LARGO URBAN FOREST MASTER PLAN

City of Largo
Recreation, Parks & Arts

Largo, Florida

2016

DAVEY
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A Division of The Davey Tree Expert Company

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INTRODUCTION

The City of Largo recognizes the value and services provided by its urban forest, along with the need for an integrated approach to its stewardship. To this end, the city recently partnered with the Florida Division of Forestry to obtain matching funds towards financing a two-part project: an assessment of the city's existing urban tree canopy (UTC) and the development of an urban forestry master plan. Developed with Davey Resource Group, Largo's master plan reflects the results of the UTC, along with a roadmap for the long-term management and improvement of the city's tree canopy.

Like many communities, Largo is working to revitalize and re-brand itself as a vibrant network of neighborhoods. This includes reversing the perception of Largo as a "drive-through city" and navigating costly urban challenges like stormwater management, urban heat island effects, public health, and economic development. Cities across the country are now recognizing trees as low-cost, high-impact infrastructure that provide solutions to these urban challenges. However, Largo does not currently have a long-range, community-wide plan in place to manage this important infrastructure. This mark's Largo's first urban tree canopy assessment and second forestry master plan.

PART I: URBAN TREE CANOPY ASSESSMENT

Results from Largo's new UTC assessment enable the city to measure the amount and location of its tree canopy, along with other land cover including: concrete and other hard surfaces; open water; low vegetation like lawns and shrubs; and bare soil. This spatial data, now housed and owned by the city for future use, was utilized to quantify many of the services provided by Largo's existing tree canopy – which is valued at over $6.3 million annually. It also creates a measurement benchmark that can be used to track future changes and trends in the city's tree canopy.

PART II: MASTER PLAN DEVELOPMENT

UTC results were just one of the data sources utilized in the second phase of this effort: the development of Largo's urban forestry master plan. An urban forestry master plan involves an assessment of the existing urban forest, definitions of a future vision and mission, and the development of a roadmap on how to achieve that vision. Urban forestry master plans are unique in that the assessment goes beyond simple statistics and data on city-managed trees. Master plans analyze the overall sustainability of an urban forest by looking at both public and private tree canopy, the multiple players actively impacting the urban forest (entities and individuals), and the approaches used to manage the entire urban forest.

About the Process. Largo's Recreation, Parks & Arts Department worked with Davey Resource Group to develop this plan by incorporating data from the city's tree inventory, recent UTC results, and city policies and codes, along with meetings and interviews with active players. Input was collected from meetings and discussions with city staff in Planning, Community Development/Code, Police, and staff from Utilities (both city and private). Public input was incorporated via the results from the city's annual Community Conversations. The resulting master plan is organized in four chapters that outline the value and services provided by trees in Largo, assess the sustainability of Largo's existing urban forest, convey a vision and mission for the future urban forest, and identify 14 actionable strategies on how to achieve that vision.

WHAT IS UTC? WHAT IS A TREE INVENTORY?

There are two primary sources of data on urban forests: tree inventories and urban tree canopy assessments (UTC's).
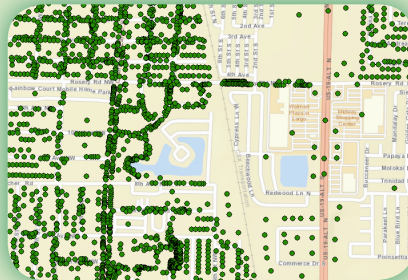
TREE INVENTORY DATA

Tree Inventory

An inventory is a catalogue of all public trees managed by the city. The most widely-used method involves field staff on the ground inputting a range of information on each tree into hand-held devices. Like UTCs, data can be stored in a GIS-based technology system for management planning. The data collected (species, size, condition, risk level, etc.) are integral to effectively managing the tree infrastructure, especially for public safety and risk exposure purposes.
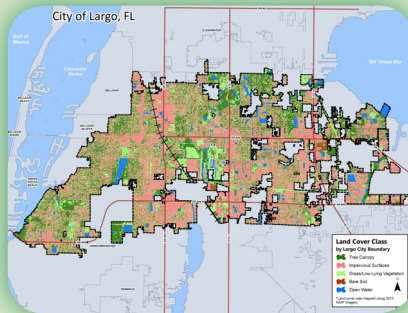
TREE CANOPY DATA

Urban Tree Canopy (UTC) Assessment

A UTC assessment is an analysis of aerial imagery in digital form designed to assess the amount of land covered by tree canopy, hard surfaces (roads, buildings), low vegetation (e.g., lawns, fields, shrubs), open water, and bare soil. UTCs measure the entire urban forest, comprising both public and private lands. This data can be analyzed to measure location and changes in tree canopy, heat island issues, and many other advanced analyses. Once completed, this electronic data is typically owned and housed within a county or municipality GIS department, where the data can be utilized in further analyses and project planning by anyone in the community.

CHAPTER 1: WHY TREES?

In today's world, characterized by tight city budgets, aging infrastructure, and fierce competition for city resources, why should we focus our attention on trees? Thanks to new technology and scientific modeling in recent decades, the role of trees in cities is starting to change. The services they provide are now largely quantifiable. Trees have emerged as a cost-effective and critical city infrastructure providing numerous benefits.

Trees are significant city infrastructure for three reasons:

1 TREES PROVIDE EFFECTIVE AND LOW-COST SOLUTIONS TO A MYRIAD OF URBAN CHALLENGES.

Urban trees have proven to be an effective tool across multiple city management areas, including planning, economic development, public health, and sanitation. Trees have been proven to alleviate water and air pollution, improve public health, increase property value, and enhance the success of business districts.

2 TREES ARE A SMART INVESTMENT.

On an annual basis, Largo's urban tree canopy removes almost 270,000 pounds of air pollutants, intercepts 1.5 billion gallons of stormwater, and sequesters 25,000 tons of carbon dioxide. These services are valued at just over $6.3 million each year (Table 1). And these are just some of the tree benefits that can be quantified currently.

When examining city expenditures for public trees only, Largo sees a strong return on investment. For every $1.00 Largo spends on its public tree program, the city receives $3.01 in benefits[1]. This return on investment is consistent with a recent five-city study which found that cities accrued benefits ranging from $1.50–$3.00 for every one dollar invested in trees (U.S. Environmental Protection Agency 2015).

For every $1 Largo spends on public trees, the community receives a $3 return in benefits.

3 TREES INCREASE IN VALUE OVER TIME.

Unlike man-made systems, trees are the only urban infrastructure that actually increase in services and value over time. As trees mature, the benefits they provide increase exponentially, unlike more traditional city infrastructure such as roads and bridges that deteriorate with age.

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[1] Calculation based on Largo's tree inventory, annual budget, and i-Tree benefits valuation of public

Largo's tree canopy provides just over $6.3 million in services to the community every year.

BENEFITS FROM LARGO'S EXISTING TREE CANOPY

TABLE 1

LARGO TREE CANOPY BENEFIT SUMMARY

	QUANTITY	UNIT	VALUE
Stormwater Runoff Interception	1,562,470,087	gal.	$4,687,410
Energy Savings from Avoided Cooling	not quantified	kWhs	not quantified
Heat Stress Alleviation	25°-45°	°F	not quantified
Carbon Sequestered	24,851	tons	$899,175
AIR: Carbon Monoxide (CO) Removed	5,620	lbs.	$3,730
AIR: Nitrogen Dioxide (NO2) Removed	16,100	lbs.	$5,100
AIR: Ozone (O3) Removed	193,880	lbs.	$598,722
AIR: Sulfur Dioxide (SO2) Removed	4,380	lbs.	$475
AIR: Dust, Soot, Other Particles Removed (Particulate Matter, PM10)	49,400	lbs.	$154,264
Improved Public Health	not quantified	n/a	not quantified
Increases in Property Values	not quantified	$	not quantified
Successful Business Districts	not quantified	n/a	not quantified
Safer, More Walkable Streets	not quantified	n/a	not quantified
Essential Wildlife Habitat	not quantified	n/a	not quantified
Stronger, More Vibrant Communities	not quantified	n/a	not quantified
Crime Prevention	not quantified	n/a	not quantified
Noise & Pollution Buffers	not quantified	n/a	not quantified
Total Annual Quantifiable Benefits			**$6,348,876**
Carbon Storage over Canopy's Lifetime (not an annual benefit)	402,330	tons	$7,790,459
Total Quantifiable Benefits Overall			**$14,139,335**

The following pages describe each of the above services in greater detail.

URBAN TREES REDUCE POLLUTION ENTERING WATERWAYS

As cities grow, the amount of land that naturally absorbs rainwater (i.e. lawns, parks, fields, woods) continues to shrink while hard surfaces (i.e., roads, buildings, parking lots) that cause rain to runoff continue to increase. After flowing over roads, parking lots, and lawns, rainwater picks up fertilizers, oil, chemicals, grass clippings, litter, pet waste, and other contaminants. This contaminated stormwater flows into man-made sewers, reaching the local lakes, streams and eventually Tampa Bay, resulting in warnings such as the recent post on the city's website in November 2015 (see below). The Tampa Bay Estuary Program (TBEP) agrees that one of the best ways residents can help Tampa Bay is to reduce the quantities of stormwater runoff (TBEP 2015).

"The City of Largo Environmental Services Department has posted signs at a number of local bodies of water urging the public not to swim in, fish in or drink from them due to contamination after the recent heavy rains. These include lakes, ponds and streams. The signs will be posted until further notice and will be removed once these waters have been tested to verify they are no longer contaminated. For more information, please contact Largo Environmental Services at (727) 507-4460." (November 2015, Largo.com)

DO NOT ENTER SEWAGE WATER
NO DRINKING, FISHING OR SWIMMING

Trees intercept, absorb, and slow rainwater, all of which play a major role in reducing the amount of stormwater that enters sewer systems. In fact, one mature deciduous tree can intercept over 500 gallons of rainwater a year, while a tree that holds leaves all year round (i.e., pines, magnolias) can intercept up to 4,000 gallons per year (Seitz 2008).

Largo's tree canopy covers 26% of the city and intercepts 1.5 billion gallons of stormwater each year. This is equivalent to 10% of all rainfall in Largo annually[2]. This service is valued at $4.7 million annually to the City of Largo.

Stormwater management is especially important in Largo, as over 45% of the city is covered by buildings, roads, and other impervious surfaces that repel rainwater. Compared to Orlando (29%), Tampa (31%), and Pensacola (31%), this is a relatively high rate of "impervious" land cover, which causes higher rates of stormwater runoff.

MILWAUKEE CITY COUNCIL RECOGNIZES THE VALUE OF TREES IN STORMWATER MANAGEMENT

The City of Milwaukee recognizes the contribution of its urban tree canopy as a large part of the solution to stormwater management challenges. Since 2010, funding for almost all tree canopy maintenance expenses originate from the city's sewer maintenance fee. This new system stemmed from significant budget cuts in urban forestry funding. Because the city council recognized that trees are a substantial part of mitigating stormwater, they voted to fund five million dollars in tree maintenance activities through a transfer payment from the Sewer Maintenance Fee (Sivyer 2015).

[2] Based on an average of 51" of rain annually across 18 square miles.

Almost ⅓ of Largo residents are vulnerable to heat stress health issues.

URBAN TREES REDUCE ENERGY COSTS

Demand and costs for energy are rising, with heating and cooling accounting for approximately half of residential energy bills (Department of Energy 2015). Florida's hot climate exacerbates this energy need.

FIGURE 1

A Largo mobile home park with no tree canopy creates an environment of heat stress and high energy costs.

Trees provide energy savings by reducing these cooling and heating costs, both through their shade as well as emissions of moisture. In fact, the cooling effect of one healthy tree is equivalent to 10 room-sized air conditioners operating 20 hours a day (North Carolina State University 2012). The shade of properly-placed trees can save homeowners up to 58% on daytime air conditioning costs, while mobile homeowners can save up to 65% (Smith 1999).

Large tracts of land in southeast Largo host multiple mobile home parks, most of which have little to no tree cover (Figure 1). These communities could see significant savings in energy costs (far beyond tree maintenance costs) by including trees on the grounds.

FIGURE 2 (Right)

The hottest areas of Largo. A larger version of this map can be found in the Appendix.

URBAN TREES ALLEVIATE HEAT STRESS

Due to the urban heat island effect, built-up urban areas without trees often experience temperatures 15-25°F hotter than nearby less developed areas. Heat stress has been proven to cause significant public health problems and even mortality. In fact, each year more Americans die from extreme heat than all other natural disasters combined (i.e., hurricanes, floods, tornadoes, lightning).

Those over 65 or under age 5 are especially vulnerable to heat-related health problems. These two age groups account for almost one-third of Largo residents (31%). The hottest areas in Largo are found along the major arterial routes throughout the city, as depicted in Figure 2.

Urban trees are widely accepted as one of the most effective long-term solutions to reducing the effects of urban heat islands. Tree canopy can lower ambient temperatures by 20°F to 45°F (EPA 2015).
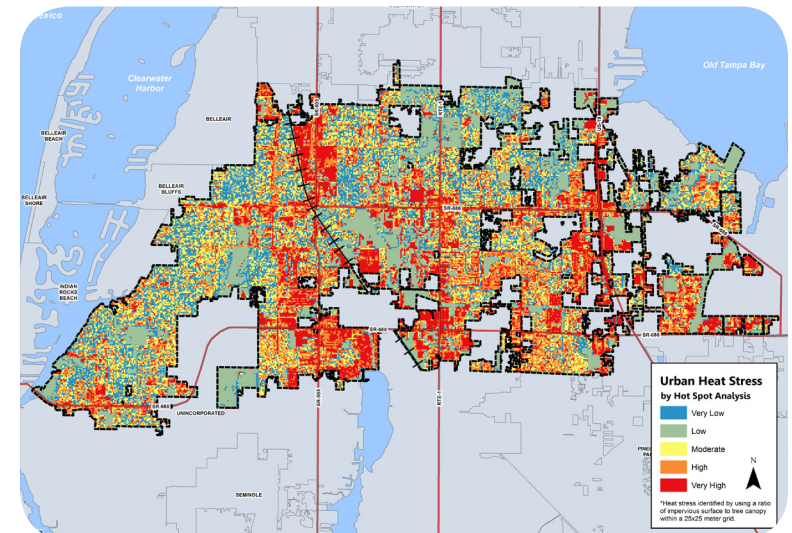
URBAN TREES REMOVE CARBON DIOXIDE

Most of the carbon dioxide (CO_2) in the atmosphere comes from human activities that involve burning fossil fuels. High levels of CO_2 result in climate issues such as more frequent and severe storms, droughts, and other natural stresses across the country in recent decades.

Trees are constantly removing carbon dioxide from the atmosphere. One single large tree is able to absorb as much as 48 pounds of CO_2 per year; one acre of trees consumes the same amount of CO_2 released by driving an average car for 26,000 miles (Megalos 2015).

In Largo, trees sequester 25,000 tons of carbon each year and store an additional 400,000 tons over their lifetimes. This annual sequestration service is valued at $900,000, while the lifetime benefit of carbon storage is estimated at $7.8 million.

URBAN TREES CLEAN THE AIR

Air pollution creates significant public health issues. Those over 65 or under 5 years of age, those with heart disease or COPD, and those working outdoors are most susceptible to health issues from air pollution. Ozone and particulates can especially aggravate existing respiratory conditions (like asthma) and create long-term health problems (American Lung Association 2015).

Trees can remove up to 60% of street-level air pollution, including carbon dioxide, ozone, nitrogen dioxide, sulfuric dioxide (a component of smog), and small particulate matter (i.e., dust, ash, dirt, pollen, and smoke) (Coder 1996).

