C	F	30	1	0.383	1	52.7	52.7	5270.0	19340.9	9.7
Slash Pine	C	F	50	1	0.218	1	106.3	106.3	10630.0	39012.1	19.5

SHADE TREE vs. PALMS:

Shade trees have more of a positive environmental impact than palms. The Town recognizes this in their landscape codes which emphasizes shade trees. *Town Code: Landscape Section 23-68 (b)(5); Section 23-96 (a)*

In a thirty-year span after planting a shade tree, that tree will sequester 7 times its initial .5 tons of carbon annually. A palm will stay stagnate at the equivalent of an estimated two-year shade tree. There is no increased benefit over time. The same applies to stormwater run-off. Canopies capture and slow down stormwater run-off. The larger the canopy and the larger the surface area of the leaf mass, the greater the stormwater capture. And again, air quality benefits are in relationship to the leaf area. Over time, a shade tree is more beneficial to the quality of life. This is not to say that palms don't have a place. They can make a statement in design, thereby increasing the aesthetic value. Some palms can also be planted in small places yet still have the clearance necessary over sidewalks and roadways, but it must be stated that palms do not come close to providing the aesthetic and environmental benefits that trees provide.

CANOPY PERCENTAGES

i-Tree Canopy Tool from i-Tree

Community	Year Built	Community Canopy Percentage	Date	Street Tree Diversity Percentage	Date	Tree Lawn Size by %		
						5'	8-9'	10'+
Botanica	2004-2005	42%	2018	100%	2018	60%	40%	
Charleston Court	2000	58%	2018	10%	2018	X		
Hamptons	1988-1989	47%	2018	30%	2018	100%		
New Haven	1999-2001	57%	2018	100%	2018	100%		
The Island	2000	57%	2018	30%	2018	100%		
Tuscany	2003-2004	51%	2018	10%	2018	40%		60%

The i-Tree tool can be used by communities to establish their own canopy percentages.

Appendix B. Street Tree Conflicts

Primary Causes

Based upon the research and field observation, there are certain facts that have come to light for street trees in Jupiter. The roots of large trees do not go deep, they go out. As the root crown develops and lifts the area around it, surface roots become visible. Roots increase in diameter just as trunks do. With age comes thicker roots. Where a small root can easily make it to the other side of the sidewalk, now that root, as it thickens, lifts the sidewalk. As a general rule of thumb:

16-18" DBH – we begin to see root crown and potential to lift sidewalks. A Street Tree Management Plan should address this as proactive strategy prior to damage to sidewalks, especially if the trees are in small green areas.

Triggers for implementing the plan:

1. Diameter of street tree
2. Minor lifting of sidewalk
3. Development of root crown

Note: DBH = Diameter at Breast Height approximately four and a half feet above ground, which is the measurement used for trees in our landscape.

Caliper = diameter of nursery material measured a few inches above the ground.

Solutions to Mitigate Lifting

There are several mitigation strategies that may be used in Jupiter based upon the physical and environmental analysis of several key communities. Choosing a solution is important because the lifting of sidewalks and damage to infrastructure may result in liability issues for the communities and for the Town. See the Community Examples within this report.

REMOVAL OF SIDEWALK AND/OR TREE

1. REMOVE SIDEWALK & ROOT PRUNE TREE – REPLACE SIDEWALK
    a. Option for trees where generally there is enough room.
    b. Option for key streetscape trees (critical to the canopy or theme).
    c. Option when approved Street Tree Management Plan is on file with the Town.

2. REMOVE OFFENDING TREE & SIDEWALK – REPLACE SIDEWALK
    a. Option when the tree lawn is too small for the type of tree (see TREE CHART).
    b. Option when tree is of poor quality.
    c. Option when tree is in decline.
    d. Option when approved Street Tree Management Plan is on file with the Town.

3. REMOVE TREE TO EXECUTE APPROVED MANAGEMENT PLAN

a. Approved Street Tree Management Plan on file with the Town.
b. Permit required

REPLACEMENTS

1. Replace trees in accordance with the Street Tree Management Plan for the community which was approved through the Minor Site Plan Amendment process through the Town of Jupiter.

2. Execute your approved Street Tree Management Plan in phases.

3. Once each phase of the Management Plan has been executed, the Community will update their Management Plan with the Town through a Letter of Modification.

4. Select replacement trees from the approved list located in the Street Tree Management Plan form.

Design Solution Strategies

When looking at the whole community and planning for the future there may be places where trees can be removed and not replaced. There may be areas which would be better suited for small or medium trees. It is best to look at this holistically and use as the basis of your Street Tree Management Plan. Landscape architects could assist if the community needs help in this.

Process:

1. Fill out the Street Tree Management Plan Decision Worksheet:
    a. Identify issues
    b. Run canopy calculations
    c. Determine diversity
    d. Understand the pattern(s) of tree planting

2. Study the Suggested Tree List.

3. Explore if one or more of these strategies could be applied to the community:
    a. Remove and do not replace –
        i. If surrounding canopy can compensate for the canopy loss,
        ii. If the tree is not part of a required parking lot tree or buffer.
    b. Remove trees in a pattern –
        i. Remove every other tree which may make a diamond pattern from one side to the other.
    c. Remove tree if another tree out of the right-of-way is able to provide similar coverage as the missing tree.
    d. Remove and replace with small- or medium-sized tree.
        i. Certain situations may require a palm.

   ii. How many of these trees are needed (over time)? Is there a philosophy for their planting? Will they be in various areas around the community? Is there a rhyme or reason to the planting design? Consistency and repetition are very important.
   iii. Determine how many or how few species are desired. Removing a dominant species tree and replacing with another species increases the diversity.

e. Remove and replace with another equal sized tree species.
   i. Determine if it is acceptable (by the board and residents) to have more than one species of large street trees.
   ii. Determine the long-range goal of the street canopy and how diversity will work.
   iii. If a second or third species are selected, develop a repetitive pattern for planting.

f. Develop a street theme as a long-range goal where each street is treated differently. This will create diversity street-by-street rather than tree-by-tree.

Appendix C. Community Examples

To address this issue, an inventory has been done of several Jupiter communities which range in age from 14 to 30 years old. The development pattern, space allotted to street trees, current size and mix of street trees, canopy cover and conflicts with lighting and/or utilities have been reviewed, along with the overall vitality of the landscape and the environment created by street trees.

Town of Jupiter Street Trees

Facts

	Botanica				Charleston Court			
Year Built	2004-2005				2000			
Bldg Type	Single Family and Townhouse				Townhouse			
Appx. Percent Tree Cover	42%				58%			
Green Lawn Typ. Width	5', 9'				5'			
Street Trees	Species	DBH	Canopy	Typ. Spacing	Species	DBH	Canopy	Typ. Spacing
	Live Oak	8-15"	30-35'	40-60'	Live Oak	16-24"	30-35'	60'
	Gumbo Limbo	12-15"	25-30'	45'				
	Pigeon Plum	5-8"	10'	30'				
	Magnolia	5-6"	8-10'	30'				
	Sycamore	5-8"	18-22'	40'				
	Mahogany	8-16"	30'	40'				
Tree Quality	Mixed species, poor quality pigeon plum				Good health, good shape			
Tree Canopy Issues	Spaced (5-10' apart)				Touching			
Side Walk Condition	No Lifting				Minor Lifting			
Lighting	Lights are appx. 12' spaced from trees and no major conflicts with canopy				No conflicts since Oaks lifted			
Utilities								

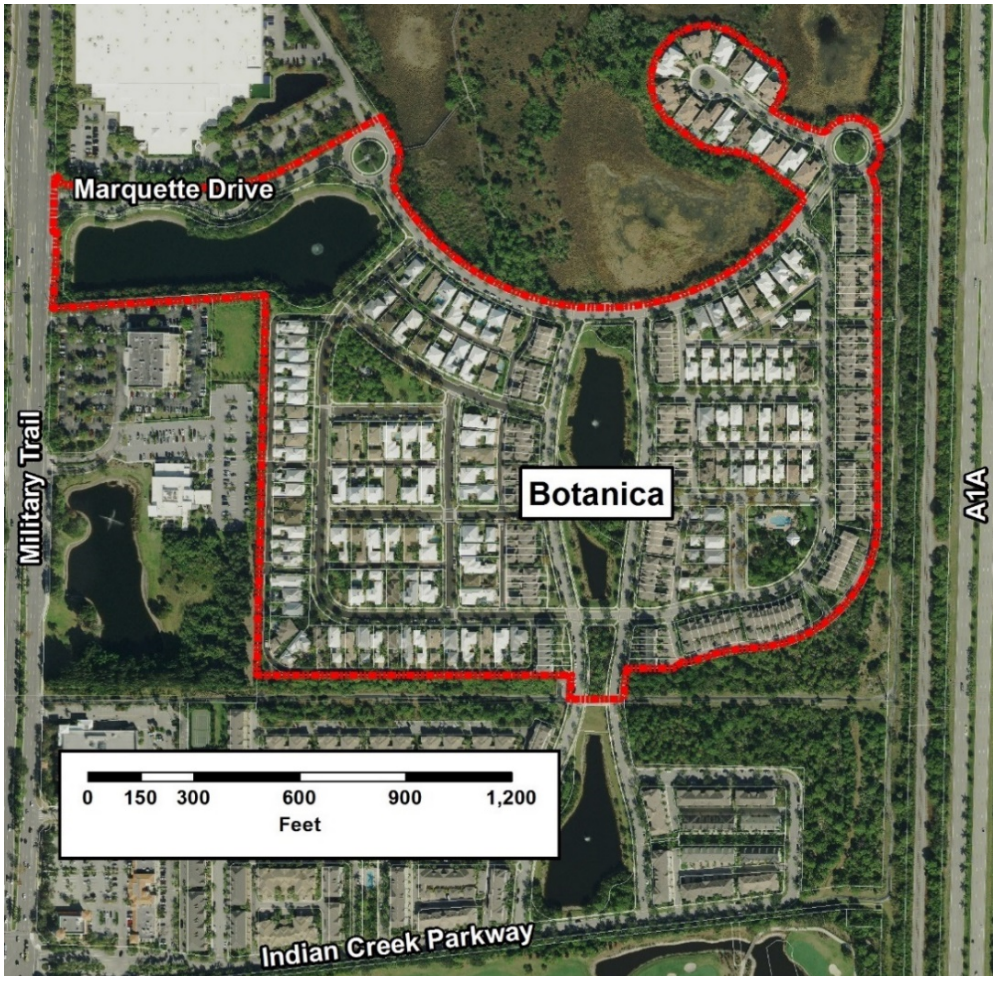
	Hamptons				New Haven			
Year Built	1988-1989				1999-2001			
Bldg Type	Single Family				Single Family and Townhouse			
Appx. Percent Tree Cover	47%				57%			
Green Lawn Typ. Width	6'				5'			
Street Trees	Species	DBH	Canopy	Typ. Spacing	Species	DBH	Canopy	Typ. Spacing
	Live Oak	2"	8-10'	60-70'	Live Oak	16-24"	25-30'	60-80'
	Live Oak	5-10"	10-20'	60-70'	Silver Buttonwood	3-4"	10-12'	30'
	Live Oaks	22-30"	30-35'	60-70'	Green Buttonwood	8-12"	20+	30'
	Laurel Oaks (Entry)	16-18"	35-40'	70'	Sycamore	8-16"	20-26'	60-70'
					Magnolia	6-12"	16-22'	60'
Tree Quality	Good Shape, many circling roots				Good health, good shape, some circling roots			
Tree Canopy Issues	Interlaced				Touching			
Side Walk Condition	Major lifting of sidewalks and curb and gutter, Mailboxe				Minor Lifting			
Lighting	Poles as close as 4' to trunk canopy above lights				Low light (about 10' height) far from trees			
Utilities	Irrigation has been broken							