Largo's urban forest removes almost 270,000 pounds of air pollutants every year, a service valued at $760,000 to the City of Largo. The map in Figure 3 shows levels of annual air quality benefits from trees across the city. This is an extremely important public health benefit to Largo residents.

FIGURE 3

Air Quality Benefits from Tree Canopy, shown by census block group.
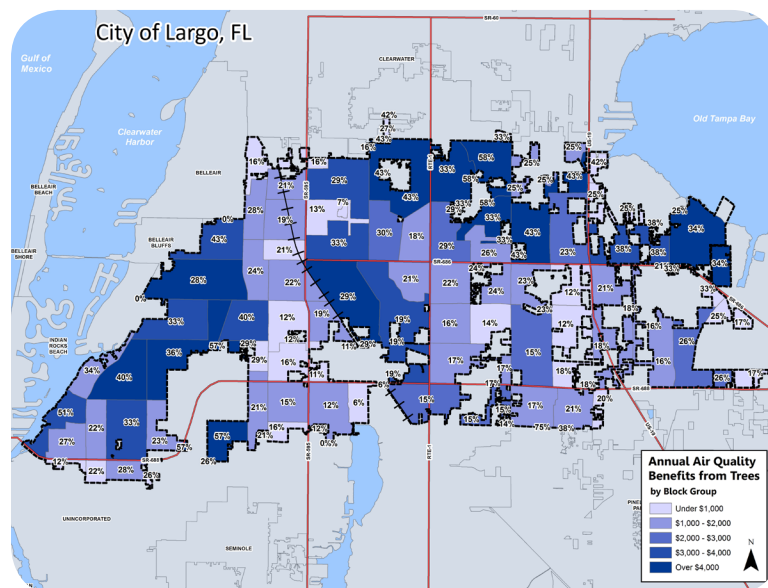
URBAN TREES IMPROVE PUBLIC HEALTH

Poor air and water quality, heat-stressed environments, and poor diet and activity levels create public health problems in cities across the country.

Trees have been shown to create healthy environments for people by improving air quality and reducing heat island effects. New York City saw a decrease of almost 30% of asthma in young children after increasing its tree canopy through installation of over 300 trees per square kilometer (Lovasi 2008).

Studies have also shown that individuals with views or access to greenspace tend to be healthier; employees experience 23% less sick time and greater job satisfaction, and hospital patients recover faster with fewer drugs (Ulrich 1984). Trees have also been shown to have a calming and healing effect on ADHD adults and teens (Burden 2008).

FIGURE 4 (Right)
Tree lined vs. no trees.
Image Sources: WestBayOaks.com and
KPBS News on YouTube.com.

URBAN TREES RAISE PROPERTY VALUES

Trees increase residential property and commercial rental values by an average of 7% (Wolf 2007). This is beneficial to both property owner and city budget bottom lines. Property values increase and properties sell faster when communities become more desirable places to live. Consider the following two residential areas.

Where would YOU rather live?

URBAN TREES MEANS MORE SUCCESSFUL BUSINESS DISTRICTS

Trees contribute greatly to the success of business districts. Despite the common perception among business owners that trees hide business signage, studies have shown that tree-covered commercial shopping districts are more successful than those without canopy.

In multiple studies, consumers showed a willingness to pay 11% more for goods and shopped for a longer period of time in shaded and landscaped business districts (Wolf 1998b, 1999, and 2003). Consumers also felt that the quality of products was better in business districts surrounded by trees (Wolf 1998a). Consider the following two business districts in Figure 5.

Where would YOU rather shop?

FIGURE 5

Business district comparison: tree-lined vs. treeless streets.

URBAN TREES MAKE STREETS SAFER AND MORE WALKABLE

In an age where walkability and pedestrian-friendly areas tend to draw the most people, tree cover is a powerful tool in revitalizing districts and neighborhoods.

Largo is bisected by numerous wide roads (four to six lane highways) maintained by the state or county. These main arterial roads have very few trees and are often surrounded by low-density suburban strip malls and residential areas. This type of development, common between 1960 and 1990, fosters an unsafe environment for pedestrians.

In the most recent Largo Community Conversations, many residents expressed a desire for walkable, bike-friendly streets. Additionally, they pointed out that one of the biggest public safety concerns involves the interaction of vehicles, pedestrians, and cyclists. Increasing tree canopy in these areas can help a great deal.

Urban trees have been shown to slow traffic and help ensure safe walkable streets in communities. Traffic speeds and driver stress levels have been reported to be lower on tree-lined streets, contributing to a reduction in road rage and aggressive driving (Wolf 1998a, Kuo and Sullivan 2001b). According to the Federal Highway Administration, tree canopy along a street provides a narrowing speed control measure by creating a "psycho-perceptive sense of enclosure" that discourages speeding (US Department of Transportation 2015). The buffers between walking areas and driving lanes created by trees also make pedestrians and cyclists feel safer.

URBAN TREES PROVIDE ESSENTIAL WILDLIFE HABITAT

Forests in urban areas are often fragmented (disconnected patches of trees) due to high levels of development, making sustained life difficult for wildlife. Waterways near urban areas are also often highly degraded, partly due to a lack of vegetated buffers (trees) along water edges and polluted stormwater runoff. The Tampa Bay Estuary Program (TBEP) is working to recover from decades of unchecked polluted runoff from the surrounding urban areas. TBEP reports that more than 4 billion gallons of oil, fertilizer, and other pollutants pass through the Bay each year. This is especially concerning as the Bay serves as a nursery for large numbers of species. "More than 70 percent of all fish, shellfish, and crustaceans spend some critical stage of their development in these nearshore waters" (TBEP 2015).

Trees are an essential component to habitat and conservation in urban areas. They intercept and clean large quantities of polluted stormwater, preventing further degradation to vital aquatic habitats such as Tampa Bay. Additionally, as smaller forests are connected through planned or informal urban greenways, trees provide essential habitat to a range of birds, pollinators, and other wildlife that feed on insects (Dolan 2015).

COMMUNITIES

Tree-lined streets can create stronger communities and attract new residents. While less quantifiable, the tree benefits related to community building are no less important than other services.

One study showed that residents of apartment buildings surrounded by trees reported knowing their neighbors better, socializing with them more often, having stronger community, and feeling safer and better adjusted than did residents of more barren, but otherwise identical areas (Kuo 2001b). According to studies released by the Pennsylvania Horticultural Society, the greening of neighborhoods increase surrounding property values, encourage investment, reduce crime and vandalism, and encourage exercise (which in turn reduces stress). All of these improvements contribute to building a better community (PHS 2015).

The City of Largo is working to foster the development of vibrant places to work and live within the city. Strong neighborhoods with tree-lined streets, meeting places, parks, libraries, and public transit can make the highly-desired low-consumption lifestyles more affordable, convenient, and attractive.

URBAN TREES BUILD STRONGER, MORE VIBRANT

FIGURE 6

Manatees are considered an ecosystem indicator in Tampa Bay. The health of this species provides insight into the health of the Bay environment overall.

URBAN TREES PROVIDE BUFFERS FOR NOISE AND POLLUTION

Pollution and noise from busy roadways and rail lines can create unhealthy and undesirable conditions for those living nearby. The American Lung Association has found "growing evidence that vehicle emissions coming directly from those highways may be higher than in the community as a whole, increasing the risk of harm to people who live or work near busy roads" (ALA 2015).

Largo has a number of heavily-trafficked state and county roads bisecting the city, especially West/East Bay Drive, Seminole Boulevard, Missouri Avenue, Ulmerton Road, and U.S. 19. Much of the city has at least one major road cutting through the fabric of the community.

Buffers of trees reduce both noise and pollution. A 100-foot-wide, 45-foot high densely-planted tree buffer can reduce highway noise by 50% (North Carolina State 2012).

URBAN TREES DECREASE CRIME

Conventional wisdom has it that trees and vegetation have a negative impact on crime due to the cover provided for criminal activity. However, recent studies have shown that tree-lined streets have actually been linked to lower crime. A study in Baltimore found that a 10% increase in tree canopy was associated with a roughly 12% decrease in crime. While low, dense brush was associated with an increase in crime, tall broad canopies were associated with a decrease in crime (Troy 2012). It has also been shown that outdoor areas populated with trees tend to suffer less from graffiti, vandalism, and littering than their treeless neighbors (PHS 2015).

SUMMARY

Trees provide effective solutions to many city challenges. Largo's tree canopy has been shown to provide over $6.3 million in solutions to the city annually.

Upon learning about the magnitude of these services, many communities often want to start planting more trees right away. However, to effectively and efficiently make long-lasting improvements, it is important to first accurately assess the state of the existing urban forest, establish goals for the future, and use this information to map out the most effective ways to move forward.

FIGURE 7

Main through streets in Largo are largely lacking in canopy, which exacerbates noise and pollution for residents.

CHAPTER 2: ASSESSMENT OF LARGO'S EXISTING URBAN

Assessing Largo's urban forest involves more than simply determining the extent of tree canopy cover. What is the quality of urban trees in Largo? Who are the key players in urban forestry? How are trees currently being managed? What are the biggest local challenges to urban forest management? Is Largo's urban forest sustainable? What does it even mean for an urban forest to be sustainable? This chapter explores these questions and evaluates Largo's existing urban forest.

What is a sustainable urban forest? For the purposes of this study, the concept of sustainability is defined as the ability to maintain the urban forest for some time into the future without compromising the ability of future generations to do the same (Clark 1997). Is the urban forest healthy enough to remain intact with minimum care? Are the financial requirements of the urban forest realistic for years to come? Is the value of the urban forest understood by all local players that actively impact trees in Largo?

How is an urban forest assessed? There are various schools of thought and systems to define, evaluate, and assess the health and sustainability of an urban forest. Because urban environments are man-made, a true assessment requires looking beyond just the tree data. Survival of an urban forest hinges greatly on human activity. For this reason, an urban forest assessment must include social and economic components.

To assess Largo's urban forest, Davey Resource Group utilized a combination of James Clark's Model of Urban Forest Sustainability and Andy Kenney's Criteria and Indicators for Strategic Urban Forest Planning and Management. This system, customized to meet Largo's unique needs, rated the city's performance level in 23 "indicators of a sustainable urban forest," broadly categorized into three groups: The Trees, The Players, and The Management Approach. Each indicator received a low, moderate, or good performance level rating, as shown in Table 2.

This assessment used the city's recently completed urban tree canopy (UTC) data, the city's public tree inventory data, plus feedback from interviews and meetings with city staff from Parks & Recreation, Planning, Code Enforcement, Streets, Police and Information Systems/GIS, and conversations with Duke Energy representatives.

SUMMARY OF RESULTS

A summary of the assessment results for each of the three categories follow and are shown in Table 2.

THE TREES: Moderate Performance Rating

Largo's 26% tree canopy is considered moderate based on total possible canopy (48%) determined in the recent UTC. However, the tree canopy is not equally distributed across the city, largely due to wide variations in land uses. The public trees are generally in good condition, and diversity of species is currently adequate, though the majority of trees are young. Missing data on condition and site details, along with a persistence of critical or dead trees precludes a higher rating. No indicators received a *Good* performance rating. Improvements are recommended.

THE PLAYERS: Low Performance Rating

The city is currently working to plant trees annually and is effective in involving residents during these initiatives. However, very few other groups in the community are actively involved in urban forestry activities. Most urban forestry efforts are funded by the city, with occasional involvement from the state forestry level. There is little involvement from large landholders, community groups, potential new funders or regional partners. Partnerships are a currently an untapped opportunity for Largo. Since the majority of indicators in this category received a *Low* performance rating, improvements are strongly recommended.

THE MANAGEMENT APPROACH: Low Performance Rating

The city is well situated for effective management thanks to the breadth of data resources available to make effective data-driven management decisions. However, no urban forest management, risk, or disaster management plans are in place, and funding is inadequate for a proactive urban forestry program. While there is a policy for protection of private trees during development, there are not effective penalties in place. Few protections are in place for public trees. The city has been actively planting trees for a number of years. Development and implementation of a management plan would help the city make great strides towards achieving an improved performance rating.

TABLE 2

23 INDICATORS OF A SUSTAINABLE URBAN FOREST USED AS A FRAMEWORK TO ASSESS LARGO'S URBAN FOREST

23 INDICATORS OF A SUSTAINABLE URBAN FOREST		ASSESSED PERFORMANCE LEVEL		
		LOW	MOD.	GOOD
THE TREES	Urban Tree Canopy Level (All Trees)		X	
	Canopy Location/Distribution (All Trees)	X		
	Condition (Public Trees)		X	
	Size/Age Distribution (Public Trees)		X	
	Species Diversity (Public Trees)		X	
	Species Suitability (Public Trees)	X		
THE PLAYERS	Public Awareness		X	
	City Department/Agency Cooperation		X	
	Neighborhood Action	X		
	Large Private Landholder Involvement	X		
	Utility Engagement		X	
	Green Industry Involvement	X		
	Regional Collaboration	X		
	Funder Engagement		X	
THE MANAGEMENT APPROACH	Tree Inventory Data			X
	Overall Canopy Data			X
	Management Plan	X		
	Risk Management Program	X		
	Maintenance Program - Public Trees	X		
	Planting Program		X	
	Tree Protection Policy		X	
	City Staffing & Equipment		X	
	Funding	X		
	Total	10	11	2

THE TREES (ASSESSMENT: MODERATE)

Assessing the trees in Largo involves looking at both the overall canopy across the entire city (public and private trees) as well as just the public trees managed by the city.

Urban tree canopy (UTC) covers 26% of the land in Largo. This canopy data (from the recent UTC analysis) reveals that Largo has a lower canopy than the American Forests' recommended 40% overall canopy cover level. Its canopy is also lower than Tampa and Jacksonville (32% each) but slightly higher than Orlando (25%). City canopy cover and goals are shown in Table 3; Largo land cover results in Figure 8.

The UTC analysis also revealed that it is possible for Largo to 46% canopy. It can therefore be said that the Largo has reached 58% of its potential canopy (also termed "relative canopy.")

CRITERIA USED IN ASSESSMENT

• Tree Canopy Level

• Canopy Location/Distribution

• Condition (Public Trees)

• Size/Age (Public Trees)

• Species Diversity (Public Trees)

• Species Suitability (Public Trees)

FIGURE 8
2013 Largo Land Cover Percentage Chart

- BARE SOIL
- OPEN WATER 5%
- LOW VEG. (LAWNS, FIELDS) 23%
- TREE CANOPY 26%
- IMPERVIOUS SURFACES 45%
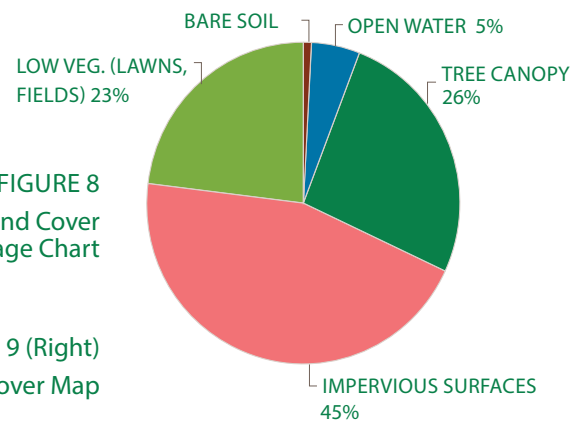
FIGURE 9 (Right)
Largo Land Cover Map

City of Largo, FL

Gulf of Mexico

Clearwater Harbor

Old Tampa Bay

Land Cover Class
by Largo City Boundary
- Tree Canopy
- Impervious Surfaces
- Grass/Low-Lying Vegetation
- Bare Soil
- Open Water

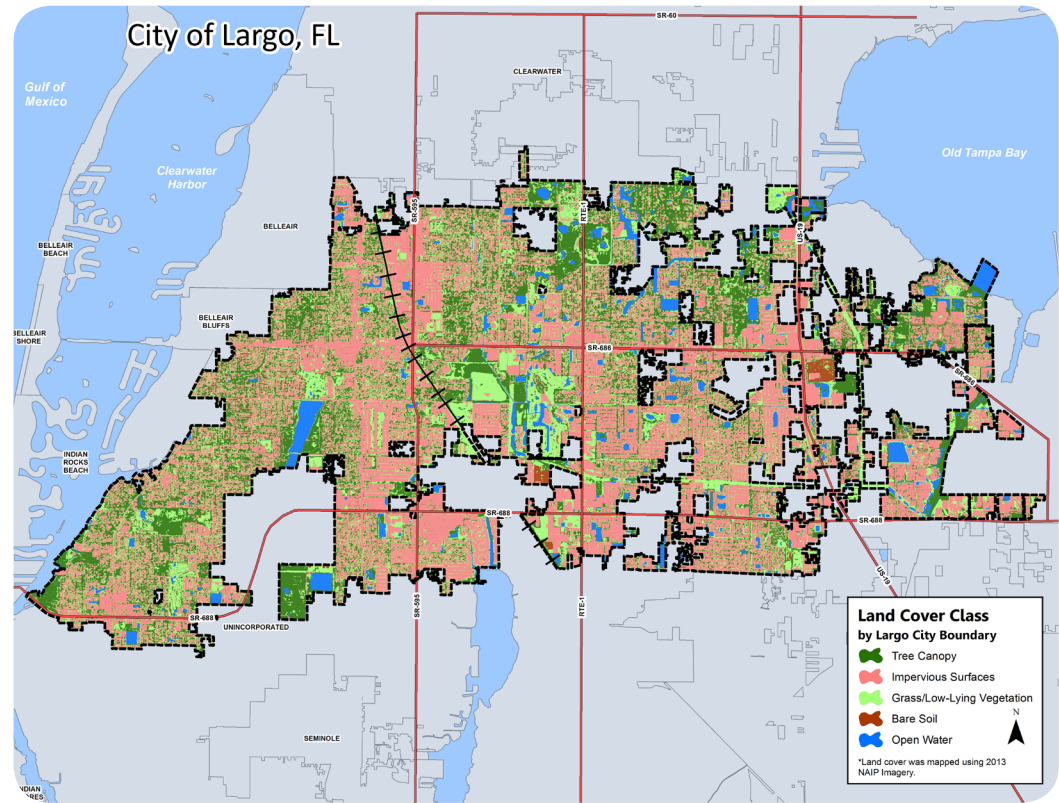*Land cover was mapped using 2013 NAIP Imagery.

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TABLE 3 (Right)

**CITY CANOPY COMPARISONS**

Tree canopy is not equally distributed across Largo. This is especially apparent upon dividing Largo into four quadrants.

The northeast quadrant comprises 23% of the city's tree canopy but only 14% of its residents. The southeast quadrant comprises 27% of the city's population but only 17% of its tree canopy (Table 4). This means that the benefits associated with the city's tree canopy (more than $6.3 million in air and water quality, property values, community, etc.) are not equally distributed to all residents.

TABLE 4

LARGO'S CANOPY DISTRIBUTION COMPARED TO POPULATION DISTRIBUTION

LARGO QUADRANT	% OF TOTAL POPULATION	% OF TOTAL CANOPY
Northeast	14%	23%
Southeast	27%	17%
Northwest	20%	19%
Southwest	39%	41%

FIGURE 10

Tree Canopy Cover Map (by parcels), with city quadrants overlaid.
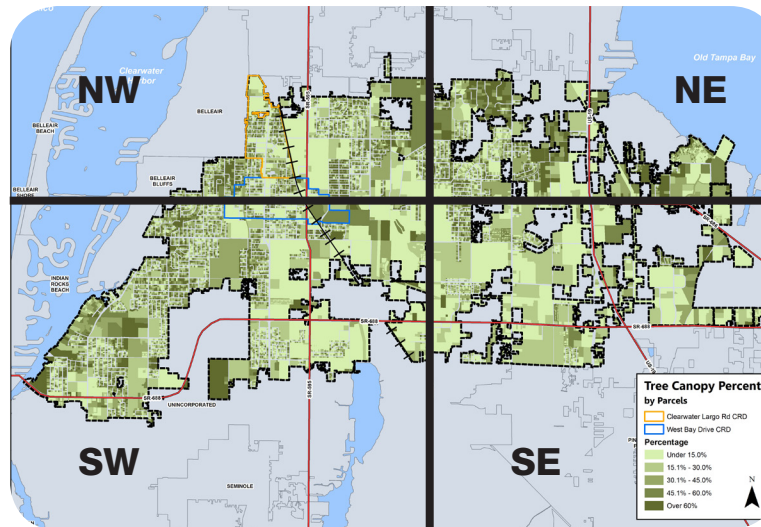
CITY	CANOPY COVER	
	UTC	YEAR
Gainesville, FL	51%	2013*
Atlanta, GA	48%	2008
Annapolis, MD	42%	2006
American Forests Recommended	- 40% -	
Pittsburgh, PA	40%	2011
Cincinnati, OH	38%	2011
New Haven, CT	38%	2009
Louisville, KY	37%	2013*
Washington, DC	35%	2009
Bradenton, FL	33%	2013*
Jacksonville, FL	32%	2013*
Tampa, FL	32%	2011
Pensacola, FL	29%	2013
Boston, MA	29%	2006
Largo, FL	26%	2013
Orlando, FL	25%	2010
Lexington, KY	25%	2013
New York, NY	24%	2006
New Orleans, LA	23%	2009
Cleveland, OH	19%	2013
Chicago, IL	17%	2007
Denver, CO	16%	2010
Indianapolis, IN	14%	2008
San Francisco, CA	14%	2012
Miami-Dade Co, FL	12%	1996
Las Vegas, NV	9%	2012

Much of this disparity can be attributed to the differences in land use throughout the city. For example, large sections of land in the southeast quadrant contain more commercial property (averaging 18% canopy) and mobile home parks (averaging 11% canopy). However, older and more established residential areas (averaging 45% canopy) are found in the western and northern sections of the city.

Mobile home parks make up 12% of the city and have canopy covers as low as 0% and 1%. More than two-thirds of the mobile home parks have a tree canopy coverage of less than 10%. Low canopy in residential areas with high percentages of elderly populations can be considered a public health issue.

TABLE 5

LARGO CANOPY
BY LAND USE

LAND USE CLASS	TOTAL LAND USE ACRES	% OF CITY	% CANOPY	% IMPERVIOUS	% LOW VEG	% BARE SOIL	% WATER
Commercial	1,497	13%	18%	62%	16%	2%	3%
Government	612	5%	42%	21%	26%	0%	11%
Institutional	447	4%	20%	48%	29%	0%	3%
Manufacturing	351	3%	16%	64%	15%	1%	3%
Mixed Use/Other	155	1%	44%	7%	45%	0%	4%
Public	447	4%	20%	12%	50%	2%	16%
Residential	5,017	55%	29%	44%	22%	0%	5%
Right-of-Way	26	0%	25%	40%	23%	7%	4%
Utilities	172	2%	12%	21%	63%	2%	2%
Vacant Land	1,330	12%	25%	41%	26%	0%	7%

This disparity becomes more transparent by calculating and comparing the value of total tree benefits per acre, as shown in Figure 11. Some areas in the northern and westernmost parts of the city (shown in the darkest colors) enjoy four times more benefits than areas in the south and southeast.

Comparing canopy and census data sheds light on socioeconomic trends. The following findings highlight some of the important trends:

- As median incomes in Largo decrease, canopy also decreases.

- Renter-occupied and owner-occupied homes show no difference in canopy levels.

- Sections of Largo with concentrations of younger residents have higher canopy. Areas with concentrations of elderly residents have lower canopy (a public health issue for a group highly susceptible to heat stress).

- Highly-educated residents live in areas with higher canopy, while less-educated residents live in areas with less canopy.

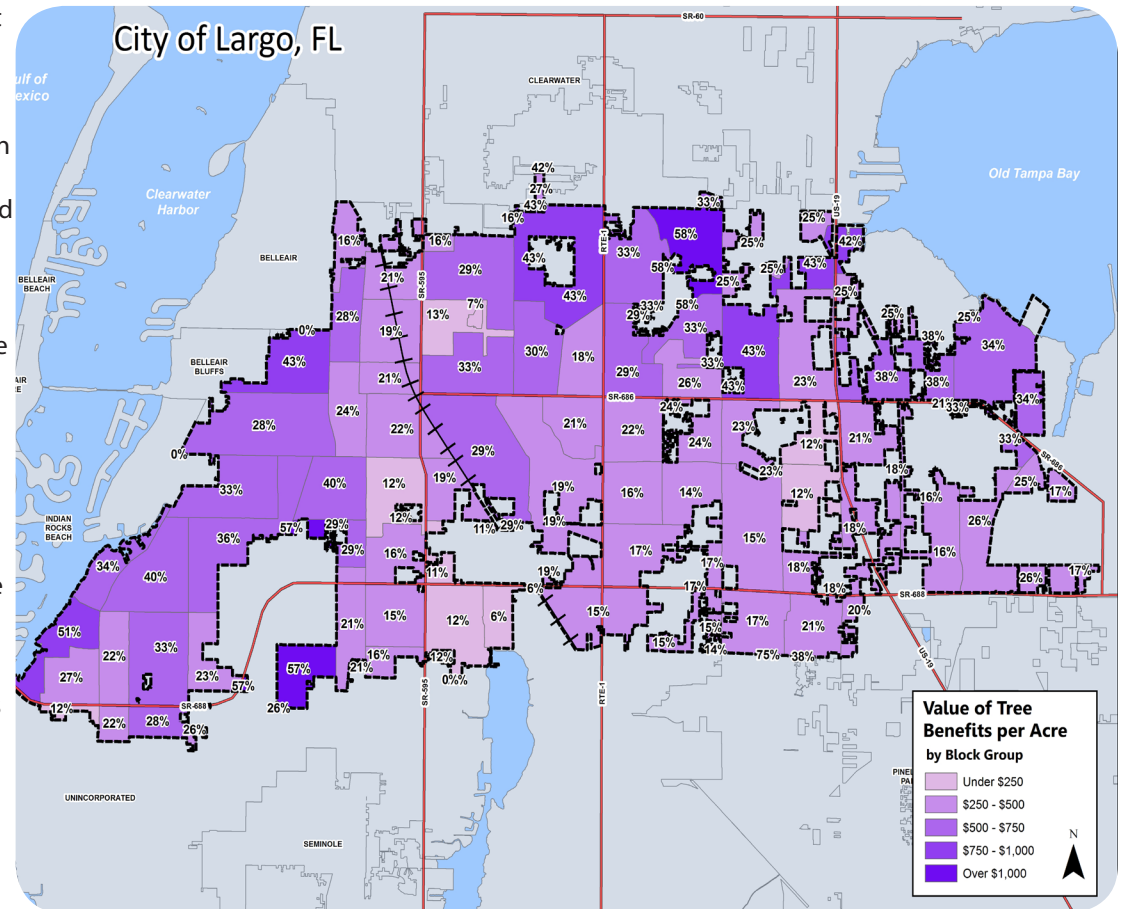**FIGURE 11**

Total tree benefits provided by Largo's urban forest, calculated and depicted as total benefits per acre.

More detailed tables and charts of UTC findings can be found in the Appendix. This electronic data is also now owned by the City of Largo (housed in the GIS/IT department) as part of the recent UTC analysis for the purpose of future analysis and planning.

Location of public trees within four quadrants of Largo (see Appendix for larger version of this map).
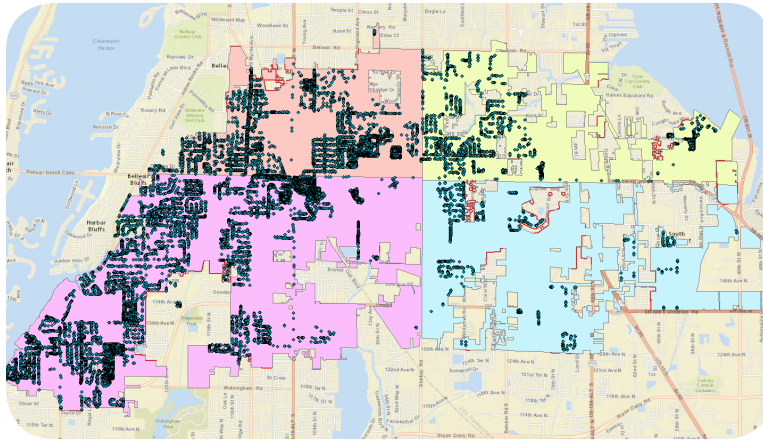
THE MAJORITY OF PUBLIC TREES ARE IN GOOD CONDITION.

Knowledge and management of tree condition is important not just for the longevity of the trees, but also for public safety management. As of 2013, all public trees (approximately 22,000) have been individually inventoried. Almost 5,200 (25%) of the sites within this system are still lacking condition and other site information, which should be updated during daily maintenance routine. However, among trees with complete data, almost 16,000 trees have been rated to be in Fair to Excellent condition (70%). This leaves approximately 1,600 trees (7%) in Poor to Dead condition, indicating a backlog of tree care (pruning or removals).

THE MAJORITY OF PUBLIC TREES ARE YOUNG.

Almost 85% of public trees are currently smaller than 17 inches in diameter at breast height (DBH). Working towards an urban forest populated with larger trees is an important goal, as mature trees provide exponentially higher benefits. For this reason, tree preservation should be highly prioritized.

MORE SPECIES DIVERSITY IS NEEDED.

Roughly 30% of Largo's trees fall into the palm family, while oak comprises almost 22% of all street trees (5,000). This is followed by crapemyrtle (7%) and pine (6%). Best management practices recommend that no one genus makes up more than 20% of the total public tree population. Increasing species diversity is recommended. A breakdown of public tree species can be found in the Appendix.

MANY TREES HAVE LIMITED ROOM TO MATURE, AND THUS CAN BE CONSIDERED UNSUITABLE.

Trees can be considered suitable for a location if there is adequate room for long-term healthy growth. One important growth space factor is the presence of overhead utilities. This data is available for less than half of all public trees. However, in areas where overhead utilities have been identified, analysis shows that more than half of the tree species are too large for their site and thus considered unsuitable.

More detailed results from the recent UTC and tree inventory analysis can be found in the Appendix.

THE PLAYERS (ASSESSMENT: LOW)

Assessing the level of involvement and cooperation of all players is key to developing a sustainable urban forest. Currently, Largo has very few other active entities beyond the city's own efforts, aside from development-related activities.

PUBLIC AWARENESS IS MIXED.

Public perception of trees is mixed. Many people have expressed wariness of trees (i.e. fear of damage to homes, unwillingness to care for trees). However, just as many residents cite their appreciation of trees.

INTERDEPARTMENTAL COOPERATION IS GOOD.

The city appears to work well across departments and with utilities on projects that affect the urban forest; however budgets are limited and no citywide goals have yet been established. The Parks Division effectively engages and involves residents as much as possible in annual street tree planting efforts by notifying residents of plantings and allowing them to opt-out or vote on tree species that will be planted.