ATTACHMENT A

	The Island				Tuscany			
Year Built	2000				2003-2004			
Bldg Type	Single Family				Single Family and Townhouse			
Appx. Percent Tree Cover	57%				51%			
Green Lawn Typ. Width	5'				5', 11'			
Street Trees	Species	DBH	Canopy	Typ. Spacing	Species	DBH	Canopy	Typ. Spacing
	Live Oak	16-24"	25-30'	40-50'	Live Oak	16-20"	15-30'	40-50'
	Magnolia	6-16"	8-20'	40-50'				
Tree Quality	Good health, good shape				Good health, good shape			
Tree Canopy Issues	Interlaced				Touching			
Side Walk Condition	Lifting				Lifting			
Lighting	Low light centered between trees no conflicts				Spaced In Between Trees No Conflicts			
Utilities								

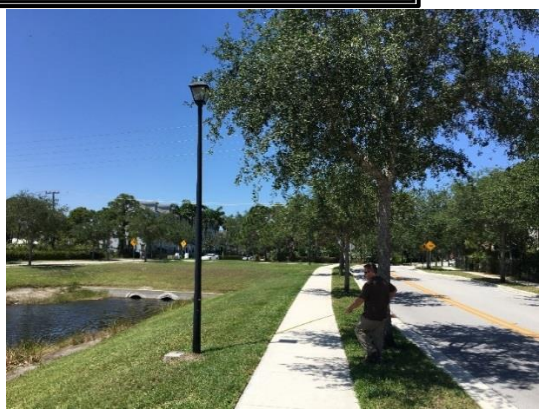
Botanica & Seaplum

Botanica is the newest community reviewed, just coming up on fourteen years old, which means it is just at the cusp of creating problems. The community is a mixture of townhouses and single-family houses set close together with rear garage parking and on-street parking. There are some beautiful open spaces and natural areas. Sidewalks run throughout the project. There are no root crowns or apparent sidewalk replacement. It also has a diverse tree species among the street trees.



	Botanica			
Year Built	2004-2005			
Bldg Type	Single Family and Townhouse			
Appx. Percent Tree Cover	42%			
Green Lawn Typ. Width	5', 9'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	8-15"	30-35'	40-60'
	Gumbo Limbo	12-15"	25-30'	45'
	Pigeon Plum	5-8"	10'	30'
	Magnolia	5-6"	8-10'	30'
	Sycamore	5-8"	18-22'	40'
	Mahogany	8-16"	30'	40'
Tree Quality	Mixed species, poor quality pigeon plum			
Tree Canopy Issues	Spaced (5-10' apart)			
Side Walk Condition	No Lifting			
Lighting	Lights are appx. 12' spaced from trees and no major conflicts with canopy			
Utilities				

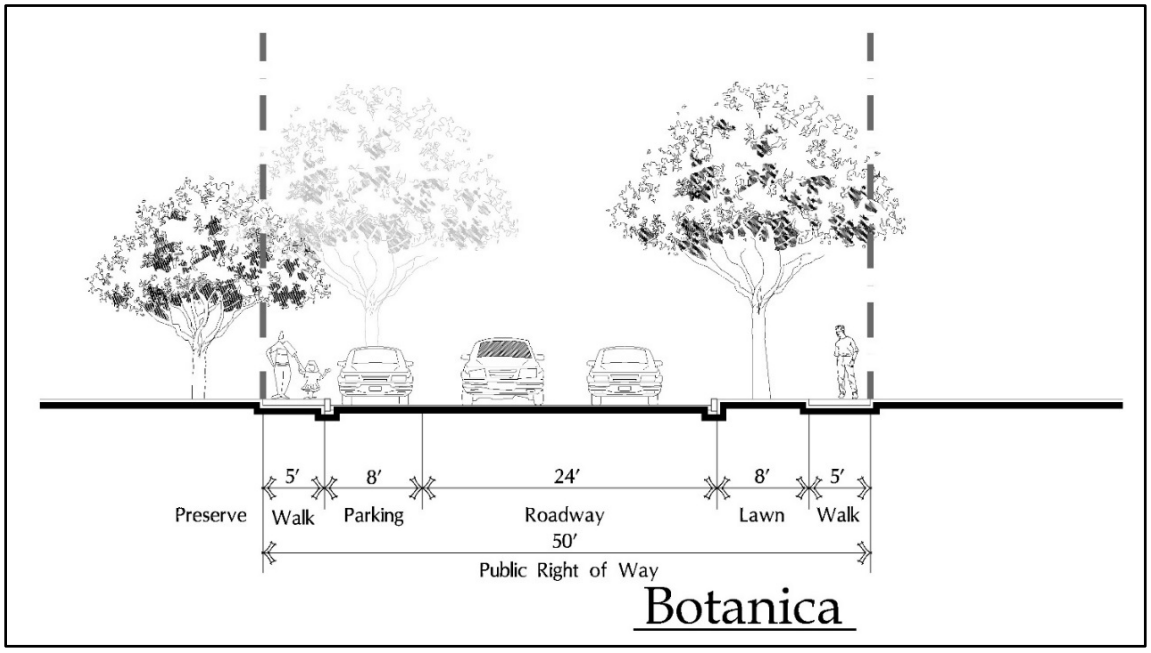
Typical Street

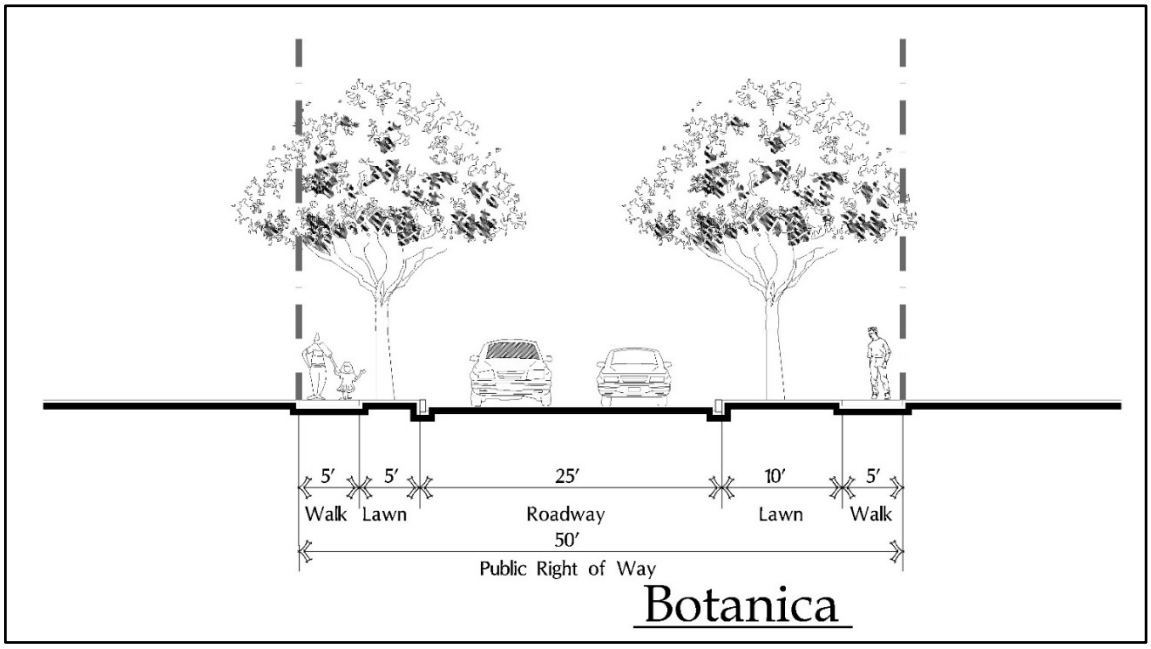


Potential Conflict with Lights

Sycamore Trees in 5' Planting Area

Mahogany Street Trees





POTENTIAL SOLUTIONS:

1. Remove Oak Trees in 5’ wide spaces next to parallel parking and replace with small or medium trees.
2. When adjacent to natural area with tree canopy, selectively remove Oaks where canopy can be maintained.
3. Lift tree limbs for street lights as needed.

Charleston Court in Abacoa

Charleston Court consists of traditional townhouses which face along two major roads within the community, Frederick Small Road, connecting to The Heights, and Parkside Drive.

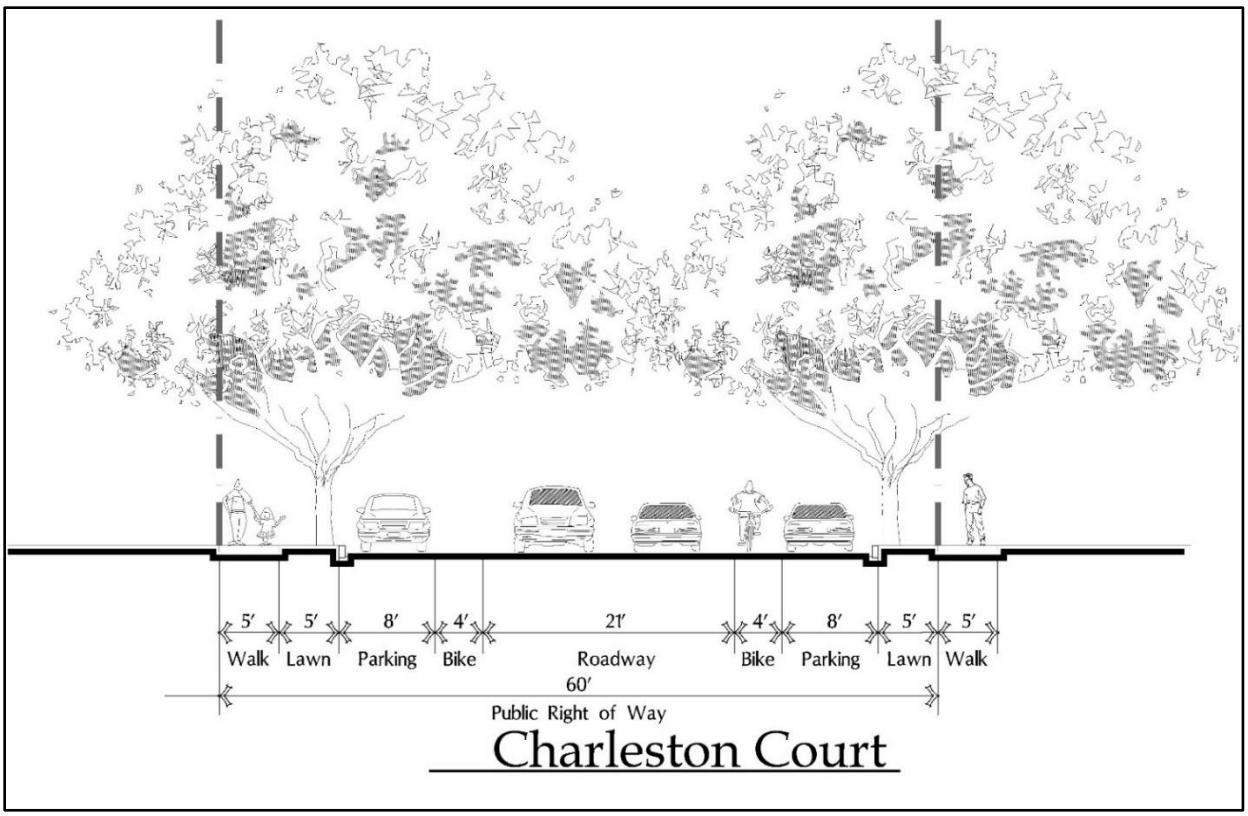
	Charleston Court			
Year Built	2000			
Bldg Type	Townhouse			
Appx. Percent Tree Cover	58%			
Green Lawn Typ. Width	5'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	16-24"	30-35'	60'
Tree Quality	Good health, good shape			
Tree Canopy Issues	Touching			
Side Walk Condition	Minor Lifting			
Lighting	No conflicts since Oaks lifted			
Utilities				

Grinded Sidewalk – Oak Not Centered in Island

Typical Planting Area Minor Lifting

Oaks Lifted Above Lights & Away from Utilities

Oaks in Open Areas with No Conflicts



Since the aforementioned streets set the character for the whole area, we suggest the following:

POTENTIAL SOLUTIONS:

1. Work to retain all the currently planted Oaks.
2. Root prune and replace sidewalks as needed.
3. When trees planted in common areas (not right-of-ways) serve as street trees with canopy over the sidewalk, Oaks may be removed from the right-of-way.