NEIGHBORHOOD LEVEL ACTION IS MINIMAL.

There is little to no community involvement or initiation of neighborhood-level tree planting campaigns, except when prompted by the Parks Division during annual city street tree plantings. This may be due to the lack of small community/neighborhood group organizing, as well as the lack of a citywide canopy goal.

CRITERIA USED IN ASSESSMENT

- Public Awareness
- City Department/Agency Cooperation
- Neighborhood Action
- Large Private Landholder Involvement
- Utility Engagement
- Green Industry Involvement
- Regional Collaboration
- Funder Engagement

FEW CURRENT PARTNERS HIGHLIGHT AN UNTAPPED RESOURCE.

The business community and large landholders have not yet been engaged but have expressed interest through Community Conversations via requests for walkable and bike-friendly areas, neighborhood clean-ups and beautification projects, all of which include tree planting.

THE GREEN INDUSTRY IS NOT YET INVOLVED.

Aside from paid contractors, the green industry (i.e. nurseries, landscapers, ground management companies, architects) are not currently involved, nor have they been prompted to get involved. Involvement can take the form of leadership and implementation of best practices in planting and tree care, partnering in tree programs, or providing community leadership in reforestation and beautification efforts.

FUNDER ENGAGEMENT IS MINIMAL.

Aside from occasional grant funding for projects like this master plan and urban forestry assessment, alternative funds are uncommon. Projects beyond annual maintenance are infrequent.

THE MANAGEMENT APPROACH (ASSESSMENT : LOW)

How an asset is managed is just as important as *who* is active. The assessment revealed the following findings related to how Largo's urban forest is currently managed.

EXTENSIVE DATA IS NOW AVAILABLE ON LARGO'S TREE CANOPY.

The City of Largo is fortunate to have extensive data on the urban forest, thanks to a recent urban tree canopy assessment and an existing tree inventory data and software. Most public trees have been inventoried, though gaps in data exist and should be remedied. Overall, Largo is well-positioned to develop sound and efficient data-driven decisions and improvements to its urban forest management.

NO MANAGEMENT PLANS/PROGRAMS ARE CURRENTLY IN PLACE.

Currently there is no urban forest management plan, risk management, or disaster plan in place. Lacking a management plan, Largo is largely maintaining the urban forest on a reactive basis, which has associated risks to public safety. Tree pruning and removals are currently performed in reaction to calls or crises rather than accomplished according to a proactive plan or schedule. Work is also performed based on institutional knowledge from long-term staff, which is not ideal. As staff turns over, important knowledge is lost and public risk may rise even further.

CRITERIA USED IN ASSESSMENT

- Tree Inventory Data
- Canopy Assessment Data
- Management Plan
- Risk Management Program
- Maintenance Program
- Planting Program
- Tree Protection Policy
- City Staffing & Equipment
- Funding

ANNUAL PUBLIC TREE PLANTINGS ENGAGE HOMEOWNERS.

The city has been actively planting trees on public lands (i.e. street trees, parks) for the last eight years and have installed approximately 1,500 during this time. During this process, citizens are notified by door hangers and other outreach strategies, and are offered the opportunity to vote on the tree species that will be planted along their street or to opt out of the program completely. Trees are installed by a city contractor who cares for them for the first two years. Sites are selected based on tree inventory data showing streets that have a low street tree population.

TREE PROTECTION POLICY EXISTS BUT NEEDS IMPROVEMENT.

Tree protection policies are in place on private land during development (found in the Comprehensive Development Code). Protection of public trees (found in the Code of Ordinances) is minimal as currently written. There is only one line restricting the removal of public trees, though there is no regulation in place to prevent and compensate for damage to public trees. Penalty levels in both codes for removal or damage to trees is weak compared to other cities (see page 47 for specific examples). This is a lost opportunity to:

1 CONVEY TO THE PUBLIC THE VALUE OF THIS CITY INFRASTRUCTURE THROUGH EXAMPLE

2 BOOST TREE FUND REVENUES

3 PROTECT THE HIGH LEVEL OF SERVICES PROVIDED BY MATURE TREES THROUGHOUT LARGO

STAFFING/FUNDING IS INADEQUATE FOR PROACTIVE CARE.

At the current budget and staff levels, the city is currently running an urban forestry management program that is 90% reactive in nature, and 10% proactive. While some of the components of a proactive program are in place, such as the annual pruning of golf course trees, palms and two years of new tree care by planting contractors, Largo's urban forestry efforts are largely reactive. The city has two tree crews and a manager that work with city-owned trees. A tree inspector works with privately-owned trees during development. City contractors are utilized for tree plantings and hazardous pruning and removals.

USING THIS ASSESSMENT

Through this assessment, improvements needed to achieve a more sustainable urban forest begin to emerge. These assessment results, when combined with a vision for Largo's future urban forest, help clarify the strategies for action going forward. These indicators can also be used as benchmarks for measuring progress when the urban forest is reassessed in five to ten years.

CHAPTER 3: A VISION FOR THE FUTURE

A unified vision is important to define before any action steps can be developed. A recommended vision for Largo's urban forest follows:

This vision statement can be adjusted based on future public input if needed. With the comprehensive assessment of the existing urban forest, a clear vision allows for the development of effective strategies for action.

This plan clearly conveys the importance of engaging the community in the improvement and care of the urban forest. The ability to preserve and sustain the city's urban forest over time depends on actions taken not just by the city, but also by community organizations, businesses, and individuals as well.

LARGO'S VISION FOR IT'S URBAN FOREST

The community of Largo continuously and proactively works towards building a healthy and sustainable urban forest. The urban forest is recognized as city infrastructure and valued by all in Largo for the wide range of services it provides. Protected, improved and maintained through the collaboration of many partners, an equally-distributed, vibrant urban forest ensures that Largo will remain a healthy, prosperous community for residents to live, work, and play.

CHAPTER 4: A PATH FORWARD: STRATEGIES FOR ACTION

Largo's vision can be achieved through three actionable missions, each of which is described with multiple strategies, shown below.

1 MISSION I: INCREASE TREE CANOPY COVER AND THE SERVICES IT PROVIDES.

STRATEGY 1: Set a Canopy Goal

STRATEGY 2: Work to Achieve Canopy Goal Through Preservation

STRATEGY 3: Work to Achieve Canopy Goal Through Planting

STRATEGY 4: Work to Achieve Canopy Goal Through Support

STRATEGY 5: Regularly Measure and Assess Canopy Progress

2 MISSION II: ENGAGE THE COMMUNITY THROUGH AN OUTREACH AND COLLABORATION PLAN.

STRATEGY 6: Build a Support Structure / Team for Outreach

STRATEGY 7: Define City Neighborhoods

STRATEGY 8: Develop a Campaign (Brand, Messaging)

STRATEGY 9: Develop an Outreach Plan

3 MISSION III: IMPROVE THE MANAGEMENT OF PUBLIC TREES.

STRATEGY 10: Complete Missing Inventory Data

STRATEGY 11: Develop a 3-5 Year Management Plan

STRATEGY 12: Improve and Streamline the Tree Selection Process

STRATEGY 13: Institute Policy Improvements

STRATEGY 14: Develop Disaster Management Plan

MISSION I: INCREASE TREE CANOPY AND ASSOCIATED SERVICES

Increasing Largo's urban tree canopy increases the level of benefits and services trees provide, including the interception of more stormwater, improvements to public health, and continued revitalization of neighborhoods.

How do we increase tree canopy and benefits?

STRATEGY 1:
SET A CANOPY GOAL

Setting a canopy goal is important for a number of reasons. Goals can engage and motivate the public to reach a specific number (instead of mandating a general increase in canopy). They can also serve to unify actions of many different players operating independently. Canopy goals provide benchmarks to measure future progress and trends. Lastly, a canopy goal can be effective in supporting or conveying the reasoning behind tree protection regulations. It demonstrates the conviction that the urban forest is a critical element of what makes Largo a vibrant place to live. Canopy goals should be set as a community and incorporated into public policy and outreach efforts.

Task 1: Set The Canopy Goal As A Community
There are many ways to determine the canopy goal for a community (see About Setting Canopy Goals). Whichever method or combination of methods are used, setting a unified goal as a community is strongly encouraged. This task provides the perfect opportunity to engage the community (citizens, businesses, elected officials). A two to three hour workshop could be used to relay the findings of the recent UTC, spell out the strategies from this master plan, then begin the discussion to set and achieve a canopy goal. Community buy-in at this early stage can have a substantial impact on future success.

Task 2: Incorporate the Canopy Goal into Outreach Efforts
Public engagement is required to achieve real progress in increasing tree canopy. The newly-determined canopy goal should be incorporated into the outreach campaign, which is discussed in more detail in Strategies 6-9.

Task 3: Incorporate Canopy Strategy into City Policy
The canopy goal should also be incorporated into city policy where applicable. This ensures its survival and momentum during transitions in leadership and/or staffing. Incorporation into city policy can be done in the following ways:

- 2016 LARGO COMPREHENSIVE PLAN. At a minimum, the new canopy goal should be included in the city's upcoming comprehensive plan. For example, Tampa's most recent comprehensive plan *Imagine 2040* discusses tree canopy goals at length in the Urban Forestry chapter. The plan also calls for the UTC to be regularly updated. This conveys a clear and official conviction of the importance of tree canopy in Tampa.

- ADOPTION BY LARGO CITY COMMISSION. It is strongly recommended that the city commission officially adopt the canopy goal in a proclamation.

- INCORPORATE INTO TREE ORDINANCE. City tree ordinances should include a general reference to the canopy goal. This helps property owners and developers understand why the regulations are in place and sheds light on how tree canopy is critical to a healthy community. It also serves to reiterate Largo's commitment to trees as city infrastructure. The Miami-Dade ordinance 18A-2 explains one of the intents of the code (among other points) is to "prevent the destruction of the community's existing tree canopy and promote its expansion." Note that an exact canopy goal number should not be used, as it may change over the years.

ABOUT SETTING CANOPY GOALS

There are a number of ways canopy goals can be set. It is not uncommon to use a combination of these methods. There is no right or wrong way to set canopy goals, as every community is unique.

Comparisons to an Industry Standard.
American Forests, a recognized leader in conservation and community forestry, has established standards and goals for canopy cover in metropolitan areas, as shown in Table 19. Largo's 26% overall canopy falls below American Forest's recommendations for metropolitan areas east of the Mississippi (shown below):

Average All Zones - 40%
Central Business Districts (CBD) - 15%
Urban Residential - 25%
Suburban Residential - 50%

Comparison to What is Possible.
Canopy can also be measured by how much canopy has been achieved compared to what is possible (termed "relative canopy"). This metric is useful with respect to setting realistic goals for very different areas. Largo has a potential canopy cover of 46%. As Largo's actual canopy is 26%, relative canopy achieved is 58% (26% divided by 46%).

Comparisons to Other Cities.
Comparing Largo's canopy cover to other cities can be a helpful exercise but should be considered with the caveat that every city is unique. Some cities assess their canopy cover county-wide and therefore include urban and rural areas (i.e., Charlotte, Louisville). Other cities are characterized by geography or climates that affect canopy levels. Cincinnati and Pittsburgh, for example, have high canopies in part because both have many undevelopable hillsides that require trees for stabilization. A list of tree canopies and goals for other cities can be found in the Appendix.

Outcome-Based Goals.
Choosing a canopy goal based on the desired benefits outcome (e.g., reduction in heat stress, stormwater intercepted) is also a possibility. Additionally, many cities are starting to work towards equitable distribution of canopy as a main goal of canopy increase efforts.

Neighborhood Goals.
Canopy goals can also be set beyond simply using citywide numbers. Neighborhoods in need of more canopy can focus efforts on preservation and future planting activities. These local goals help distribute canopy benefits equally among all residents and can be consolidated to convey a citywide canopy goal.

Other Considerations.
A phased goal approach is also common, for example achieving no-net-loss within five years, then 30% canopy by 2025. Some cities establish target dates; others have ongoing goals. Some establish target percentages; others aim for an increase of diversity AND canopy cover.

About Strategies 2-4 on Working to Achieve Canopy Goals. In the most general terms, increases in tree canopy can be achieved in three ways: preserving existing trees, planting more trees, and ensuring a supportive structure is in place to support preservation and planting. Strategies 2-4 detail tasks dedicated to each method.

STRATEGY 2:
WORK TO ACHIEVE CANOPY GOAL THROUGH PRESERVATION

Largo's public tree inventory reveals that over half of all public trees are young (less than 8 inches DBH). This is a positive sign that points to recent tree planting. However, the large payoff in services comes as trees mature. A larger percentage of more mature trees can exponentially increase the services provided (see Comparison of Tree Preservation vs. Planting) without the costs associated with planting and establishment. For these reasons, Largo's first and foremost priority should be to care for existing trees by taking the following steps:

Task 1: Improve the Management of Public Trees
To ensure trees reach mature sizes and provide the most benefits to the community, improvements are recommended to better manage public trees. This is addressed in Strategies 10-14.

Task 2: Ensure Effective Tree Protection Policy is In Place
This is addressed in Strategy 13.

Task 3: Educate Players on Best Management Practices
Ensure all players in the urban forest, including city staff, contractors, and the public, are well-informed on best management practices (BMPs) in tree planting and tree care.

Task 4: Implement a Landmark Tree Program
Landmark trees, often located on private property, can have an impact on the community's perception of trees. This type of program can convey to the public the value of large, significant trees in Largo. The program will make removal less likely for larger trees. Tree appreciation programs are an effective way to educate residents on the benefits these large trees provide, and are often promoted by the tree owners themselves. This type of program can be implemented in two general avenues: either an official city designation with associated legal tree protection; or a more informal appreciation program with no legal implications or requirements.
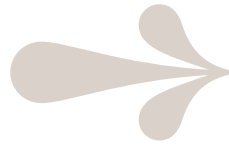
STRATEGY 3:
WORK TO ACHIEVE CANOPY GOAL THROUGH PLANTING

Planting and establishing more trees to increase canopy seems obvious. The city has been planting park and street trees on public lands annually for the last eight years. However, only 10% of the land in Largo is publically-owned (Table 6). Therefore, to make any real progress, tree planting needs to happen beyond annual city tree planting on private lands as well.

TABLE 6

WHO OWNS IT?

		ACRES	% OF LARGO
WHO OWNS THE LAND IN LARGO?	Private	10,107	90%
	Public	1,086	10%
WHO OWNS LARGO'S EXISTING CANOPY?	Private	2,631	88%
	Public	355	12%

Recommendations for additional efforts (public and private) are as follows:

Task 1: Prioritize and Fill the 6,000 Vacant Public Sites
Develop a plan for filling the 6,000+ vacant available planting sites mapped in the existing tree inventory over the next five to ten years. Prioritize the vacant sites based on a methodical, purpose-based end goal or strategy. This can involve using the UTC's new prioritized planting areas (see Best Planting Areas Identified), which focuses largely on maximizing stormwater interception and reducing heat stress. Alternatively, planting sites can be prioritized based on a city-determined goal like better public health or equitable distribution of tree canopy and services to residents. Regardless of priority, planting sites should be planned with a purpose.

TREE PRESERVATION VS. TREE PLANTING

It is no surprise that larger trees provide more services to the community. They intercept more stormwater, remove more air pollution, provide more energy savings, and sequester more carbon. However, it is important to understand that this increase in services is exponential. Preservation of large trees should be a high priority for communities.

Consider the air pollution benefits alone: large healthy trees (greater than 30" DBH) have been shown to remove 70 times more air pollution a year than small healthy trees (less than 8" DBH) (Marritz 2012).

Consider comparing the number of new trees it would take to replace the services provided by one mature tree. Ten to twenty-four new swamp white oaks (3" DBH) would be needed to compensate for the benefits lost from the removal of just one mature swamp white oak (30" DBH) (National Calculator 2015).*

Because part of Largo's vision is to maintain and enhance the services trees provide to residents, prioritizing care for existing trees (over planting new trees) is critical for a healthy community.

* Exact replacement equivalent depends on the specific tree benefit to be matched.

Task 2: Officially Incorporate Trees into the City's Stormwater Management Solutions

Green infrastructure solutions to stormwater issues, including tree planting, should be incorporated into municipal stormwater management efforts. The current $38.1 million, 18-month Wet Weather Project, spurred by the need for compliance with the Florida Department of Environmental Protection by preventing sewer overflows during and after rainstorms, involves only "gray" solutions (i.e. man-made pipes, drains, etc.) to stormwater management. Currently, there is no inclusion or mention of green infrastructure.

Task 3: Incorporate Trees into a Complete Streets or Streetscape Design Code

FIGURE 13 (Right)

FACTORS AND EXAMPLE OF PRIORITIZED PLANTINGS MAP

Consider a complete streets code or policy that includes possible road diets (which often reduces the amount of impervious surfaces) and streetscape design standards to incorporate large tree planting buffers and divert road stormwater runoff to tree wells. This type of code will also facilitate the neighborhood revitalization desired in Largo.

BEST PLANTING AREAS IN LARGO IDENTIFIED

As part of the recent urban tree canopy (UTC) assessment, an advanced analysis has identified prioritized planting areas across the entire City of Largo. These are areas highlighting the most optimal places to plant to achieve the highest benefits impact.

Current land cover types (i.e., tree canopy, low vegetation, concrete surfaces, water and bare soil) were overlaid with heat and stormwater related data (i.e., soil types, floodplains, hottest areas, population density, and slope) to identify ideal potential planting areas. Unrealistic sites for planting (i.e., recreational fields, agriculture, and utility right of ways) were eliminated, leaving a final map of potential planting areas ranking low to high, as shown in Figure 13. When planted, the highest priority areas will provide the community with the highest impact of services. These maps are now available through the city (electronically and in a printed map book) for use in future planting planning.

Environmental and Social Factors
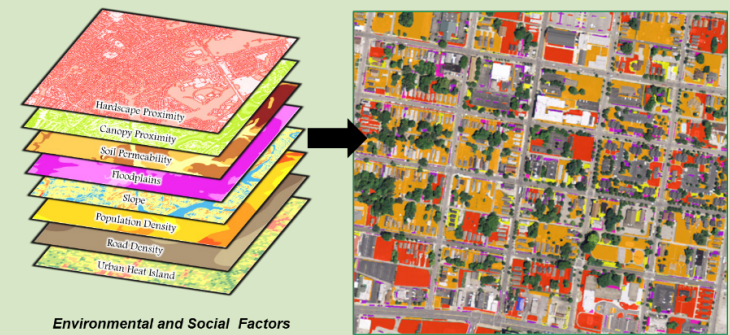
Task 4: Encourage and Assist in Neighborhood-Led Tree Campaigns

While communities can provide the labor and enthusiasm for local tree planting campaigns, they often need support and technical assistance to implement campaigns. This can take the form of logistical support, access to data and maps from the recent UTC to help in planning or raising funds, and/or education and training on tree planting best practices. Consider developing incentives for tree planting and care, potentially in the form of matching funds, tax breaks, or discounts on stormwater fees. Incentives could be provided upon completion of a planting campaign, or based on whether the neighborhood achieves its canopy goal by the next UTC update. Encouragement for neighborhood level campaigns is further addressed in Strategies 6-9 on *Outreach and Collaboration*.

Task 5: Participate in Regional Tree Planting Initiatives and Programs

From time to time, regional tree planting initiatives arise via watershed groups, regional planning organizations, or state-wide programs. Staying connected and aware of what is happening in neighboring areas can open up access to pre-built ready-to-go private tree planting campaigns that can be promoted and implemented within Largo. For example, the Florida Forest Service is partnering with the Arbor Day Foundation (ADF) to provide all Florida cities with access to ADF's Energy-Saving Trees planting program. This program combines an online tree ordering system with an easy-to-use online mapping tool that helps property owners calculate where to specifically and strategically plant trees on their property for the greatest savings. Once up-and-running (anticipated in 2016), this program can be locally promoted at almost no cost to the city.

ENCOURAGING TREE PLANTING ON PRIVATE LAND

The Orlando parks division runs a program that assists neighborhood groups and associations in tree planting campaigns. Through their Trees to Good Homes program, city staff works with neighborhood groups to help select the right trees and provide access to trees at wholesale prices to plant on private property. The neighborhood groups coordinate efforts on helping citizens raise funds to buy and plant trees. The minimum request is 15 trees.

"Need to green-up your home? Need some shade? The City of Orlando wants to help you build and maintain a healthy urban forest."

http://www.cityoforlando.net/trees/programs/

FIGURE 14 (Right)

EXAMPLE OF ONLINE CONTENT FOCUSED ON CONSUMER NEEDS
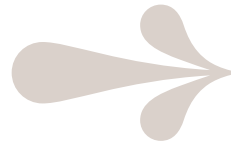
STRATEGY 4:
WORK TO ACHIEVE CANOPY GOAL THROUGH SUPPORT

Planting and maintaining tree canopy can be difficult, if not a complete waste of funds and efforts, without supportive policies and partnerships in place. Problems can arise through conflicting city department goals and work, policies that don't support canopy goals, lack of enforcement of existing policy, and lack of public and municipal education and support. The following tasks identify four ways to create a supportive environment for urban forestry efforts.

Task 1: Improve Tree Policy
Policies should protect the existing canopy and support the work of other "players" working to improve the urban forest. They must also incorporate specifications on best practices in urban forestry, and institute penalties reflected of the services lost after damage or removal. This is addressed in Strategy 13.

Task 2: Provide Easy Public Access to Data and Related Urban Forest Information.
Easy access (preferably online) to multiple types of information and data can encourage those interested in urban forestry to take action. This can include information and diagrams on how to plant and care for trees, in-person tree planting training sessions, and access to UTC results. Urban forestry web pages on the city website should answer the most commonly-asked questions: how to get a tree, what to do if a limb is falling, how to get involved, how the city processes work, etc. Consider including some information in Spanish (multi-lingual needs were requested via Community Conversations). There are many informative urban forestry websites that detail how residents can get involved. For example, New York City's page (Figure 14) provides a good description of city services.

Task 3: Ensure Canopy Cover is a City Priority

By including tree canopy goals in relevant policy and code, the city establishes canopy as a priority from the outset, as discussed in Strategy 1.

Task 4: Improve Consumer Access to a Wider Variety of Tree Species

Diversity of tree species is critical to the sustainability of an urban forest. One of the challenges to planting a more diverse (and thus longer-lasting) urban forest is the lack of species varieties available at local nurseries. Many tree nurseries throughout the state of Florida closed as a result of the 2008 recession; the remaining nurseries carry a limited range of species and typically grow and sell the most commonly requested trees. Pre-ordering, grow-to-order, or incentivizing (officially or unofficially) nurseries to carry a wide range of species can ultimately help diversify Largo's urban forest. Involvement of local nurseries is also included in Strategies 6-9 on outreach.
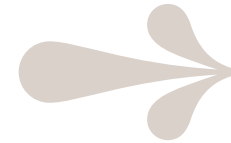
STRATEGY 5:
REGULARLY MEASURE AND ASSESS CANOPY PROGRESS

As with any program, it is important to regularly track progress and re-evaluate efforts. To track canopy progress, the urban tree canopy (UTC) should be reassessed every five years. Many cities, including Tampa, require the regular update in their tree ordinance (Tampa Ord. No. 2006-74, § 9, 3-23-06). After the first update, the data will enable identification not just of trends of gains or losses in canopy, but also where the largest canopy changes are actually occurring. The data will also help identify problems areas, along with ways to rectify losses and get back on track to reach future canopy goals.

Task 1: Plan for a UTC Update

Largo's first UTC was completed using 2013 aerial data. An update is recommended every five years, so the next UTC update should be in 2018 or 2019.

Task 2: Explore Partnerships and Secure Funding in Advance

Once the first UTC is completed, updates can be significantly less expensive to undertake. However, funding should be secured in advance. UTCs can also be implemented with partners on a larger scale, which also has the potential to save costs. Largo may want to explore partnering with larger regional entities like Pinellas County, McKay Creek Watershed, Tampa Bay Estuary Program, or Tampa Bay Regional Planning Council to share costs while providing the necessary land cover data to gauge progress and trends.

MISSION II: PROGRESS THROUGH OUTREACH AND COLLABORATION

The use of public outreach and partnerships to maintain long-term increases in tree canopy is essential. City actions alone have limitations to increasing canopy because public land accounts for only a small percentage of municipalities (10% in Largo). Fortunately, Largo residents have expressed the desire to get involved (see Largo Residents Want to Get Involved). Positive public sentiment and a collective sense of priority for tree canopy can also result in more support / funding for public tree care budgets. Outreach efforts can unearth new partners and funding sources that otherwise can go untapped.

An education and outreach campaign will achieve the following:

1 FOSTER AN UNDERSTANDING OF CONNECTION BETWEEN TREES AND THE SERVICES THEY PROVIDE TO THE COMMUNITY, LEADING TO A PROSPEROUS, HIGH QUALITY OF LIFE.

2 PROMPT RESIDENTS AND BUSINESSES TO TAKE ACTION IN TREE PRESERVATION AND PLANTING ON PRIVATE AND PUBLIC LANDS.

3 CULTIVATE SUPPORT OF PUBLIC TREE FUNDING AND MANAGEMENT.

4 CONVEY THE CITY'S PRIORITY OF TREES AS ESSENTIAL CITY INFRASTRUCTURE.

How do we engage the public (citizens, businesses, visitors) and develop a plan to work collaboratively on this effort? The following four strategies (Strategies 6-9) provide a roadmap to robust public engagement in Largo.

LARGO RESIDENTS WANT TO GET INVOLVED

The City of Largo has established a solid foundation for collaborating with the community through its annual Community Conversation outreach efforts. Most recently, in March of 2015, these facilitated meetings brought together 120 citizens to address five questions centered on defining what the community wants and providing suggestions on how to get there. Public involvement and volunteerism was a resounding theme throughout many of these meetings, which is good news for an urban forestry outreach effort. The following comments from the meetings reflect positively on how the community is looking for ways to get involved:

"Volunteerism was mentioned in many of the discussions. Some saw the city as the spark to create more civic involvement."

"A program in which volunteers can help their neighbors was thought to be a great way to achieve some of the overarching themes that came through in these talks."

"The government cannot do this alone; residents have a role in efforts to improve the community."

"Notable impediments to progress in Largo include lack of communication and coordinated civic involvement."

"Many people don't embrace getting out and meeting their neighbors…the city may need to be the spark to try and bring people together."

"There is a need to get residents and businesses more involved."

"More volunteering should be encouraged."

"More volunteerism in the area, involving city officials and staff."

"The city may not have the funds to do everything but perhaps working with service organizations more could be done."
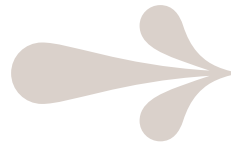
STRATEGY 6:
BUILD A SUPPORT STRUCTURE AND TEAM FOR OUTREACH

A comprehensive public outreach campaign cannot realistically be sustained by city staff on a long-term basis. The city is, however, well-positioned to spark community involvement by bringing stakeholders together, providing an avenue for citizen involvement and neighborhood level action, and building a supportive environment for their work.

It is recommended that the city create and engage an advisory team to help spearhead this initial outreach initiative. There are a number of forms this advisory group can take. With city support, this effort can be a project of the city's existing Recreation, Parks, and Arts Advisory Board or the local non-profit Friends of Largo Nature Parks. Alternatively, outreach can take the form of a new city-initiated but publicly-run committee made up of community activists, business community leaders, and/or neighborhood representatives. No matter the form it takes, an advisory team support structure is essential for the longevity and success of a public outreach campaign.

STRATEGY 7:
DEFINE CITY NEIGHBORHOODS

Residents tend to get involved in their smaller neighborhoods and communities more than in citywide projects. However, the City of Largo does not currently have well-defined neighborhoods, which may be a barrier to more public involvement at the local level. The *2009 Largo Strategic Plan* echoes this idea, citing as one of its four main principles the need to "Engage the Neighborhoods" by defining neighborhood planning areas. To date, this has not yet been completed.

Demarcating neighborhoods beyond HOA boundaries can also serve to work towards building of community inclusion that was repeatedly mentioned in Largo's Community Conversations. Residents asked for more inclusion, multilingual communication, and crossing of cultural barriers.

Largo would be well served to work with residents to define the boundaries and identities of neighborhoods. Leaders from each newly-defined neighborhood could then serve as a city contact and communication funnel for those residents and in future projects. Cincinnati's award-winning Neighborhood Enhancement Program (see A Neighborhood Incentive Program) provides a good example of how well-defined neighborhoods, with city incentives, can help spark local action and progress.

Once these neighborhoods are well formed and defined, they can serve to promote and implement the outreach program defined in the next two strategies.

A Neighborhood Incentive Program

Cincinnati's award-winning Neighborhood Enhancement Program (NEP) is an incentive program offered by the city to create local action and progress with minimal costs. NEP is a 90-day collaborative effort between city departments, neighborhood residents, and community organizations. Each year, one neighborhood is chosen to participate in an intensive enhancement program. The neighborhood is provided with funding (often supplemented by local fundraising) and receives planning assistance and direct access to all city departments. Work often includes: cleaning up streets sidewalks, and vacant lots; tree planting and other landscaping; streetscape and public right-of-way improvement; addressing crime and code violations; and engaging property owners and residents to create and sustain a more livable neighborhood.

NEIGHBORHOOD ACTION STARTS WITH NEIGHBORHOODS.

The lack of smaller community identities within Largo may be one barrier to initiation of citizen-driven neighborhood level projects. The following comments reflect some of the desires and ideas shared by the community on neighborhood involvement:

"We need to publicize and celebrate our distinct commercial areas and neighborhoods as some of our neighboring cities have done."

"Moving the city forward needs to start at the grass root level: community leaders… lay the groundwork for re-establishing neighborhoods."

"…Create a sense of community, sense of place for the district."

"People in the city want a clear identity and clarified boundaries, to stop the drive through that Largo has become."

"Students want a city that is inclusive, where neighbors know each other, and are in the community by supporting neighborhood and community-based projects."

"The government cannot do this alone… residents have a role in the effort to improve the community….We need to strengthen our neighborhood groups."

"There is a need to building brand for the city, and highlight different areas of the city instead of one downtown."
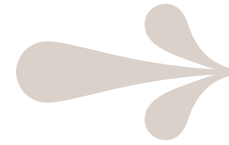
STRATEGY 8:
DEVELOP A CAMPAIGN BRAND AND MESSAGING

Collective voices working to improve and expand the urban forest are always ideal. The key to effectively engaging many voices (without micromanaging) is to ensure all players are committed to the following:

1 WORKING TOWARDS THE SAME GOAL

2 UTILIZING THE SAME MESSAGES

This requires the development of a solid all-encompassing brand, along with well-crafted messaging and graphics. This step sets the foundation of the entire outreach campaign and should ideally use the services of a professional marketing/PR firm to ensure it is done effectively. Professional firms can also make sure the campaign is applicable across language barriers, age groups, cultures, and neighborhoods.