The Hamptons

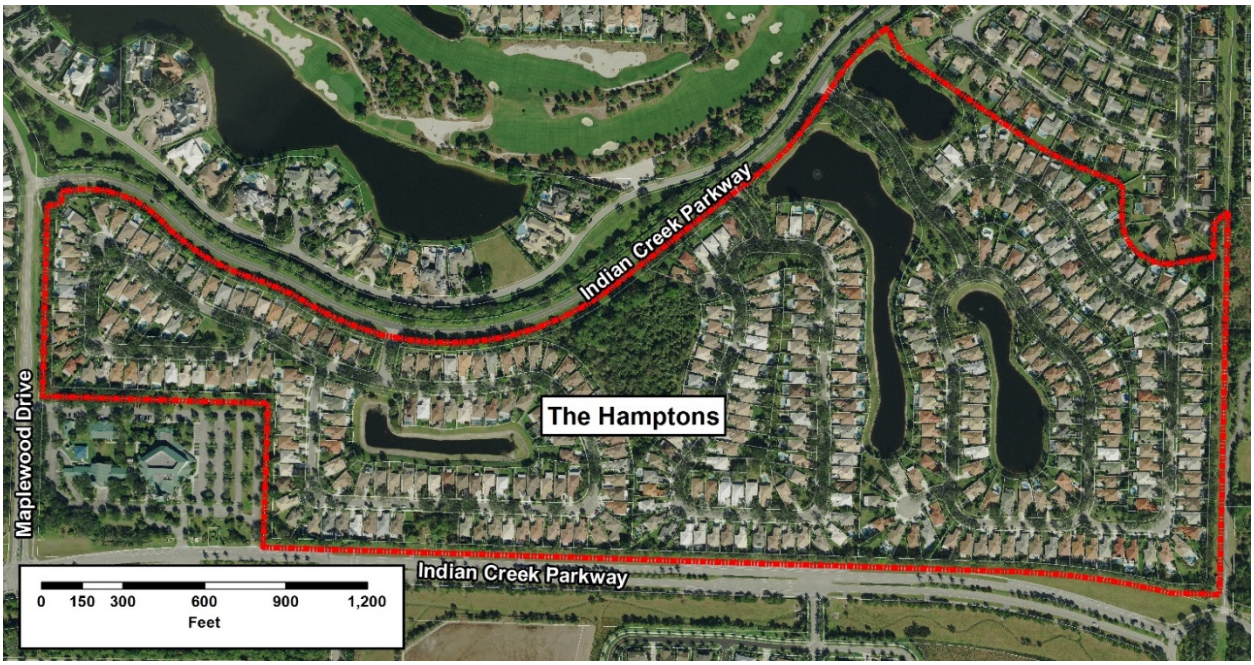
The Hamptons is a community of single-family zero-lot line houses with a 50’ wide right-of-way. There is generally a sidewalk on only one side of the road. The roadway is extra wide but does not designate on-street parking along the valley gutter sides. The tree lawn is 6’ wide but broken by many driveway aprons. Since the trees are thirty years old, the trees have lifting root flares. In some areas, trees have been removed and sidewalks narrowed to deal with the issues. In some specific cases, the sidewalk narrowing was completed and eventually the tree still needed to be removed. The community would benefit from a replacement program in certain areas where no street trees are present due to removal, especially on the culs-de-sac. Some areas have had trees replaced with Live Oaks and the spacing is too close. Oak trees should not be placed closer than 30 feet on-center. If trees need to be planted close to existing trees, change the variety of tree type. It is noticeable, and inconsistent, where trees have been removed and not replaced within this community.

Two Replacement Oaks on the left where one would be the recommendation to achieve a better spacing like the right

Walk, drive, and curb damaged.
Future tree possible if removed.

Sidewalk narrowing to reduce lifting.
Room for possible replacement.

ATTACHMENT A



	Hamptons			
Year Built	1988-1989			
Bldg Type	Single Family			
Appx. Percent Tree Cover	47%			
Green Lawn Typ. Width	6'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	2"	8-10'	60-70'
	Live Oak	5-10"	10-20'	60-70'
	Live Oaks	22-30"	30-35'	60-70'
	Laurel Oaks (Entry)	16-18"	35-40'	70'
Tree Quality	Good Shape, many circling roots			
Tree Canopy Issues	Interlaced			
Side Walk Condition	Major lifting of sidewalks and curb and gutter, Mailboxe			
Lighting	Poles as close as 4' to trunk canopy above lights			
Utilities	Irrigation has been broken			

Poor Structure Trimmed Around Light

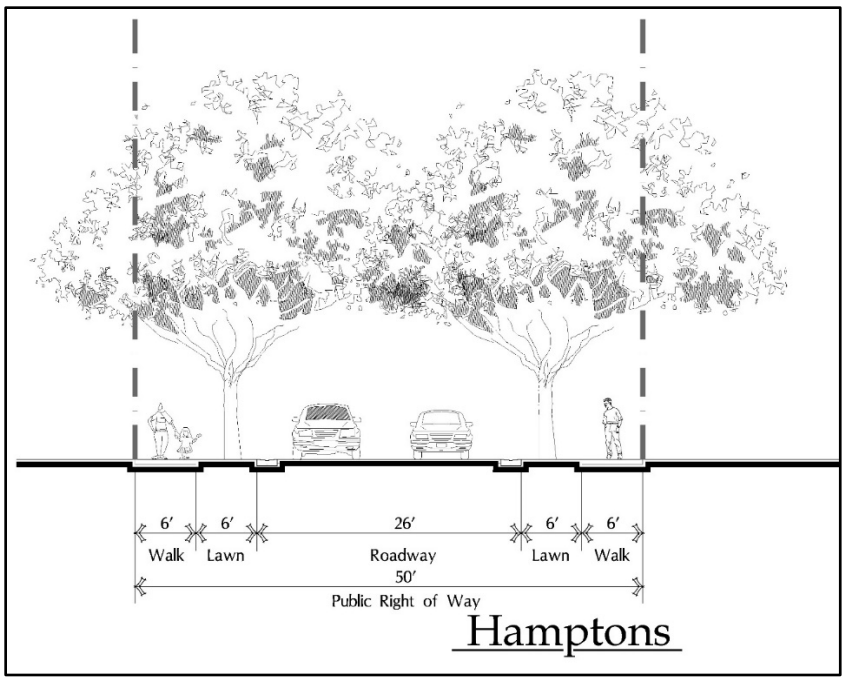
Poor Structure Trimmed Around Light

Lifted Mailbox Concrete Pads

Broken & Repaired Irrigation

Poor Structure/Trimming

Less Damage to walks due to no driveway and Open Space beyond walk



Large Open Areas where trees were removed. Small trees and/or Palms recommended as replacement.

POTENTIAL SOLUTIONS:

1. Remove trees which will be an on-going problem (fixing sidewalk more than one time).
2. Add small or medium trees in areas where the trees come out. The spacing will not be the same due to the stump so the replacement may not be 1-to-1.
3. Encourage the planting of the cul-de-sac with no trees. A single Sabal Palm, 15 to 20 feet on-center, in the narrowed green space will add character to an area with no canopy.
4. Plant replacement trees further away from light poles.
5. Replacement trees near mailboxes should be palms or small trees.

New Haven in Abacoa

New Haven is approximately twenty years old. The oaks have large canopies and the road is extra wide for parking. There are limited bulb-outs along the parallel parking. This means that the majority of the sections have 5’ tree lawns. The trees don’t do as well when they are on the side of buildings. Even when planted in the 5’ tree lawn, trees do better up against open area and recreation parcels.

Haven neighborhood.

	New Haven			
Year Built	1999-2001			
Bldg Type	Single Family and Townhouse			
Appx. Percent Tree Cover	57%			
Green Lawn Typ. Width	5'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	16-24"	25-30'	60-80'
	Silver Buttonwood	3-4"	10-12'	30'
	Green Buttonwood	8-12"	20+	30'
	Sycamore	8-16"	20-26'	60-70'
	Magnolia	6-12"	16-22'	60'
Tree Quality	Good health, good shape, some circling roots			
Tree Canopy Issues	Touching			
Side Walk Condition	Minor Lifting			
Lighting	Low light (about 10' height) far from trees			
Utilities				