TASK 1: Create a Brand
A brand is the face of the campaign; its purpose is to capture and hold the attention of the target market to create interest for further education. It should be professional, credible, and visually attractive across multiple applications.

TABLE 7

EXAMPLES OF
TRANSLATING PUBLIC
NEEDS TO EFFECTIVE
TREE MESSAGING.

TASK 2: Develop Messaging

Today's society is characterized by sound-bites and short attention spans. Combine this with the fact that the human brain generally does not retain a lot of information all at once; the need for limited and concise messages becomes evident.

Using a professional a firm to help craft messages from existing input (Community Conversations) into what people want for their communities (demonstrated in Table 7) is critical. This includes making the connection between trees and solutions to urban problems. Messages can also ameliorate some emotion-based perceptions of trees, the most common of which is fear (i.e. trees, houses and hurricanes together) and the perception that trees are mostly work (messy, dirty, leaf clean up).

IF THE PUBIC WANTS…	THEN THE MESSAGE COULD BE…
…inviting streets which help stop the drive through that is Largo	Trees can help slow traffic and create safe, interesting and vibrant neighborhoods.
…walkable/bike-friendly areas.	Trees are a key piece to walkable and bike-friendly design by slowing traffic and providing safe buffers for pedestrians.
…to engage youth and young families to become a more vibrant community.	Imagine the signs that say "Join your neighborhood in the next tree planting project. Come get your hands dirty. All ages welcome!"
…multilingual, inclusion of all types and to bridge cultural barriers.	Neighborhood-wide tree planting projects that span beyond HOAs to include larger more inclusive geographic areas.
…an attractive city people want to live in, for an improved perception of city and thus property values.	Cities with tree canopy have property values 7-15% higher than cities without tree canopy.

STRATEGY 9:
DEVELOP AN OUTREACH PLAN

Outreach and implementation is where the brand and messages are put to work. This involves defining audiences, partnerships, and reaching out to the public, with the goal of getting the audience to work on the tasks described in strategies 1-5.

TASK 1: Define Audiences and Approaches

There are many different groups and individuals that actively impact the urban forest (see list below). All can provide valuable assistance and support for urban forestry initiatives. However, each group or segment views the urban forest differently and each has different priorities or goals. Typically a blanket, one-message-fits-all approach is not effective. Thus, each segment should be approached with the most compelling message for that group. Each constituent group should be approached in a targeted way and informed of the vision, mission, and strategies of the plan and how it can get involved.

Each of these groups will have different priorities, but all have a stake in the urban forest. Groups should be defined by the advisory team with help from the professional marketing firm. Targeted approaches should be identified for each group.

POTENTIAL AUDIENCES FOR OUTREACH

NEIGHBORHOODS
Yet to be defined in Largo.

DEVELOPERS
Homebuilders and other construction companies, engineers, architects.

LARGE PRIVATE LANDHOLDERS
Often large businesses, but also city, county, and state entities.

BUSINESS DISTRICTS
Community Redevelopment Districts, business associations.

GREEN INDUSTRY
Grounds managers, landscapers, tree companies, landscape architects, engineers.

NON-PROFITS/NGOS
Friends of Largo Nature Parks, Keep Pinellas Beautiful, Kiwanis, etc.

ELECTED OFFICIALS
City commission, county leadership, and state representatives.

CITY STAFF
All levels of city staff.

GENERAL PUBLIC/CITIZENS
Residents, employees, visitors.

Task 2: Initiate Partnerships

Sustainable outreach requires partnerships for long-term results. Each audience has the potential to produce partnerships, and new community leaders can emerge throughout this process.

Strong partnerships can occur where missions match up. Effective partners can be found in groups that prioritize the *services* trees provide (not the trees themselves). For example, public health organizations, community revitalization, and watershed groups may produce effective partnerships. Large landholders (often businesses) can have a significant impact on increasing tree canopy simply due to large amounts of land available for trees. Large businesses also tend to have an interest in making their community a nice place to live and work in order to retain good employees. For example, in the recent community survey, the Largo Medical district community cited the desire for more walkable lunch options, access to the Pinellas Trail, and more clean up and beautification projects, all of which at least include trees.

Partners can also be regional or state-wide in scope. The Tampa Bay Regional Planning Council is responsible for maintaining the Tampa Bay regional plan, which includes environmental management and water quality topics among many others. The Florida Forestry Division can provide technical assistance. The Tampa Bay Estuary Program (TBEP) is already partnering with local agencies (including Largo) to protect and conserve Tampa Bay. TBEP even offers mini grants for public involvement community projects that advance water quality and habitat restoration among other topics (TBEP 2015).

Task 3: Develop Implementation Plan

Using assistance of the professional marketing firm, combine the developed tools (brand, messaging) and strategies (partnerships, neighborhood building, advisory team) to develop a detailed implementation plan for the next three to five years. This can include planning public meetings, press releases, advertising, fundraising efforts, and incentive programs to name a few. Bring together all the players in the community for a kick-off meeting to collectively review the new urban tree canopy assessment results and master urban forestry plan, and to ultimately set a canopy goal.

MISSION III: IMPROVE PUBLIC TREE MANAGEMENT

Public trees need to be effectively managed for public safety, but also to reach maturity, and thus provide the community with the greatest amount of services. Public trees have already proven to be a good investment. For every $1.00 Largo spends on its public tree program, it receives $3.01 in benefits. As public tree management improves, this already impressive return on investment will continue to grow.

How do we improve public tree management? There are a number of recommended improvements, including collecting missing data, adopting a proactive care system, streamlining tree selection, and planning for disaster recovery.

TABLE 8 (Right Top)

CONDITION OF PUBLIC TREES

TABLE 9 (Right Bottom)

PRESENCE OF OVERHEAD UTILITIES AT PUBLIC TREE SITES

STRATEGY 10:
COMPLETE MISSING INVENTORY DATA

Effective management of public trees requires an accurate assessment of site data and the existing condition of the urban forest. Having wisely invested in both a public tree inventory and a new urban tree canopy assessment, the City of Largo is well situated to map out a plan of action. However, there are still a number of sites (over 5,000, primarily on the east side of the city) missing tree condition data, which is critical information to have for ensuring public safety on an ongoing basis. Additionally, there are 12,000 sites with no data on the existence of overhead utilities. While not as critical as condition data, utility presence is important for streamlining species selection and ensuring adequate grow space for trees.

This missing information can be collected when performing other work in an area, or on rain days, or with assistance from an intern or co-op student from a local university. If students are utilized, they *should assist an arborist* (not do on their own) as assessing data like tree condition affects public safety.

CONDITION OF PUBLIC TREES		
Excellent	4,648	
Good	5,192	
Very Good	73	
Fair	5,698	
	15,611	70%
Critical	255	
Dead	207	
Poor	1,198	
	1,660	7%
Unknown	5,210	
	5,210	23%

UTILITIES PRESENT AT PUBLIC TREE SITES		
No Utilities	9,159	41%
Overhead Utils.	1,197	5%
No Data Avail.	12,127	54%
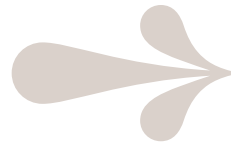
STRATEGY 11:
DEVELOP A 3-5 YEAR MANAGEMENT PLAN

Using the public inventory data, develop a three to five year management plan that will outline a realistic maintenance program to increase the amount of proactive, annual tree care cyclical program. This involves prioritizing the most immediate needs, and working to gradually increase the maintenance budget to eventually fund a fully proactive tree care program.

Task 1: Prioritize the Most Immediate Tree Care Tasks

There are currently 207 public trees listed as dead and requiring removal. These should be prioritized for removal, or at a minimum, inspected for public safety / risk management.

There are 255 public trees listed in critical condition, and another 1,198 in poor condition. At a minimum, these should be inspected during the first year for risk evaluation.

Task 2: Intuitive Proactive Cyclical Pruning Care

Proactive tree maintenance has many advantages over reactive maintenance, the most significant of which is reduced risk to the public. Proactive systems ultimately reduce crisis situations in the urban forest because every public tree is visited, assessed, and maintained on a regular basis. Other benefits include: more predictable budgets and projectable workloads; reduced long-term tree maintenance costs; and increased environmental and economic benefits from trees as more reach maturity.

THE CASE FOR PROACTIVE TREE CARE

The City of Largo primarily plans tree work in response to requests from citizens, often submitted via the eGov (311) system. Davey Resource Group analyzed two years of eGov tree-related service requests by comparing the requested service locations to locations of trees in poor condition.
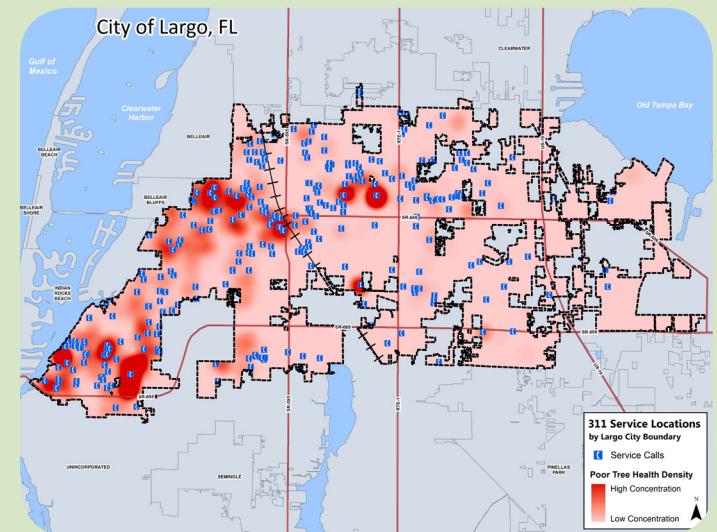
While the map shows that calls (blue dots) are coming from all over the city, most of the calls are not coming from the areas in highest need of pruning and care (shown in red) according to the city's tree inventory. This shows that Largo's request-based system does not effectively reach the trees with the highest need and is therefore an ineffective method for managing the urban forest. A proactive care plan is critical for real progress and effective maintenance.

Although some components of a proactive program are in place (such as the annual pruning of golf course trees and palms, as well as two-year contractor care for newly-planted trees) urban forestry efforts in Largo are largely reactive. At its current budget levels, the program is 90% reactive and 10% reactive. This method of management is not ideal, primarily because work is often not being performed in areas of highest need (as determined by a certified arborist), but in highest need according to untrained citizens (via citizen requests). An analysis of Largo's citizen service request locations and the location of trees in the poorest conditions (see The Case for Proactive Tree Care) highlights the ineffectiveness of this method of management.

Ideally, municipalities should strive towards a five-year pruning cycle. Though in the real world, longer cycles are often necessary due to budget constraints. For example, Pinellas County is currently on a seven-year pruning cycle.

Unsurprisingly, the biggest impediment to a proactive care plan is funding. Largo's urban forestry budget would require a significant increase to institute a cyclical pruning and planned removal program.

The table below (Table 10) provides a few budget options for a gradual transition to a more proactive tree care program. This can be done via reallocation of the exisiting budget, and/or small increases in total budget.

Realloation of the existing budget elevates city's tree maintenance program to a more proactive level simply by assigning a larger percentage of labor hours to cyclical pruning and planned tree removals. However, the reality of this adjustment is that less money is available for on-call and emergency tree work.

Increasing the tree maintenance program's budget by only 10% (approximately $28,000) and dedicating those additional funds to proactive tree work would allow an 8% increase in the amount of cyclical pruning and planned removals while maintaining current funding for on-call and emergency tree work.

A budget increase of 20% (approximately $56,000) would move the city's tree maintenance program to 25% proactive, 75% reactive while maintaining current funding for on-call and emergency tree work.

Reallocating crews and staff to proactive tree work or increasing the program's budget can be large steps to undertake. However, the long-term benefits of cyclic pruning and planned tree removal—healthier trees and reduced risk—are worth the investment of time and money.

A full, more detailed table of potential budget adjustments to achieve a higher rate of proactive work can be found in the Appendix.

TABLE 10

MAINTENANCE BUDGET ADJUSTMENTS TO MOVE TOWARDS A MORE PROACTIVE CARE PROGRAM

LINE ITEM ADJUSTMENTS	CURRENT MAINTENANCE BUDGET (NO CHANGE)						10% BUDGET INCREASE		20% BUDGET INCREASE	
	NO ADJUSTMENT		LINE ITEMS ADJUSTED 10%		LINE ITEMS ADJUSTED 20%		LINE ITEMS ADJUSTED 10%		LINE ITEMS ADJUSTED 20%	
Proactive Maintenance	$27,500	10%	$55,726	20%	$83,952	30%	$55,726	18%	$83,952	25%
Reactive Maintenance	$254,760	90%	$226,534	80%	$198,308	70%	$254,760	82%	$254,760	75%
Maintenance Subtotal	$282,260	100%	$282,260	100%	$282,260	100%	$310,486	100%	$338,712	100%

The maintenence budget is based on the the total 2014 city expenditures on contract and city staff tree pruning and removals, per Largo's Tree City USA application.

STRATEGY 12:
IMPROVE AND STREAMLINE TREE SELECTION PROCESS

Tree disease disasters have historically proven time and again the danger of planting the same tree species year after year. First Chestnut blight, then Dutch elm disease wiped out billions of trees throughout the country. Today, Emerald ash borer is decimating ash trees. The Redbay ambrosia beetle results in mortality in infected redbays and avocado species, while Texas Phoenix Palm Decline causes constant care issues for many of Largo's palms. We are continually reminded of how important diversity is when selecting tree species, yet often at the mercy of our own time constraints, what we know, what is available at local nurseries, and experience with resilient tree species that seem to survive on any site. However, with

some advance planning and coordination, a smart tree selection tool can be developed to provide a streamlined, yet diverse set of species choices appropriate for planting sites.

Davey Resource Group developed a system and matrix for quick and effective tree selection based on a system employed by the New York City Parks Department (Moore, 2015). This system requires each potential planting site to be assigned a type identifier (termed Suitability Type), which is determined by a combination of three characteristics: site type; presence of overhead utilities; and amount of grow space (Table 11). A corresponding tree species list was developed for Largo, which assigns these suitability types to each species. This tool has been delivered to the Largo Parks Division for use in future plantings.

TABLE 11

TREE SELECTION MATRIX TOOL

SITE CHARACTER	VERTICAL CLEARANCE	TREE BED WIDTH	SUITABILITY TYPE
Urban	Wireless	<3.5'	1
		3.5'-4.5'	2
		>4.5'	3
	Wires	All Widths	4
Commercial	Wireless	<3.5'	5
		3.5'-4.5'	6
		>4.5'	7
	Wires	All Widths	8
Landscape	Wireless	<3.5'	9
		3.5'-4.5'	10
		>4.5'	11
	Wires	All Widths	12

45

STRATEGY 13:
INSTITUTE POLICY IMPROVEMENTS

Tree protection policies can regulate and guide tree activities on both private and public lands. Largo's current policies were assessed during this project by Davey policy experts and were found to vary in effectiveness. The development code, regulating trees on private land, is comprehensive and, for the most part, well-written. However, the city has very little regulation (almost nothing) that dictates the management and protection of public trees for which the city is actually responsible and liable. Additionally, neither code has adequate penalties and enforcement mechanisms to reach potential effectiveness. A summary of recommendations for policy changes can be found below.