HOA Trees on Left in median
TOJ Trees on Right

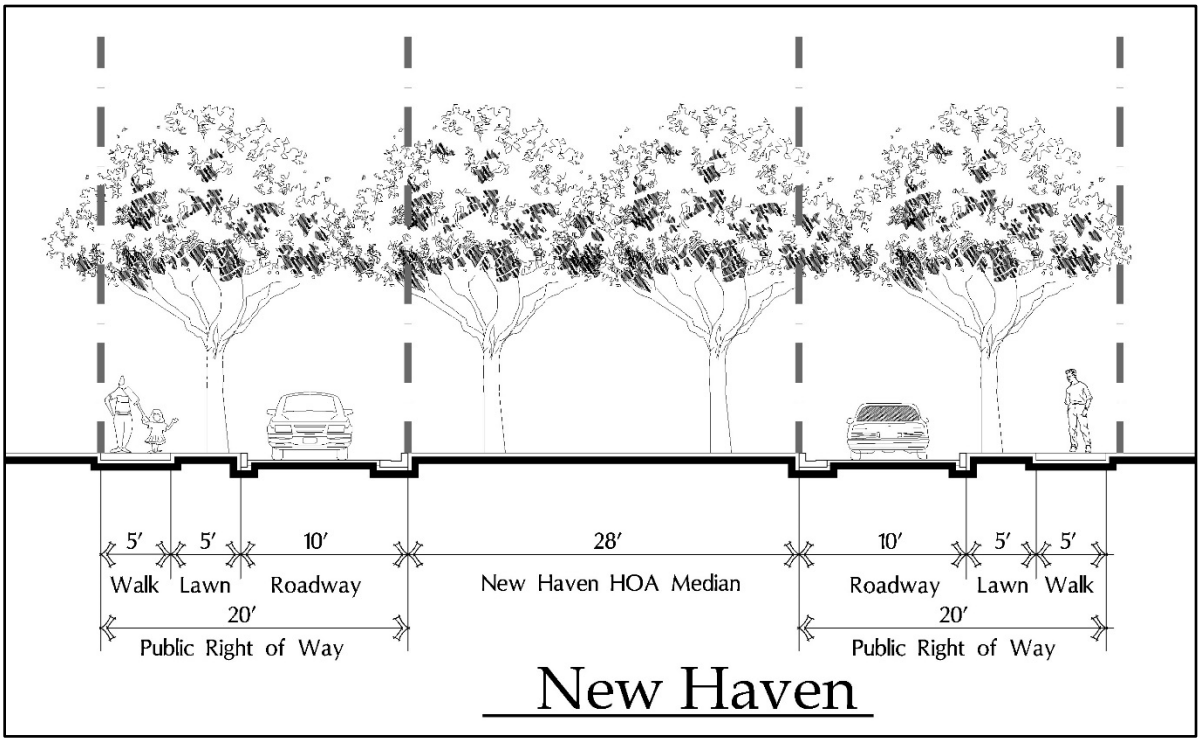
Typical Street

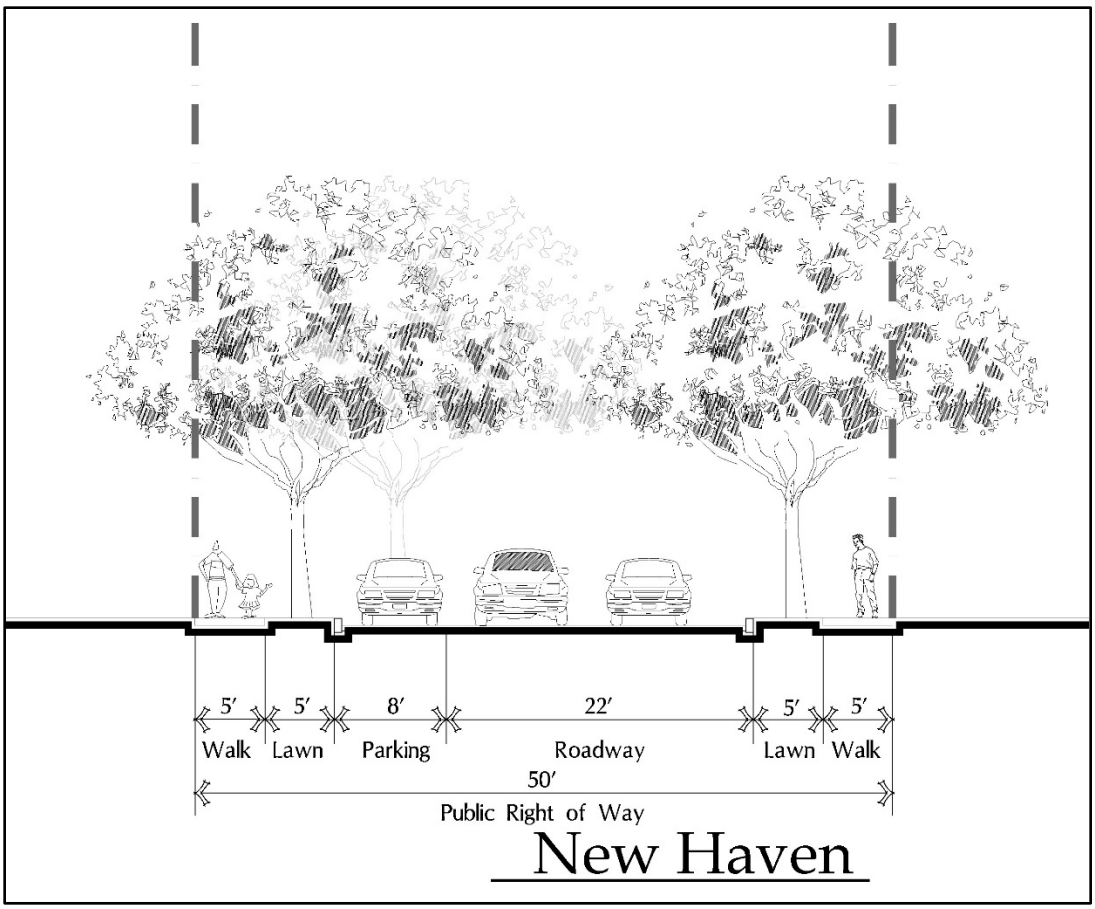
Sycamores with Preserve Beyond walk minor lifting

Circling Roots may be candidate for removal

HOA Trees on Left in median
TOJ Trees on Right

Magnolias on Right performing excellent;
Left Magnolias have poor canopy and leaf cover



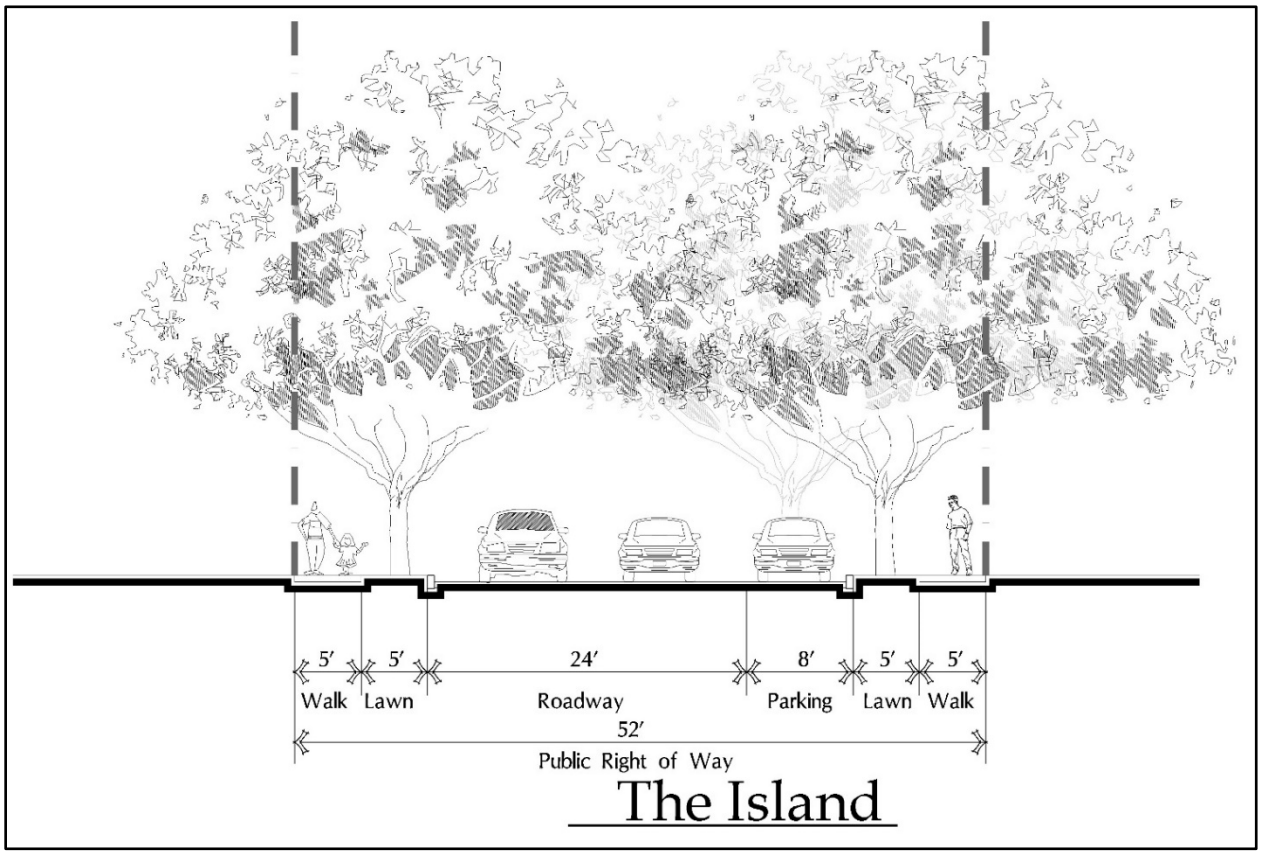


POTENTIAL SOLUTIONS:

1. Remove every other Live Oak when in front of multi- or single-family houses.
2. Replace with one or two small or medium trees for consistency in design. Multi-stem Crape Myrtle would look great.
3. Keep one out of three oak trees along the eastern native buffer.

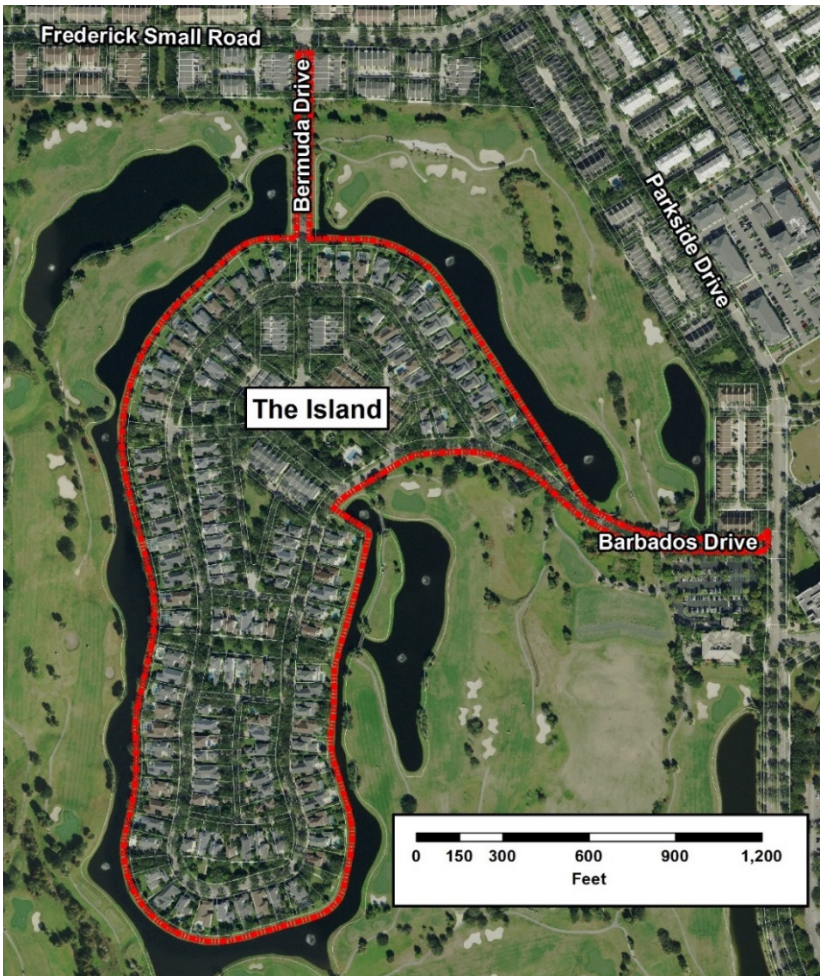
The Island in Abacoa

The Island in Abacoa is approximately twenty years old and is a mixture of townhouses and single-family residences. With garages off the one- or two-sided alleyway system, only the perimeter houses have driveways. The typical street has one- or two-sided parallel parking. The Oaks are too large for the 5' tree lawn especially with the structures being close to the road (reduced setbacks). But there are bulb-outs along parallel parking which offer a larger area for the growth of street tree roots.