CARE AND PROTECTION OF PUBLIC TREES.
Public trees (streets, parks, rights-of-way) are governed and managed based on various and separate sections of the city's Code of Ordinances. The Code, however, does not contain a dedicated tree ordinance. Rather, public trees are briefly mentioned in one line in *Chapter 17 Parks & Recreation* and one section in *Chapter 21 Streets, Sidewalks and Other Public Places* (see excerpt below). Violation of this code carries a $250 fine.

Chapter 17: Parks & Recreation. Sec. 17-7. Preservation of park property. (d) No person shall transplant or remove any tree or plant or part thereof...

Chapter 21: Streets, Sidewalks and Other Public Places. Sec. 21-23. Tree removal from the public right-of-way. No trees shall be removed from the public right-of-way except under the direction of the city manager or his/her designee.

Multiple changes are recommended in the city Code of Ordinances to better protect public trees. These recommendations can be grouped into three tasks:

Task1: Create a Separate Centralized Location for Public Trees
Largo's code of ordinances includes very little regulation dictating the management and protection of public trees for which the city is actually responsible and liable. Well-written tree ordinances, even in their most basic form, create formal communication around all tree activity (via permits, best practices) and result in a proactive program that reduces threats to public safety. This reduces the liability of the city while potentially creating a revenue stream for future tree management. Additionally, the little regulation that does exist is located in multiple chapters and sections throughout the code. Because of this "decentralized" organization of tree regulations, the city's authority or responsibility is unclear (what it and its citizens can and cannot do regarding public trees) and the urban forest is not presented as a priority for the city (as viewed by citizens and businesses). Therefore, it is recommended that Largo create a simple but separate Tree Ordinance chapter or section that consolidates and clarifies public tree regulations. Detailed recommendations and guidelines for a new ordinance can be found in the Appendix.

Task 2: Include Tree Damage Requirements
Public trees require protection not just from removal, but from damage as well. Trees on public land are public property. If tree damage or loss occurs due to a vehicular accident, vandalism, construction, private utility work, etc., then the responsible party should be required to pay for the appraised or replacement value and/or repair costs. See the Examples from Other Cities (next page) for examples of city code requirements for mitigation of tree damage. Currently, Largo's code does not protect public trees from damage (only removal).

EXAMPLES FROM OTHER CITIES

Tree Damage as Defined in Miami-Dade Ordinance.

In Miami, fines are instituted for violations of any tree abuse including "damage inflicted upon any part of a tree, including the root system, by machinery, construction equipment, cambium layer penetration, storage of materials, soil compaction, excavation, chemical application or spillage, or change to the natural grade. Hatracking <topping>, girdling or bark removal of more than one-third (1/3) of the tree diameter, and tears or splitting of limbs."

Rates in Atlanta for Tree Ordinance Violations.

Atlanta, Georgia assesses penalties for tree damage and removal with steep fines for violations. The first violation is a minimum of $500; the second violation is $1,000. If the violation cannot be tied to an exact number of trees (for example in a natural area), fines are set at $60,000 per acre of land affected (Atlanta 2015).

Additional Remedial Action for Tree Damages in Sunrise, FL.

Tree Code Sec 16-173: "In the event a person abuses a tree in violation of this section, the violator, in addition to being subject to the penalties found in section 1-15 of the City Code, shall be responsible to undertake pruning and other remedial actions that the city determines are reasonably necessary to protect public safety and property, and to help the tree survive the tree abuse damage. If the natural habit of growth of the tree is destroyed, the violator shall remove the abused tree and install a replacement tree."

Tree Permits and Costly Consequences in Raleigh, NC.

Raleigh requires a $100 tree impact permit for any work done in the right-of-way where trees are located. Activities that require this permit include heavy equipment use or storage of soil, stone, or mulch in the critical root zone. Raleigh reminds its citizens "remember, you can greatly reduce costs by protecting a tree at the beginning of a project rather than paying up to thousands of dollars for removal and replacement at the end of a project when an impacted tree becomes hazardous" (Raleigh 2015).

Cincinnati Utilizes CLTA Assessed Value to Set Fee.

In Cincinnati, if a property owner or contractor significantly damages a public tree, they are charged the assessed landscape value (set by Council of Tree & Landscape Appraisers) of the tree. A 20" DBH maple, for instance, has a landscape value of over $2,000. In addition, they are charged the cost of its removal and new replacement planting. These penalties make tree protection and preservation a priority for both the public and contractors. All revenue is deposited into a dedicated urban forestry fund (Gulick 2015).

Task 3: Increase Penalties for Tree Code Violations

Currently, Largo sets a $250 fine for any code infraction. Compare this to Cincinnati or Atlanta (see Examples from Other Cities) where tree removal or damage is much more costly to violators. Low penalties are not typically effective, as it can often be easier to remove a tree in violation and pay the $250 fine than comply with regulations. Fines are not just about the loss of a tree, but the loss of benefits that a tree provides to the community.

Consider a 20" DBH laurel oak street tree. A Largo resident can remove the tree and incur a $250 fine. However, other cities use the Council of Landscape and Tree Appraisers (CLTA) methodology to determine the value of a public tree. In this example, a 20" Laurel Oak is valued at approximately $2,500. The CLTA value is the property value of the tree. The city should also consider the loss of the environmental services of a public tree removed in violation of the code. A 20" oak intercepts approximately 7,000 gallons of stormwater and almost 900 pounds of CO_2 from the atmosphere each year. Over the next 20 years, if the tree remains, those numbers compound to total 190,000 gallons of stormwater intercepted and 8,800 pounds of CO_2 removed (NTBC 2015). Does $250 pay for that loss in benefits to the city and its residents over time?

According to ISA's study of over 160 tree ordinances, multiple types of penalties have been used in tree ordinances, including fines, jail terms, and forfeiture of performance bonds. These penalties are also often accompanied by specific replacement requirements. Penalties appear to deter offenders, but only if consistent enforcement and authority are set in place early on. (ISA 2001). This source may not generate a great deal of money, but it is a legitimate and often under-pursued source of funds that can be used to better manage and protect public trees.

PRIVATE TREES CARE & PROTECTION.

Trees on private lands are typically only regulated before and during development projects through requirements spelled out in cities' development regulations. Chapter 10 Landscape Standards of Largo's Comprehensive Development Code (CDC) dictates tree canopy preservation and replacement in Largo's private development projects. Chapter 10 effectively relays why trees and canopy are important, and describes the requirements for protection and addition of new trees during development projects.

Overall, the development code is comprehensive and well-written. However, the stipulations for compensatory payments and for violations of the CDC should be modified so property owners and developers favor tree preservation over simply paying a small fee or penalty. In order for the CDC to truly address tree canopy preservation in Largo, the following tasks are recommended:

Task 1: Amend Language in Regulations

Amendments to the existing text is recommended in two sections.

Amend the language of Section 10.6.E (2) Destruction of trees. Currently this section indicates that the penalty/mitigation for "Illegally destroyed" trees or trees that have "major damage from illegal activities" is the same as mitigation for legal and proper compliance with the CDC. The city should consider amending the language so that double or triple penalties are levied for illegal activities to encourage compliance.

Amend Section 10.7.2.B.(3)b to include other land uses. This section states that existing single family, duplex, triplex, and mobile home lots are exempt from tree replacement for trees 10 inches in diameter or less. Trees begin to provide significant benefits when they reach 4 to 6 inches in caliper. These trees are highly vigorous and canopy spread is increasing at a rapid rate. It is recommended that the exemption still be provided to these land uses, but that the diameter limit be lowered to 4 or 6 inches to protect these trees that are providing multiple benefits and that will quickly become the future urban forest of Largo.

Task 2: Strengthen Fee Structure

Strengthen Section 10.7. 2.B.(7). The section refers to the Building Division fee schedule (Appendix B of the Code) for fees incurred for removal of the trees from private land during development that are not replaced. The fees are a cash-in-lieu payment. Currently those fees are $25 per caliper inch of the tree(s) removed. There are two concerns with this section:

• Developers may simply opt for the cash-in-lieu payment as a way of not having to make a good faith effort to include replacement trees in the project. The city's tree fund will benefit from this, but the entire premise of Chapter 10 -- protecting and encouraging tree canopy cover on private property (of which makes up the majority of land in the city and where trees thrive best) --- may be negated.

• The fee structure of $25 per caliper inch results in significantly lower fees than the replacement cost or appraised value of the tree removed. For instance, a 3 inch caliper tree can be purchased, planted and guaranteed for an average of $400. The city would only receive $75 for that size tree when removed and not replaced by a developer. A 10 inch tree would cost the developer $250, but the appraised value (using the nationally recognized, industry standard Council of Tree and Landscape Appraisers' "Trunk Formula Method" for a 10 inch shade tree in good condition is in the range of $1,500 to $2,500.

This section should have language that states payments of cash-in-lieu for replacements shall be the current retail cost of purchase, labor and a 1-year guarantee for trees under 6 inches in caliper, and will be the appraised value of trees over 6 inches in caliper.
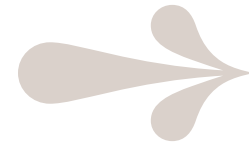
STRATEGY 14:
DEVELOP A DISASTER MANAGEMENT PLAN

An urban forestry-focused disaster management plan can take many forms. It can serve as an addendum to a city-wide emergency management plan, or simply as a summary of the urban forestry division's expected role in a disaster for staff education and preparedness purposes. They often include the following:

• Chain-of-command description and clarification
• Method of communication to be used in emergencies.
• A triage process for tree debris removal (often clearing critical lanes and access to hospitals and other key sites first).
• Preset debris sites to facilitiate quick and safe removals.
• Prearranged tree pruning and removal contract agreements after disasters, to avoid high-rate fees in last minute situations.

However, urban forestry disaster plans should look further than immediate response tasks. A disaster management plan can play a critical role in tree preservation after the skies clear as well. Inclusion of a predetermined, clear plan of action for outreach and education can greatly assist in the preservation of trees after a severe weather event. Many trees, especially those native to the southern coastal states, can withstand high winds and storm damage and rebound after severe storm events. However, after a storm, with no leaves, they can appear dead or dangerous to the untrained eye, and unwarranted removals occur. Forward-thinking disaster plans can include a communication plan to explain this to the public, and a system to help property owners safely determine which trees can be saved. Without a proactive preservation plan, many trees fall prey to uneducated contractors offering to remove every tree that experienced any damage.

Further exploration of Largo's current disaster plans is needed before identifying any additional needs of an emergency response plan. Having a plan is strongly recommended and can result in better tree preservation, increased response time, operational efficiency, decreased risk and liability, and less concerns from citizens about trees after a storm.

CHAPTER 5: NEXT STEPS - A FOUR-YEAR PLAN

Through implementation of the 14 strategies of action, Largo can begin to move towards a more sustainable urban forest, and thus a more vibrant and healthy community for all residents. The biggest question now is "where do we start?" It can be overwhelming and difficult to determine where to begin with all the strategies of recommended action. To help Largo get started, a suggested general timeline for the first four years may clarify how all of these steps fit together and can be implemented. It is important to get multiple strategies started at once as many of them will take on their own momentum (especially as the public gets more involved).

YEAR 1 – 2016

WINTER
• Form an advisory team for public outreach.
• Advisory team to plan public meeting to review master plan, set canopy goal together.
• Incorporate canopy goal into upcoming comprehensive plan
• City council to officially support canopy goal in a city proclamation.
• Develop proactive pruning cycle that fits in realistic budget.
• Develop an outline of a 3-year plan of work (management plan).

SPRING
• Start implementation of management plan.
• Start process of inspecting and possibly removing dead and critical public trees.
• Start process of updating missing data in tree inventory.
• Work with PR firm to develop messaging/brand for public campaign.

SUMMER
• Define neighborhood boundaries.
• Work to improve city web pages on trees, based on PR recommended messaging.
• Explore tree ordinance/policy change options.
• Explore disaster management planning (before hurricane season).

FALL
• Neighborhoods plan for 2017 tree plantings.
• Start public engagement campaign implementation, especially reaching out to targeted audiences.

YEARS 2 AND 3 – 2017-2018

• Potential Implementation of neighborhood plantings in 2017.
• Develop city incentives in 2017 for 2018 neighborhood plantings.
• Continue all 2016 efforts.

YEAR 4 – 2019

• Update UTC with 2018 aerial imagery. Assess progress and benchmarks provided through the assessment matrices.
• Use results of UTC to reassess efforts needed to continue towards a more sustainable urban forest.
• Track progress made to-date. Once the strategies area implemented, performance ratings will increase in each indicator.

GLOSSARY

BARE SOIL LAND COVER: The land cover areas mapped as bare soil typically include vacant lots, construction areas, and baseball fields.

CANOPY: Branches and foliage which make up a tree's crown.

CANOPY COVER: As seen from above, it is the area of land surface that is covered by tree canopy.

CANOPY SPREAD: A data field that estimates the width of a tree's canopy in five-foot increments.

EXISTING UTC: The amount of tree canopy present within the study boundary.

GEOGRAPHIC INFORMATION SYSTEMS (GIS): A technology that is used to view and analyze data from a geographic perspective. GIS links location to information (such as people to addresses, buildings to parcels, or streets within a network) and layers that provide a better understanding of data relationships.

GREENSPACE: A term used in land use planning and conservation to describe protected areas of undeveloped landscapes.

IMPERVIOUS LAND COVER: The area that does not allow rainfall to infiltrate the soil and typically includes buildings, parking lots, and roads.

LAND COVER: Physical features on the earth mapped from satellite or aerial imagery such as bare soils, canopy, impervious, pervious, or water.

MORTALITY: tree loss from insects, disease, natural tree decline/death, severe weather events, removals by human activities, etc.

water typically include lakes, oceans, rivers, and streams.

PERVIOUS LAND COVER: The vegetative area that allows rainfall to infiltrate the soil and typically includes parks, golf courses, residential areas.

POSSIBLE UTC: The amount of land that is theoretically available for the establishment of tree canopy within the study boundary. This includes all pervious and bare soil surfaces.

RIGHT-OF-WAY (ROW): A strip of land generally owned by a public entity over which facilities, such as highways, railroads, or power lines, are built.

STREET TREE: A street tree is defined as a tree within the right-of-way.

SPECIES: Fundamental category of taxonomic classification, ranking below a genus or subgenus.

TREE: A perennial woody plant that may grow more than 20 feet tall.

TREE BENEFIT: An economic, environmental, or social improvement that benefited the community and resulted mainly from the presence of a tree. A tree benefit carries an associated value.

URBAN FOREST: All of the trees within a municipality or a community. This can include the trees along streets or rights-of-way, parks and greenspaces, and forests.

URBAN TREE CANOPY ASSESSMENT: A study performed of land cover classes to gain an understanding of the tree canopy coverage, typically performed using aerial photographs, GIS data, or LIDAR.