Typical Street

Oak Lifting Sidewalk



	The Island			
Year Built	2000			
Bldg Type	Single Family			
Appx. Percent Tree Cover	57%			
Green Lawn Typ. Width	5'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	16-24"	25-30'	40-50'
	Magnolia	6-16"	8-20'	40-50'
Tree Quality	Good health, good shape			
Tree Canopy Issues	Interlaced			
Side Walk Condition	Lifting			
Lighting	Low light centered between trees no conflicts			
Utilities				

Magnolias performing poorly

Removed Street Tree Sidewalk being repaired

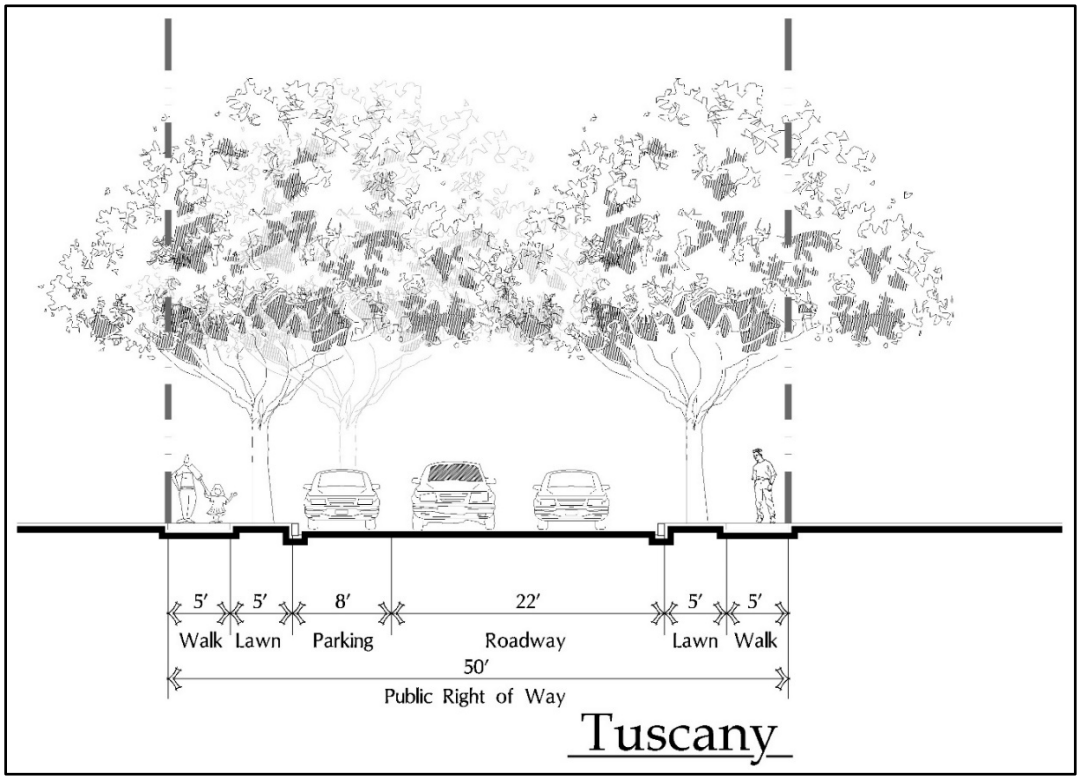
POTENTIAL SOLUTIONS:

1. Remove all Oaks that are close to structure within a 5’ tree lawn.
2. Replace at a rate greater than 1-to-1 if small or medium trees or, in limited cases, palms are utilized.

Tuscany

Tuscany in Abacoa is a mixture of townhouses and single-family houses that are arranged in a dense pattern. Garages are accessed through an alley system. The perimeter residences have driveway aprons on the street. The outer edge of the perimeter buildings have a valley gutter system. The parallel street parking is defined by bulb-outs. There are sections with one- and two-sided parallel parking along with sections of no parking.

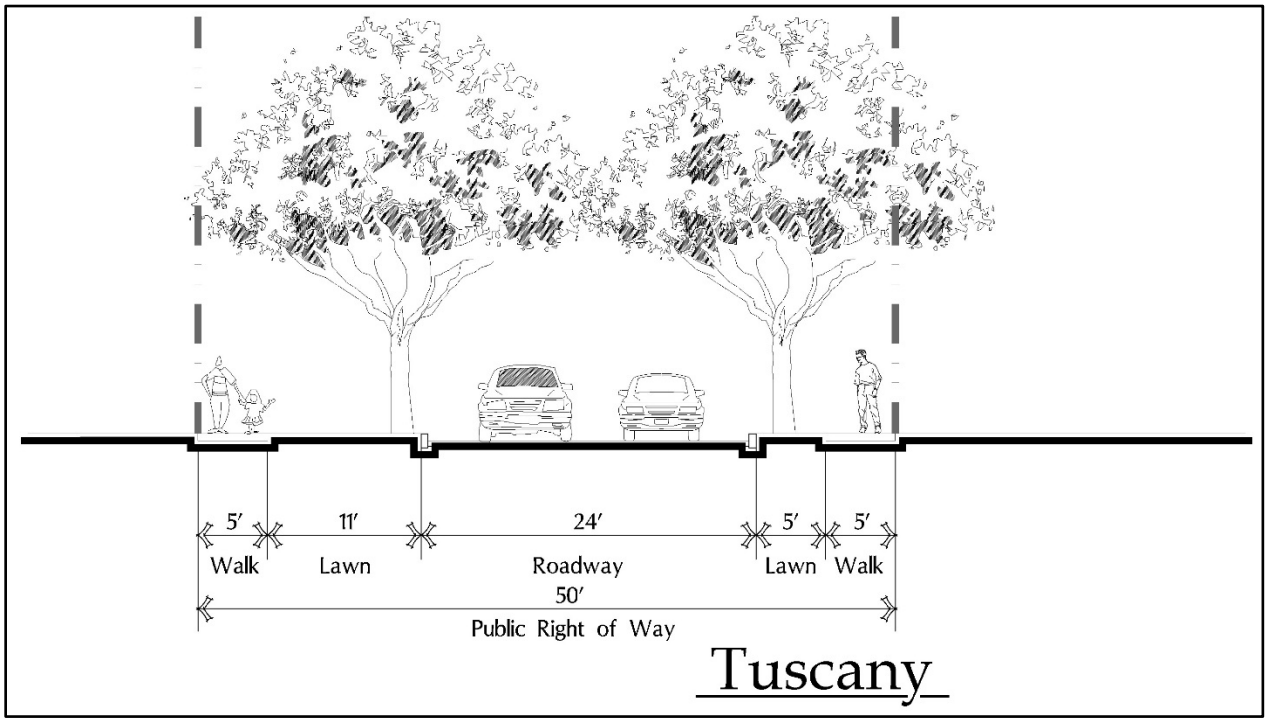
Typical Street



	Tuscany			
Year Built	2003-2004			
Bldg Type	Single Family and Townhouse			
Appx. Percent Tree Cover	51%			
Green Lawn Typ. Width	5', 11'			
Street Trees	Species	DBH	Canopy	Typ. Spacing
	Live Oak	16-20"	15-30'	40-50'
Tree Quality	Good health, good shape			
Tree Canopy Issues	Touching			
Side Walk Condition	Lifting			
Lighting	Spaced In Between Trees No Conflicts			
Utilities				

Typical Street

Trees should have been planted in center of tree lawn.



POTENTIAL SOLUTIONS:

1. Remove all Oaks that are close to structure within a 5’ tree lawn.
2. Replace at a rate greater than 1-to-1 if small or medium trees or, in limited cases, palms are utilized.

Appendix D. Suggested Tree List

Palms

Variety	Native	Spread	Formal	Informal	Issues
Adonidia Palm	**No**	8’			Too short – slow grower.
Alexander Palm	**No**	8’			Little to no presence.
Bismark Palm	**No**	25’	**Y**		Costly to get roadside clearance.
Coconut Palm “Green Malayan”	**No**	20-25’			Heavy droppings – liability.
Chinese Fan Palm	**No**	10’	**Y**	**Y**	
Date Palm	**No**	20-25’	**Y**		
Florida Thatch Palm	**Yes**	10’	**Y**	**Y**	Very slow grower – costly or unavailable.
Foxtail Palm	**No**	20’			Over used – heavy feeder.
Hurricane Palms	**No**	15’	**Y**	**Y**	Heavy feeder.
Montgomery Palms	**No**	15’	**Y**	**Y**	Heavy feeder.
Ribbon Palm	**No**	10-12’	**Y**	**Y**	
Round Palm	**No**	10-12’	**Y**	**Y**	
Royal Palm	**Yes**	25’	**Y**	**Y**	Heavy dropping – liability.
Sabal Palm	**Yes**	12’	**Y**	**Y**	

* RED – Please be advised, plants listed in red may create issues in certain situations. See notes for details.

Trees

Variety	Native	Large	Med.	Sm.	Urban Spread	Formal Form	Issues
Bald Cypress	**Yes**	X			25-30’	Yes	Potential knees affecting mowing, bare for 2 months.
Black Ironwood	**Yes**			X	8’		Very slow grower, availability limited.
Bulnesia	**No**		X		25-30’		Loose, open, yellow flowers.
Crepe Myrtle	**No**		X		20-30’	Yes	Bare 2 months.
Dahoon Holly	**Yes**		X		15’		Bad virus affecting them.
Green Buttonwood	**Yes**		X		15’		Vertical, stiff.
Gumbo Limbo	**Yes**	X			40’		Character, relatively fast growing.
Japanese Blueberry	**No**		X		20’	Yes	Heavy lower canopy may block.
Laurel Oak	**Yes**	X			50’		Does poorly in urban conditions.
Live Oak	**Yes**	X			60’		Roots.
Mahogany	**Yes**	X			50’	Yes	Stiff, does not adapt to odd situations.
Magnolia	**Yes**	X	X		40’		Heavy feeder to keep looking good.
Pigeon Plum	**Yes**		X		20’		Does not seem to be doing well.
Pink Tab	**No**		X		20’	Yes	Pink Flowers.
Pitch Apple (rosea)	**Yes**	X			60’		Heavy canopy, buttressing roots.
Red Maple	**Yes**		X		30’		Color, looses leaves for short time, untried in this area as street tree. Leaf litter.
Satin Leaf	**Yes**		X		20’		Beautiful tree, does not survive well here.
Seagrape	**Yes**	X			40’		Pruning required to get to and keep a tree specimen. Heavy leaf litter.
Silver Buttonwood	**Yes**			X	12’		Appears short lived when trimmed into trees.
Slash Pine	**Yes**	X			50’		Does not do well as urban street tree

ATTACHMENT A

Variety	Native	Large	Med.	Sm.	Urban Spread	Formal Form	Issues
Stoppers (Red, White, Spanish)	**Yes**			X	15’		Weak.
Stopper (Simpson)	**Yes**			X	15’		
Sycamore	**Yes**						
Weeping Podocarpus	**No**						

* RED – Please be advised, plants listed in red may create issues in certain situations. See notes for details.

Appendix E. Town Codes

Sec. 23-1. - Intent.

It is the intent of the town to provide for the general promotion of the health, safety, welfare, and well-being of the community by establishing rules, regulations and guidelines regarding the protection of existing vegetation, installation of native landscaping and maintenance thereof regarding all vegetation including, but not limited to, trees, shrubs, beach dune vegetation, ground cover and mangroves within the corporate limits of the town.

(Code 1992, § 23-1; Ord. No. 56-89, § II, 12-4-1990; Ord. No. 23-00, § 2, 6-6-2000)

Sec. 23-2. - Purpose.

The purpose and intent of this chapter includes the following:

(1) Provide for the appearance of setback and yard areas, vehicle use areas, open lots, and property abutting public rights-of-way within the town.

(2) Protect, preserve and promote the appearance of surrounding neighborhoods by requiring buffering between commercial, industrial and residential uses.

(3) Promote the public health and general welfare by providing for installation and maintenance of landscaping and screening to:

a. Improve air and water quality through natural processes of photosynthesis;

b. Maintain permeable land areas critical to surface water management and aquifer recharge;

c. Reduce and minimize air, noise, heat, and chemical pollution and soil erosion;

d. Promote energy conservation through the creation of shade and reduce heat gain in and on buildings or paved areas; and

e. Reduce the temperature of the microclimate through the process of evapotranspiration.

(4) Increase land values by requiring landscaping in development, thereby becoming a capital asset.

(5) Provide direct physical and psychological benefits to humans by reducing noise and glare in addition to breaking up the visual monotony and softening the perception of the urban environment.

(6) Promote an innovative and cost-conscious approach to design, installation and maintenance of landscaping, and encourage water and energy conservation.

(7) Require the removal of nuisance vegetation to ensure preservation of protected or native vegetation and ensure no disruption of native ecosystems.

(Code 1975, § 13½-2; Code 1992, § 23-2; Ord. No. 56-89, § III, 12-4-1990; Ord. No. 23-00, § 2, 6-6-2000)

Sec. 26-2. - Legislative intent.

It is the intent of the town to establish regulations governing the protection of native vegetation, including, but not limited to, trees, shrubs, beach dune cover, and mangroves, and all environmentally sensitive lands within the corporate limits of the town.

(Code 1992, § 26-2; Ord. No. 81-90, § 2, 2-19-1991; Ord. No. 24-00, § 3, 6-20-2000; Ord. No. 22-18 , § 2, 11-6-2018)

Sec. 26-3. - Purpose and intent.

The purpose and intent of the regulations in this chapter include the following:

(1) To encourage the preservation and protection of native vegetation within the town in recognition of its invaluable environmental, economic, social, educational, scientific and aesthetic functions including:

a. Absorption of carbon dioxide and production of oxygen through the process of photosynthesis;

b. Reduction or reversal of air, noise, heat and water pollution through the biological filtering capacity of living vegetation;

c. Promotion of energy conservation through the creation of shade, thereby reducing heat gain in and around buildings and paved areas;

d. Reduction of erosion by stabilizing soils and beaches;

e. Providing habitat for wildlife;

f. Serving as educational, aesthetic, historic and cultural resources;

g. Buffering and providing a transition between otherwise incompatible uses and various types of development;

h. Providing direct and increasingly important psychological and physical benefits to humans by reducing noise and glare, breaking up monotony, and softening the harsh aspects of urban development;

i. Providing habitat for protected or desirable birds or animal species (e.g., "listed species"); and

j. Protecting biological diversity.

(2) To preserve land values through incorporation of the purpose and intent of these regulations through the use of innovative site design. Vegetation increases the economic value of land through inherent aesthetic and environmental characteristics.

(3) Complements and enhances the requirements in chapter 23 and the comprehensive plan; namely, the conservation element and the coastal management element, recognizing the significance of all native vegetation, forest ecosystems, wildlife habitat, and other natural resources such as soil, water and air quality.

(4) To prevent destructive land development practices such as speculative clearcutting or grubbing properties when no bona fide site development plan has been prepared.

(5) To encourage land and forest management practices through economically feasible, environmentally sound land development practices, in conjunction with vegetation protection techniques developed by the division of forestry of the state department of agriculture and consumer services.

(6) Encourage creative site development concepts to promote water conservation by providing for:

a. Preservation of existing plant communities;

b. Re-establishment of native plant communities;

c. Increased green space or permeable ground cover area to encourage water transpiration;

d. The use of xeriscape plant species;

e. The use of shade trees to reduce transpiration rates of lower story plant materials;

f. Site development that retains stormwater runoff on-site;

g. The use of pervious paving materials; and

h. Recognition of environmentally sensitive site development concepts.

(7) To provide a level of protection for individual trees not protected through these regulations as environmentally sensitive lands.

(Code 1992, § 26-3; Ord. No. 31-85, § 1, 2-18-1986; Ord. No. 81-90, § 3, 2-19-1991; Ord. No. 24-00, § 4, 6-20-2000)

Sec. 26-121. - Supplemental tree protection requirements.

For those parcels of land not governed by the requirements of section 26-67 or section 26-68, the following regulations shall apply. Priority shall be given to preservation of existing native trees in place, followed by on-site relocation. Tree mitigation shall only be considered if preservation or relocation is not possible, or the viability or health of the existing native trees and supporting habitat makes it not practicable.

All applicants for a vegetation removal permit shall observe the following:

(1) Prior to the submission of an application, attend a pre-application meeting with the department to assess and evaluate the quantity, type (planted or naturally occurring tree) and quality of trees on the site which is the subject of the application.

(2) Submit a tree survey, signed and sealed by a state-licensed surveyor, at the time of application for all administrative development approvals, special exceptions, planned unit developments and large-scale site plan reviews, pursuant to the requirements of section 26-36(4).

(3) All naturally occurring native trees (including, but not limited to, Laurel Oak, Live Oak, Scrub Oak, Sand Pine, Sweet Bay, Red Bay, Sea Grape, Gumbo Limbo, Mahogany, and Turkey Oak) with a diameter or trunk diameter of four inches or greater, as measured four and one-half feet above existing grade, shall be preserved. Exceptions to the four inch minimum diameter or trunk size are those tree species with the minimum diameter or trunk size as set forth in Table I. below:

Table I. Minimum Preservation

Common Name	*Scientific Name*	*Trunk Size (Inches at DBH *)*
Slash Pine	Pinus elliottii	8 inches or greater
Red Maple	Acer rubrum	6 inches or greater
Cypress	Taxodium distichum	4 inches or greater
Green buttonwood	Conocarpus erectus	4 inches or greater
Dahoon	Ilex	2 inches or greater
Myrsine	Myrsine	2 inches or greater

(4) Preserve those existing trees which were identified in the pre-application meeting as warranting preservation and incorporate them into the site plan. The trees identified for preservation shall be protected during construction. Emphasis shall be given to the preservation of designated historic and specimen trees pursuant to section 26-122, significant groupings of native trees, trees adjacent to public rights-of-way and trees with a DBH of 28 inches or greater. Existing trees that cannot practicably be preserved in place on the site shall, with the approval of the director of the department of planning and zoning, be relocated to one of the following areas, listed in order of the town's preference: buffers, other green space areas, or interior landscaping areas. As determined by the town, all suitable coniferous trees and all suitable nonconiferous trees shall be relocated on-site and incorporated into the landscape plan, to the greatest extent practicable. Trees suitable for relocation shall be determined by the town staff at or prior to the time of application for a vegetation removal permit. All relocated trees shall be planted in accordance with good horticultural practices as outlined in Your Florida Landscape, published by the University of Florida, Institute of Food and Agricultural Sciences, on file with the town. One hundred percent of the relocated or installed material shall remain alive. Vegetation which expires as a result of relocation or of construction activities on-site, shall be replaced with similar species within 30 days of their expiration. Based on availability, replacement material for expired vegetation shall be of the same size subject to the approval of the director.

(5) Should it be determined by the director that a specific naturally occurring or planted tree cannot be preserved on site, or that it is not practical to do so without adversely affecting the viability or health of the tree, on-site tree mitigation shall be allowed in accordance with the following tree credit/replacement table:

Table II. Tree Credit Replacement Table

Existing Tree's DBH	Naturally Occurring Trees	
	Credits for On-site Preservation/Relocation/Replacement OR Number of Trees Required to Replace a Removed Conifer (Cypress Excluded)	*Credits For On-site Preservation/Relocation/Replacement OR Number of Trees Required to Replace a Removed Non-Conifer*
2—5 inches	0	4
6—7 inches	0	6
8—11 inches	2	7
12—15 inches	3	8
16—19 inches	4	10

20—23 inches	5	11
24—27 inches	6	12
28 inches or greater	Shall be preserved in place unless determined by the town council that preservation in place would place an undue hardship or financial burden on the development of the site.	
[Existing Tree's DBH]	*Planted Trees*	
	Credits for On-site Preservation/Relocation/Replacement OR Number of Trees Required to Replace a Removed Conifer (Cypress Excluded)	*Credits For On-site Preservation/Relocation/Replacement OR Number of Trees Required to Replace a Removed Non-Conifer*
2-5 inches	0	2
6-7 inches	0	3
8-11 inches	1	4
12-15 inches	2	4
16-19 inches	2	5
20-23 inches	3	6
24-27 inches	3	6
28 inches or greater	Shall be preserved in place unless determined by the town council that preservation in place would place an undue hardship or financial burden on the development of the site, or in accordance with subsection d. below.	

a. To the greatest extent possible, mitigation shall be like species for like species, i.e., when a slash pine tree is removed, a slash pine tree shall be replaced. In the event that replacement of like trees for like trees is not feasible, the director of the department of planning and zoning shall have the authority to approve alternative species.

b. Existing trees preserved on-site or relocated within the site shall be given credit (as provided in the tree credit/replacement table) towards the tree requirements of chapter 23, except that tree credits shall not be used to eliminate trees required in a landscape buffer located along a road right-of-way or waterway, nor to eliminate trees required in a screening buffer adjacent to a residential use or zone.

c. The director of the department of planning and zoning, or his designee, shall make a determination as to the quality of each tree required to be preserved, relocated or mitigated in accordance with these regulations. Any tree determined to be alive but severely damaged, diseased or malformed such that it cannot fulfill the functions and values typically expected of that species, shall be mitigated at half the number of credits required in Table II.

d. The director of the department of planning and zoning, or his designee, may make a determination as to whether a planted tree with a diameter at breast height (DBH) of 28 inches or greater may be removed, with the number of mitigation trees required being equivalent to a 24 to 27 inch tree of the same category, based on the following criteria:

1. The tree is causing damage to infrastructure that cannot be practicably remedied through other means including, but not limited to, alternative sidewalk materials, root pruning and root barrier installation, and/or sidewalk relocation;

2. There is inadequate space for planting a replacement tree of the same species;

3. Replacement of the tree with the same species would conflict with existing structures or infrastructure.

(6) All native trees/vegetation located within ten feet of any mangrove species shall be preserved.

(7) In the event the director of the department of planning and zoning determines that trees cannot be preserved on-site, relocated within the site, or mitigated with replacement trees, an applicant shall contribute the sum of $450.00 for each replacement tree required as mitigation for a tree the director of the department of planning and zoning has determined cannot be preserved on-site. These funds shall be placed into a separate town account designated for planting trees on public lands, rights-of-way, or other areas within the town which are part of an adopted neighborhood strategic plan. With the approval of the director of the department of planning and zoning, an applicant may also donate the required mitigation trees for incorporation into the town's parks, preservation areas, or other areas within the town which are part of an adopted neighborhood strategic plan, which would satisfy all or a portion of the mitigation requirements provided for in section 26-121(5) and (6). However, all costs associated with the proper removal, transportation, and replanting of any donated vegetation shall be the responsibility of the person making the donation.

(8) All replacement trees shall be at least 12 feet in height and two inches diameter. All plant materials shall meet the minimum standards of Florida Number One or better as represented in Grades and Standards for Nursery Plants, published by the state department of agriculture and consumer services, on file with the town.

(9) Street trees may be removed and replaced, if the director determines that the tree is damaging the infrastructure in the immediate proximity of the tree and that the infrastructure cannot be remedied by the use of alternative sidewalk materials, root pruning, root barrier installation, and/or sidewalk relocation. Should the director determine that a tree must be removed based on specific site conditions, the trees removed shall be replaced on a one-for-one basis, giving preference to the same species. In the event that specific site conditions are constrained and the director determines that the planting of a replacement tree of the same species is not practicable, the following criteria shall be followed:

a. Replacement with an alternative species is permitted where the director finds:

1. There is inadequate space for planting a replacement tree of the same species;
2. Replacement of the tree with the same species conflicts with existing structures or infrastructure;
3. The alternative species selected is consistent with the species which exist throughout the immediate area;
4. The alternative species selected for replacement do not impact the existing canopy coverage and would not result in a significant loss of shade.

b. Removal without replacement:

1. The criteria for replacement with an alternative species set forth above cannot be met;
2. Replacement of the tree would conflict with existing structures or infrastructure;
3. There is inadequate space for replacement for a tree or palm to thrive;
4. Removal does not impact the existing canopy coverage and will not result in a significant loss of shade.

(Code 1992, § 26-96; Ord. No. 81-90, § 10, 2-19-1991; Ord. No. 24-00, § 21, 6-20-2000; Ord. No. 47-01, § 2, 2-19-2002; Ord. No. 22-18 , § 4, 11-6-2018)

E. Comprehensive Plan

CONSERVATION ELEMENT:

Goals, Objectives and Policies

Goal 1: ***To conserve, protect and enhance the functions and values of the natural resources within Jupiter to ensure the highest environmental quality possible.***

Environmentally Sensitive Areas

Objective 1.1 To implement a program and a set of standards to protect environmentally sensitive areas from adverse impacts of urban development.

Policy 1.1.1 The Town shall maintain, periodically review and update the Vegetation and Environmental Preservation ordinance.

Policy 1.1.2 At a minimum, environmentally sensitive areas shall contain one or more of the following natural resources:

a) rare, threatened and endangered wildlife and vegetation,. A complete list is defined by U.S. Fish and Wildlife Service, Florida Fish and Wildlife Conservation Commission, Treasure Coast Regional Planning Council, Florida Endangered Plant Advisory Council, Palm Beach County and the Florida Department of Environmental Protection (DEP);
b) rare and unique upland habitat;
c) wetlands and deepwater habitats;
d) special geologic formations;
e) artifacts of archaeological or historic significance;
f) within public water supply system wellfield cone(s) of influence;
g) within floodways and areas subject to flooding; and
h) designated as a wild and scenic river by the Federal government.

Policy 1.1.3 In addition to the other conservation policies, any proposed development in an area designated as environmentally sensitive shall adhere to the following guidelines:

a) Proposed development projects that are situated in a defined environmentally sensitive area must submit, as part of the site plan review process an environmental assessment report which contains at a minimum:
   1) an inventory of existing vegetation and wildlife based on a field survey;
   2) an identification of wildlife or vegetation listed as endangered, threatened or species of special concern and whether or not the environmentally sensitive area potentially will attract and support off site species and wildlife use;
   3) an assessment of the land identifying the location of all environmentally sensitive habitat or vegetation;
   4) an analysis of the functional viability and quality of the various habitats;
   5) a discussion of the impacts, both positive and adverse, on the resources;
   6) a discussion concerning whether there is any irreplaceable or irretrievable environmental damage,
   7) a mitigation plan that describes actions to be taken to replace those functions and values of the

ecological community(s) lost as a result of developing the land.

8) A maintenance and management plan which shall be submitted and approved for all environmentally sensitive areas and/or mitigation sites proposed, and shall at a minimum address the following:
   a. Areas designated environmentally sensitive shall be identified and mapped on the approved site plan.
   b. Maintenance schedules and methodologies for the removal of exotic and invasive species.
   c. Wildlife enhancement provisions, including the installation of food sources, shelter, nesting and roosting facilities, etc., and the survivability of the habitat preserved.

Policy 1.1.4 The Town supports the protection of environmentally sensitive lands by using the Jupiter Open Space Program to evaluate and purchase of properties or other means, such as conservation easements among others, for their long term protection.

Policy 1.1.5 The Town shall submit applications for eligible projects whenever appropriate, under the Florida Communities Trust matching land acquisition funding program to leverage land acquisition program monies.

Objective 1.2 To cooperate with and assist the South Florida Water Management District (SFWMD) and the Department of Environmental Protection (DEP) in protecting and preserving the Loxahatchee Slough/River Corridor to ensure that the quality of freshwater and estuarine water is maintained at current levels or improved as determined by the SFWMD and the DEP using DEP established criteria for water quality classifications as reported in Chapter 17-3, F.A.C.

Policy 1.2.1 The Town will continue to require adequate conservation buffers for properties adjacent to the Loxahatchee Slough/River Corridor. If properties located within the Corridor are annexed into the Town, these properties will be assigned with a Conservation land use designation.

Policy 1.2.2 Uses allowed within the Conservation future land use designation shall be limited to those which are compatible with and preserve the natural character of the area, such as passive recreation, observation areas, hiking and nature trails, canoeing, primitive camping and environmental education facilities. Active recreation uses, such as playing fields, tennis courts, etc. shall be prohibited. All residential, commercial, industrial and community service uses shall be prohibited.

Policy 1.2.3 The Town shall monitor and maintain public access to the river corridor so that the environmental values of the system can be enjoyed, but not overburdened, by users.

Policy 1.2.4 The Town shall participate with the South Florida Water Management District, Palm Beach County, Jupiter Inlet District, Loxahatchee River District and other appropriate agencies to re-establish the historic hydrologic connections between the three segments of the corridor.

Policy 1.2.5 The Town, coordinating with the South Florida Water Management District (SFWMD) and the Florida Department of Environmental Protection (DEP), as appropriate, shall continue to maintain land development regulations for protecting all aspects of the Loxahatchee River corridor from incompatible land development. Such regulations shall be consistent with and further the "Loxahatchee River National Wild and Scenic River Management Plan" (June 2000, as may be amended) as adopted by the SFWMD and DEP.

Policy 1.2.6 All applications for proposed amendments to the Town's Future Land Use Map involving property abutting the Loxahatchee River corridor shall be transmitted to South Florida Water Management District and the Florida Department of Environmental Protection, as appropriate, for review and comment before formally being reviewed by the Town Council.

Policy 1.2.7 Subsurface water wells which adversely affect existing water users within the Loxahatchee River Corridor or would extend a zone of influence into the defined limits of the Loxahatchee River Corridor are prohibited.

Policy 1.2.8 A buffer of at least 100 feet shall be established along all portions of private property abutting portions of the Loxahatchee River identified by the Federa1 designation "Wild and Scenic" and a buffer of at least 25 feet shall be established along all portions of private property abutting the Loxahatchee River Corridor within the Town of Jupiter. Development applications for individual sites shall include an environmental assessment prepared by a qualified environmental scientist, engineer, biologist or ecologist. The assessment shall include specific recommendations, and supporting justification, for the establishment of appropriate buffer width to protect the corridor. The assessment shall identify properties possessing significant environmental, natural resources, topographic, and similar characteristics relating to the corridor. In the event of disturbance to properties abutting the corridor, the assessment shall include recommendations regarding the re-establishment of vegetative communities, drainage patterns, topographic features, and related improvements to provide protection to the corridor.

Policy 1.2.9 Within all buffers established for protection of the Loxahatchee River Corridor, all exotic plants shall be removed and maintained free of exotics. For the purposes of this policy, the term "exotic vegetation" shall include all plants listed as Category 1 on the Florida Exotic Pest Plant Council's list of invasive species.

Policy 1.2.10 Fences, walls, and similar barriers shall not be installed in a manner to separate the corridor from adjacent preserve or buffer areas. Fences, walls, and similar barriers may be installed as a means to limit or eliminate public access into the corridor and associated preserve or buffer areas. Secured access, as requested by the appropriate corridor management agency, shall be provided by owners of property abutting the corridor.

Policy 1.2.11 All properties directly abutting the Loxahatchee River Corridor and used for nonresidential purposes shall develop and implement a hazardous waste management and disposal plan. The hazardous waste management and disposal plan shall be consistent with all federal,

state, regional, water management district, and county requirements.

Policy 1.2.12 All properties directly abutting the Loxahatchee River Corridor and used for residential and nonresidential purposes shall develop and implement an overall stormwater management plan. The stormwater management plan shall be consistent with all federal, state, regional, water management district, and county requirements. The stormwater management plan shall maintain the classification of the Loxahatchee River, Loxahatchee Slough, and associated wetland systems in a manner consistent with state legislative and administrative requirements. The stormwater management facilities constructed pursuant to the overall plans shall ensure ground water and surface water inflow shall not degrade the existing water quality or hydrology of water-dependent ecological systems within the corridor, including the Loxahatchee River, the Loxahatchee Slough, and associated wetlands.

Policy 1.2.13 The Town shall continue to enforce the provisions of the Palm Beach County Wellfield Protection Ordinance (Ordinance No. 88-7) within all areas immediately adjacent to the corridor.

Groundwater Resources

Objective 1.3 The quality and quantity of the Town's groundwater shall be maintained at current levels as determined by the Department of Environmental Protection using DEP established criteria for water quality and quantity classifications as reported in Chapter 17-3, F.A.C.

Policy 1.3.1 The Town will continue to monitor the quality and quantity of its groundwater resources to insure that the long-term withdrawal of water does not exceed the system's ability to recharge or replenish itself naturally.

Policy 1.3.2 All proposed new development or modified existing development within the Zones of Influence as defined in the Palm Beach County Wellfield Protection Ordinance shall be subject to the Conditional Approval process until such time that all the appropriate development regulations have been brought into compliance with the Wellfield Protection Ordinance.

Policy 1.3.3 New potable water wells and wellfields shall be located in areas where no regulated materials (e.g., hazardous or toxic materials) will be used, handled, stored or produced within the projected zones of influence of such wells or wellfields. At the time future wellfield locations are identified, establishment of incompatible land uses within the zones of influence of such wells or wellfields shall be prohibited.

Policy 1.3.4 The Town will continue to withdraw from the Floridian Aquifer and use reverse osmosis water treatment.

Policy 1.3.5 New development whose anticipated non-potable water consumptive use is expected to be significant shall make application to the Loxahatchee River District or the Seacoast Utility Authority for the purchase of I.Q. water. Existing development with major non-potable water uses, e.g., golf course irrigation, shall be encouraged to enter into contract with the Loxahatchee River District or Seacoast Utility Authority to purchase irrigation

(I.Q.) water in order to reduce non-potable water demands on the surficial aquifer.

Policy 1.3.6 The Town will maintain its Water Shortage Conservation Program, and will review it every five years to assure that the ordinance remains current with changing technology and regulations.

Policy 1.3.7 The Town shall require water saving devices, e.g., irrigation systems, plumbing fixtures, be installed in all new developments. Existing homes not containing such devices are encouraged to retrofit such systems.

Policy 1.3.8 The Town supports and will continue to implement the utilization of water from the C-18 Canal for the purpose of maintaining adequate water levels in lake systems adjacent to Town's wellfields in order to protect them from salt water contamination.

Policy 1.3.9 To encourage the conservation of potable water the Town shall maintain and periodically update measures that discourage excessive use of potable water.

Policy 1.3.10 Utilize the concept of planned unit type and cluster development in an attempt to provide maximum open space and promote recharge.

Policy 1.3.11 All wetlands located in direct recharge area shall be retained and preserved.

Policy 1.3.12 To promote recharge, the Town supports lake management plans that maintain historical groundwater levels.

Policy 1.3.13 Within 18 months of the adoption of SFWMD's 10-year Lower East Coast Regional Water Supply Plan update and any future updates to the Plan, the Town shall amend its Infrastructure Element to consider the District's plan updates. These updates will include the following:

a) The Town's 10-year water supply plan;
b) Identification of adequate water supply sources to meet future demand;
c) Identification of alternate water supply projects.

Policy 1.3.14 The Town's Utility Department shall continue to update and implement the recommendations of the Water System Master Plan and inclusive 10-year Water Supply Facilities Work Plan, which shall assess projected water needs and sources for at least a 10-year planning period while considering the SFWMD's Lower East Coast Regional Water Supply Plan.

Surface Water Resources

Objective 1.4: The quality of the Town's surface water shall be maintained at appropriate levels as determined by the Department of Environmental Protection using DEP established criteria for water quality classifications as reported in Chapter 17-3 F.A.C.

Policy 1.4.1 The Town's stormwater management practices shall be directed by the Stormwater Management Plan.

Policy 1.4.2 The Town shall require new development to preserve permanent open space buffer zones of natural vegetation along waterways and within the floodplain.

Policy 1.4.3 The Town shall maintain and periodically update its Stormwater Management Plan.

Policy 1.4.4 The Town will maintain active membership on the Loxahatchee River Management Coordinating Council, and the Treasure Coast Regional Planning Council.

Policy 1.4.5 The Town supports the Loxahatchee River Management Plan.

Policy 1.4.6 Runoff from streets and yards should be carefully controlled to prevent flooding in adjacent areas or pollution of water bodies. Catchment basins should be constructed at storm sewer outfalls to prevent silt and other pollutants from entering water areas. French drains, properly engineered, will be considered an acceptable stormwater runoff drainage practice. The Town will continue its program of upgrading the drainage systems of each basin, and will give priority to those areas with the most severe problem.

Policy 1.4.7 Commercial shoreline development should be restricted to those activities that require a waterfront location.

Policy 1.4.8 Parking facilities should be located away from the bodies of water and their runoff controlled.

Policy 1.4.9 The Town shall require unique environmental characteristics be incorporated into the overall site design.

Policy 1.4.10 Coastal bulkheads should only be allowed when an environment for native vegetation is provided waterward of the bulkhead for at least 50 percent of the shoreline. Existing coastal bulkheads in need of repair may be replaced.

Policy 1.4.11 Coastal bulkheads should be located at, or landward of, coastal wetlands and their ecotones.

Policy 1.4.12 Sloping revetments, riprap, native vegetation including but not limited to mangroves, or interlocking blocks or some combination of the foregoing, shall be used in high energy areas to more effectively dissipate wave forces, boat waves and reduce the effects of bottom scouring.

Policy 1.4.13 Land development activities that are feasible only through dredging and filling of submerged and wetland areas shall be prohibited unless permitted by the appropriate federal or state agency or has been properly mitigated as determined by an appropriate federal or state agency.

Policy 1.4.14 Buffer zones of vegetation should be established between any area of urban development and adjacent waterways.

Policy 1.4.15 Waterway connections to open water should be located to minimize adverse environmental impact. Avoid connections that disrupt wetlands, marine grasses and shellfish beds.

Policy 1.4.16 Approved upland waterway construction should be done in the dry, if possible, so that shaping and stabilization of the banks can be completed before the "plug" is removed for connection to open waters.

Policy 1.4.17 New artificial waterways are discouraged.

Policy 1.4.18 Dredging for navigational access or flood control should be planned to prevent unnecessary channels. In areas

having shallow water shorelines, peripheral canals on the upland, leading to a central navigational channel, should be considered rather than separate access channels for each waterfront landowner.

Policy 1.4.19 All dredging spoil material should only be placed on suitable upland areas. Where feasible, sandy spoil should be used for dune construction and restoration projects.

Policy 1.4.20 Effective turbidity control mechanisms and procedures should be used to protect water quality in areas adjacent to construction activities.

Policy 1.4.21 Docks and piers should not obstruct navigation or public use of waters, and they should be constructed in a manner that does not restrict water flow, nor block views to the water.

Habitats & Wildlife

Objective 1.5: To protect and conserve all ecological communities and wildlife, especially endangered and rare species, for present and future generations

Policy 1.5.1 Protection and management of wetland and deepwater habitats shall be in a manner consistent with the adopted policies of the Treasure Coast Regional Planning Council, and the South Florida Water Management District, as well as, the Loxahatchee River Aquatic Preserve Management Plan, and the Loxahatchee River Management Plan.

Policy 1.5.2 The Town will continue to encourage the re-establishment of wetlands in previously drained areas where feasible, and will encourage future development and use of wetlands only for purposes which are compatible with their natural values and functions.

Policy 1.5.3 The Town will encourage site planning and development practices that conserve wooded areas by minimizing damage or destruction to trees and maximizing the design opportunities presented by native vegetation.

Policy 1.5.4 The Town will require new developments to install no less than 50% of the landscape in native vegetation. Vegetation includes not only shrubs and trees, but also grasses.

Policy 1.5.5 The Town shall maintain land development regulations that require all development to set aside through selective clearing and other construction activity, as a minimum, 25 percent of the native plant community which occurs on- site.

Policy 1.5.6 New transportation and utilities development should take place, to the extent possible in existing rights of way, in areas that avoid wetlands and ecotones and areas of historic and scenic value. Where wetlands cannot be avoided, bridging rather than filling should be utilized to the maximum degree feasible.

Policy 1.5.7 All slopes, cuts and fills should be stabilized immediately with vegetation or other effective means in order to prevent unnecessary erosion. Natural vegetation should be retained whenever possible.

Policy 1.5.8 Protection of 25 percent of each native plant community which occurs on-site may be reduced only if the native plant community types are determined not to be rare or endangered. Reduction may be approved only in exchange for

increased conservation of native plant types which are rare. In cases where plant types are considered to be rare or endangered increased conservation of these plants may be encouraged by providing an incentive. One unit of rare or endangered plant habitat for two units of common habitat.

Policy 1.5.9 Site clearing, vegetation removal and/or building demolition shall be phased concurrent with construction activity to minimize soil erosion and generation of airborne dust. Construction practices such as seeding, wetting and mulching which minimize airborne dust and particulate emission generated by construction activity shall be undertaken within sixty (60) days of completion of clearing work. Building construction will occur not later than thirty days after vegetation removal and site clearance.

Policy 1.5.10 Landscaping should utilize native species that are adapted to soil, water and temperature conditions of the area. No less than 50% of the vegetation shall be native. This allows ground cover without introduction of fertilizers, pesticides and other potentially harmful materials that are often necessary for survival of non-indigenous plants. Many times native plants can be salvaged before development occurs and later used for landscaping. To the extent possible, native trees and shrubs located within buildable areas shall be relocated and used on the site.

Policy 1.5.11 Wetlands shall be protected by all development, unless proven to be of overriding public interest and/or determined to be an isolated, non-functioning or a diminishing system by the appropriate jurisdictional agency.

Policy 1.5.12 Any development that does occur in wetlands shall take special care to avoid unnecessary ecological or hydrological damage to the area. Development that occurs adjacent to wetlands shall be designed and developed in a manner that has no negative impact on the wetland and associated systems.

Policy 1.5.13 Wetlands shall have a development potential of ½ dwelling unit per acre, with density transferred to the adjacent non-wetland area of the site.

Policy 1.5.14 Submerged lands shall receive no density allocation.

Policy 1.5.15 In cases where it appears ownership of land extends into waters of the state, ownership of those submerged lands must be established prior to seeking a development order.

Policy 1.5.16 A buffer zone of native upland edge (i.e., transitional) vegetation shall be provided and maintained around wetland and deepwater habitats which are constructed or preserved on new development sites. The buffer zone may consist of preserved or planted vegetation, but shall include canopy, understory and ground cover of native species only. The edge habitat shall begin at the upland limit of any wetland or deepwater habitat. As a minimum, ten square feet of such buffer shall be provided for each linear foot of wetland or deepwater habitat perimeter that lies adjacent to uplands. This upland edge habitat shall be located such that no less than 50 percent of the total shoreline is buffered by a minimum width of ten feet of upland habitat.

The upland buffer requirement does not apply to those created deepwater habitats (e.g., stormwater management ponds) less

than one-half acre in size nor to drainage canals or stormwater conveyance requiring periodic maintenance.

Policy 1.5.17 Development of non- wetland areas shall preserve a minimum of 25% open space.

Policy 1.5.18 Land that is environmentally sensitive shall be preserved for the purposes of open space, passive recreation uses, traffic mitigation, flood protection and environmental enhancement.

Policy 1.5.19 The Town's Department of Planning and Zoning shall review proposals for developments that are adjacent to environmentally sensitive lands for possible adverse effects to these lands.

Policy 1.5.20 All nuisance and invasive exotic vegetation defined as Category 1 by the Florida Exotic Pest Plant Council shall be removed and replaced with native plant species adapted to existing soil and climatic conditions. Removal shall be in a manner that avoids seed dispersal by any such species. Planting of invasive exotic vegetation shall be prohibited. On privately owned land implementation shall occur at the time of development or redevelopment. On publicly owned land implementation shall occur at the time of development or as soon as possible. It should be noted that private environmental groups may voluntarily implement this work as an organized project. In all cases, implementation shall be consistent with the overall objective of protecting the functions and values of native habitats. All lands shall be maintained exotic free.

Flood Prone Areas

Objective 1.6: To protect the surface and ground water supply, prevent erosion and prevent the loss of life and property through the restriction of building in the flood zone areas, the Town shall continue to enforce its adopted Flood Zone Ordinance and shall maintain requirements.

Policy 1.6.1 No development will be approved in flood hazard areas and floodways, that is, on land immediately adjacent to major drainage and receiving streams, rivers or low areas which are known to be subject to flooding or rushing water and which therefore, create a hazard to life and property. Rather, the Town will encourage that these lands be reserved for conservation, open space, and recreation.

Policy 1.6.2 The Town shall prevent and regulate the construction of flood barriers which will unnaturally divert flood hazards to other lands.

Policy 1.6.3 Filling, grading and mineral extraction within the 100-year flood prone area is prohibited unless it can be proven that there will be no increase in flood hazards to other lands, and it is being accomplished in the public interest.

Air Quality

Objective 1.7 To maintain air quality standards at current or improved levels as determined by the Department of Environmental Protection using DEP established criteria for air quality classifications.

Policy 1.7.1 In accordance with Section 163.3202, F.S., the Town shall continue to maintain land development regulations to

provide for fuel saving techniques such as promoting car pooling, public transit, bicycling, traditional neighborhood design, pedestrian walkways and Transit Oriented Developments.

Policy 1.7.2 The Town shall maintain, and amend as necessary, the adopted Bicycle Transportation Master Plan, to reduce reliance upon automotive travel.

Policy 1.7.3 By the time the Town revises its development codes, it shall have studied and identified those uses that should be treated as special exceptions.

Policy 1.7.4 Vegetation and buffering along major trafficways shall be required.

Policy 1.7.5 The removal of natural vegetation shall be timed such that it will occur only to those areas in which construction is anticipated during the succeeding three (3) months.

Hazardous Waste

Objective 1.8 The Town will continue to maintain a contract with Palm Beach County to address a hazardous waste management program for the inventory, storage, recycling, collection and disposal of hazardous waste.

Policy 1.8.1 The Town should require notification of hazardous waste generation, handling or storage as part of the occupational license application procedure.

Policy 1.8.2 The Town should cooperate with the County in implementing and maintaining an emergency hazardous waste response program.

Policy 1.8.3 The Town should require automobile service stations to accept waste motor oil and lead acid batteries for subsequent recycling.

Policy 1.8.4 The Town should cooperate with Palm Beach County in sponsoring Amnesty Days to collect household hazardous waste for proper disposal.

Policy 1.8.5 Commercial mining within the jurisdictional limits of the Town is prohibited.

Greenways and Blueways

Objective 1.9 Provide a linked open space program for the conservation of greenways, blueways (water corridors used for conservation or recreation), and wildlife corridors that serve as connections to environmentally significant lands and conservation areas.

Policy 1.9.1 Provide incentives which encourage developers to provide linkages and connections between conservation areas and environmentally significant lands through buffers and upland set asides.

Policy 1.9.2 The Town shall preserve environmentally significant land and wildlife habitat areas using the Jupiter Open Space Program or other opportunities, to support endangered species, threatened species and species of special concern as part of a linked open space network, in order to ensure the survival of species which would otherwise be jeopardized by isolation.

Policy 1.9.3 Amend the Town Code to make consideration of greenways and

wildlife a component of the development review and approval process.

Policy 1.9.4 Allow for off-site mitigation to create greenways and to enhance existing greenways as noted on the Town's Blueways and Greenways Map.

Policy 1.9.5 The Town's Blueways and Greenways Map should be used to guide the future acquisition of property or dedication of easements to establish new blueway and greenway connections or to enhance the existing blueways and greenways.

Green Design

Objective 1.10 To encourage and promote effective green design theories and techniques for new development, redevelopment and infill projects including sustainable site development, water efficiency (including stormwater runoff), energy efficiency, sustainable material selections (including alternate paving materials to reduce heat island effects), urban agriculture and improved indoor environmental quality.

Policy 1.10.1 The Town shall maintain and amend as necessary land development regulations to promote and support green design theories and techniques, and which provide incentives for same.

Policy 1.10.2 By December 2019, the Town will strive to upgrade its current Florida Green Building Coalition "Florida Green Local Government Silver Certification" to a Gold Certification.

Policy 1.10.3 The Town will continue to support existing farmers markets, public markets, and similar activities and encourage the development of additional markets throughout the Town to provide residents with access to fresh, local produce.

Policy 1.10.4 By December 2017, the Town will adopt land development regulations to allow community gardens at a scale that is appropriate to the Town's neighborhoods, particularly in areas that have vacant or underutilized land.