OPEN WATER LAND COVER: The land cover areas mapped as

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APPENDIX

TREE INVENTORY DATA SUMMARY - PUBLIC TREES ONLY

TABLE 12

TREE FAMILY DATA TABULATION OF TOP 20

TABLE 13 (Right)

TREE GENUS DATA TABULATION OF TOP 20

TREE FAMILY - TOP 20 (QUANTITY)		
FAMILY	QTY	% OF POPULATION
Arecaceae/Palmae	6,616	30%
Fagaceae	4,964	22%
Lythraceae	1,471	7%
Cupressaceae	1,433	6%
Pinaceae	1,242	6%
Ulmaceae	720	3%
Aceraceae	524	2%
Magnoliaceae	513	2%
Oleaceae	475	2%
Apocynaceae	362	2%
Lauraceae	305	1%
Aquifoliaceae	294	1%
Rosaceae	266	1%
Sapindaceae	228	1%
Nyctaginaceae	226	1%
Myrtaceae	216	1%
Fabaceae	182	1%
Rutaceae	180	1%
Podocarpaceae	161	1%
Asparagaceae	157	1%
Totals	20,535	91%

TREE GENUS - TOP 20 (QUANTITY)		
GENUS	QTY	% OF POPULATION
Quercus (oak)	4964	22%
Syagrus (palm)	2421	11%
Sabal (palm)	1959	9%
Lagerstroemia (crapemyrtle)	1471	7%
Pinus (pine)	1242	6%
Phoenix (palm)	842	4%
Taxodium (bald cypress)	801	4%
Ulmus (elm)	720	3%
Washingtonia (palm)	561	3%
Acer (maple)	524	2%
Magnolia (magnolia)	512	2%
Juniperus (juniper)	365	2%
Ligustrum (privet)	362	2%
Ilex (holly)	294	1%
Cinnamomum (camphor)	277	1%
Platycladus (arborvitae)	249	1%
Bougainvillea (bougainvillea)	226	1%
Dypsis (palm)	216	1%
Nerium (oleander)	215	1%
Prunus (plum/cherry)	208	1%
Totals	18,429	82%

TABLE 14

TREE SPECIES DATA TABULATION OF TOP 20

TREE SPECIES - TOP 20 (QUANTITY)		
SPECIES	QTY	% OF POPULATION
Quercus virginiana (live oak)	2,893	13%
Syagrus romanzoffiana (queen palm)	2,421	11%
Sabal palmetto (sabal palm)	1,959	9%
Quercus laurifolia (laurel oak)	1,850	8%
Lagerstroemia spp. (crape mrytle)	1,316	6%
Pinus elliottii (slash pine)	1,096	5%
Taxodium distichum (bald cypress)	801	4%
Washingtonia robusta (Mexican fan palm)	561	3%
Acer rubrum (red maple)	522	2%
Phoenix roebelenii (pygmy date palm)	449	2%
Ulmus parvifolia (Chinese elm)	382	2%
Magnolia grandiflora (southern magnolia)	339	2%
Ligustrum japonicum (Japanese privet)	325	1%
Juniperus virginiana silicicola (southern redcedar)	285	1%
Cinnamomum camphora (camphor tree)	277	1%
Platycladus orientalis (oriental arborvitae)	249	1%
Bougainvillea sp. (bougainvillea)	226	1%
Dypsis lutescens (areca palm)	216	1%
Nerium oleander (oleander)	215	1%
Prunus caroliniana (cherry laurel)	198	1%
	16,580	74%

TABLE 15

SIZE/AGE OF PUBLIC TREES

TREE SIZE RANGES	ALL	% OF TREE POP.
0-8" DBH	11,438	51%
9-17" DBH	7,597	34%
18-24" DBH	2,029	9%
Over 24" DBH	1,419	6%

DBH = Diameter at Breast Height

TABLE 16

LOCATION OF PUBLIC TREES IN LARGO, BY QUADRANT

LOCATION/QUADRANT	QTY	% OF TREE POP.
NW Largo	6,093	28%
NE Largo	2,218	10%
SE Largo	769	3%
SW Largo	12,983	59%

See map on the following page for quadrant boundaries.

TABLE 17

CONDITION RATINGS OF PUBLIC TREES

TREE CONDITION	QTY	% OF TREE POP.	TALLY
Excellent	4,648	21%	
Good	5,192	23%	70%
Very Good	73	<1%	
Fair	5,698	25%	
Critical	255	1%	
Dead	207	1%	7%
Poor	1,198	5%	
Unknown	5,210	23%	23%

FIGURE 15

Map of tree inventory data showing location of public trees within four quadrants of Largo.
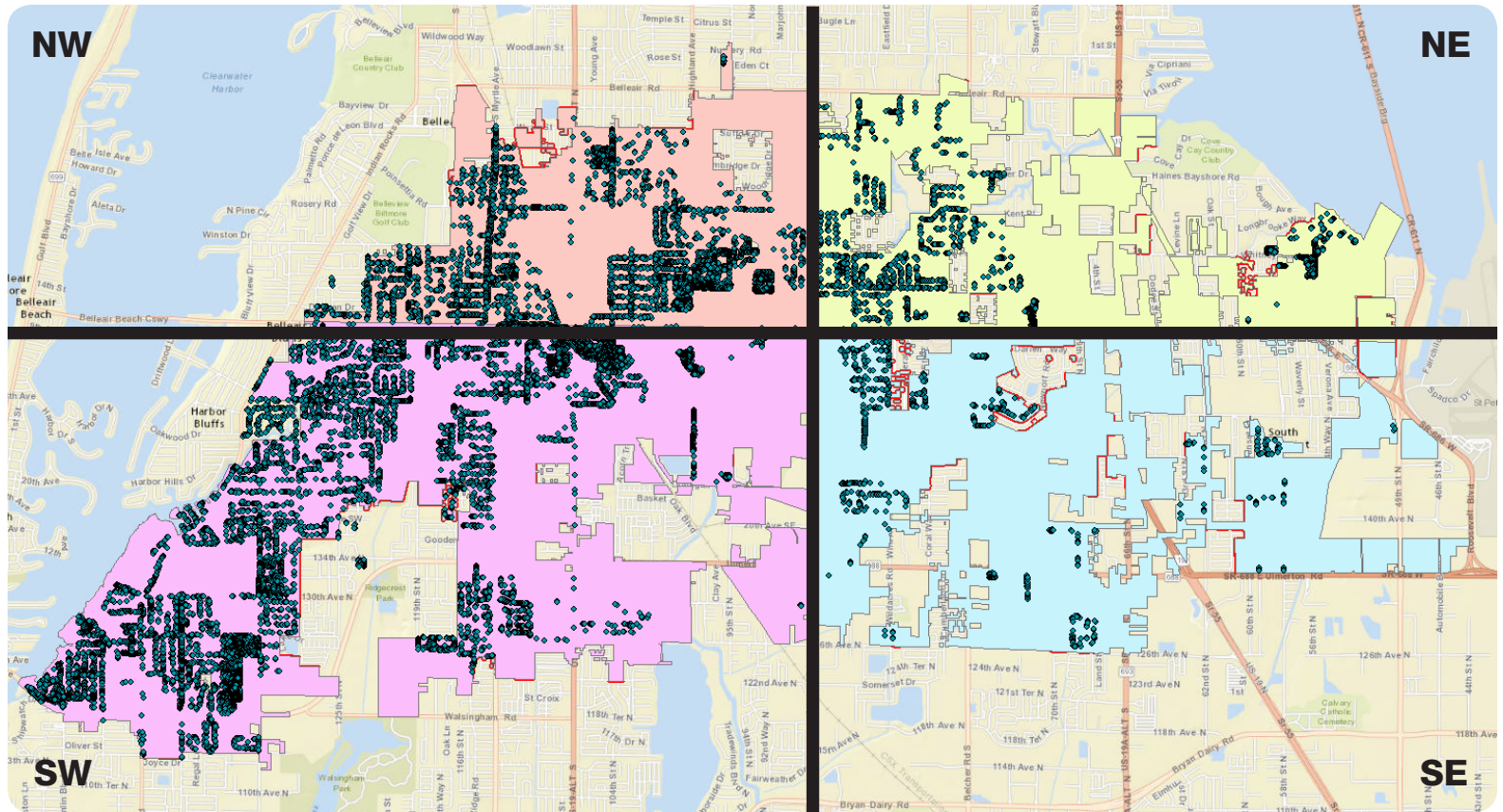
UTC RESULTS

Results from Largo's new UTC assessment (shown in the map below) enable the city to measure the amount and location of its tree canopy along with other land cover, including: concrete and other hard surfaces; open water; low vegetation like lawns and shrubs; and bare soil. This spatial data, now housed and owned by the city for future use creates a measurement benchmark that can be used to track changes and trends in the city's tree canopy in future years.

FIGURE 16

Results of UTC Assessment: Land Cover Map

City of Largo, FL

Land Cover Class
by Largo City Boundary
- Tree Canopy
- Impervious Surfaces
- Grass/Low-Lying Vegetation
- Bare Soil
- Open Water

*Land cover was mapped using 2013 NAIP Imagery.
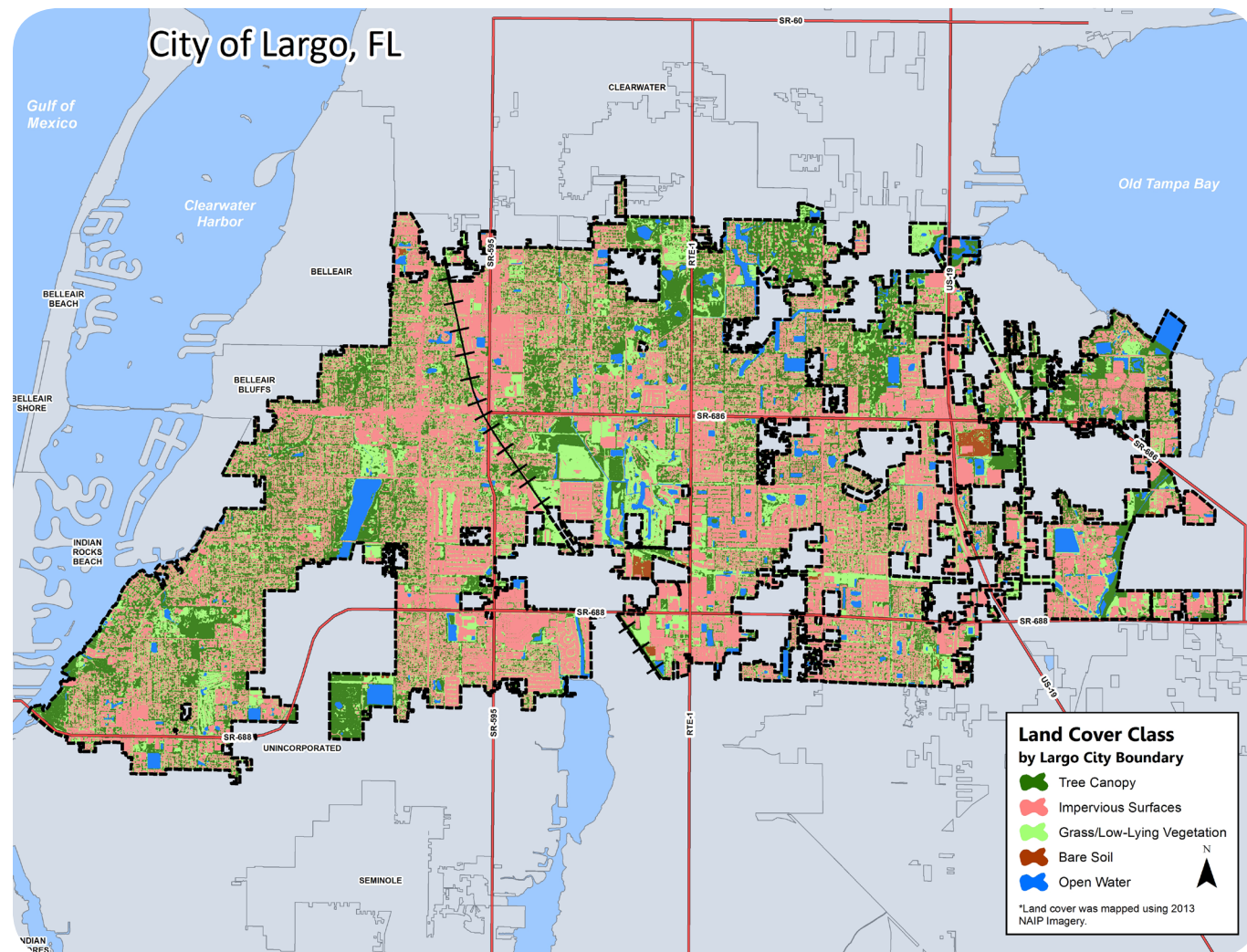
TABLE 18

LAND COVER DATA BY LARGO'S FOUR QUADRANTS

QUADRANTS OF LARGO	TOTAL ACRES		CANOPY		IMPERVIOUS		PERVIOUS		BARE SOIL		WATER		POTENTIAL CANOPY			
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Additional Plantable Acres for Canopy	Additional Canopy Percent Possible	Total Canopy Possible (Max UTC)	Current Relative Tree Canopy
Northeast	2,152	18%	737	34%	802	37%	440	20%	1	<1%	171	8%	402	19%	53%	65%
Southeast	2,932	24%	541	18%	1,566	53%	653	22%	33	1%	137	5%	551	19%	37%	50%
Northwest	2,122	18%	607	29%	982	46%	471	22%	3	<1%	59	3%	427	20%	49%	59%
Southwest	4,916	41%	1,305	27%	2,138	27%	1,250	25%	22	<1%	199	4%	929	19%	46%	58%
			3,189	26%	5,487	45%	2,815	23%	59	0.5%	566	5%	2,328	20%	46%	58%

TABLE 19

LAND COVER DATA BY LARGO LAND USE

LAND USE CLASS	TOTAL ACRES		CANOPY		IMPERVIOUS		PERVIOUS		SOIL		WATER		POTENTIAL CANOPY			
			Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Additional Plantable Acres for Canopy	Additional Canopy Percent Possible	Total Canopy Possible (Max UTC)	Current Relative Tree Canopy
Commercial	1,497	13%	265	18%	927	62%	237	16%	24	2%	45	3%	214	14%	32%	55%
Government	612	5%	260	42%	127	21%	158	26%	1	0%	67	11%	110	18%	60%	70%
Institutional	447	4%	90	20%	213	48%	130	29%	1	0%	13	3%	103	23%	43%	47%
Manufacturing	351	3%	56	16%	225	64%	54	15%	3	1%	12	3%	45	13%	29%	56%
Mixed Use/Other	155	1%	68	44%	11	7%	69	45%	0	0%	7	4%	45	29%	73%	60%
Public	447	4%	89	20%	52	12%	225	50%	8	2%	74	16%	70	16%	35%	56%
Residential	6154	55%	1,801	29%	2,721	44%	1,352	22%	13	0%	264	4%	1,301	21%	50%	58%
Right-of-Way	26	0%	6	25%	10	40%	6	23%	2	7%	1	4%	7	26%	50%	49%
Utilities	172	2%	21	12%	35	21%	109	63%	3	2%	4	2%	8	5%	17%	71%
Vacant Land	1330	12%	330	25%	552	41%	352	26%	5	0%	91	7%	289	22%	47%	53%
	11,193		2,986	26%	4,874	44%	2,691	24%	59	1%	578	5%	2,198	20%	46%	58%

TABLE 20

LAND COVER DATA ON LARGO CRDS

COMMUNITY REDEVELOPMENT DISTRICT	TOTAL ACRES	CANOPY		IMPERVIOUS		PERVIOUS		SOIL		WATER		POTENTIAL CANOPY			
		Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Additional Plantable Acres for Canopy	Additional Canopy Percent Possible	Total Canopy Possible (Max UTC)	Current Relative Tree Canopy
Clearwater-Largo Rd.	307	76	25%	155	51%	62	20%	2	1%	11	3%	64	21%	45%	54%
West Bay Drive	408	96	24%	222	54%	88	22%	0	0%	2	1%	80	20%	43%	55%
	715	172	24%	377	53%	150	21%	2	0%	13	2%	144	20%	44%	55%

SOCIOECONOMIC TRENDS

Data from the urban tree canopy assessment were used in combination with census block data to identify any correlation between socioeconomic data and levels of canopy cover. The results are depicted in the following six charts.

FIGURE 17

Tree Canopy & Household Income
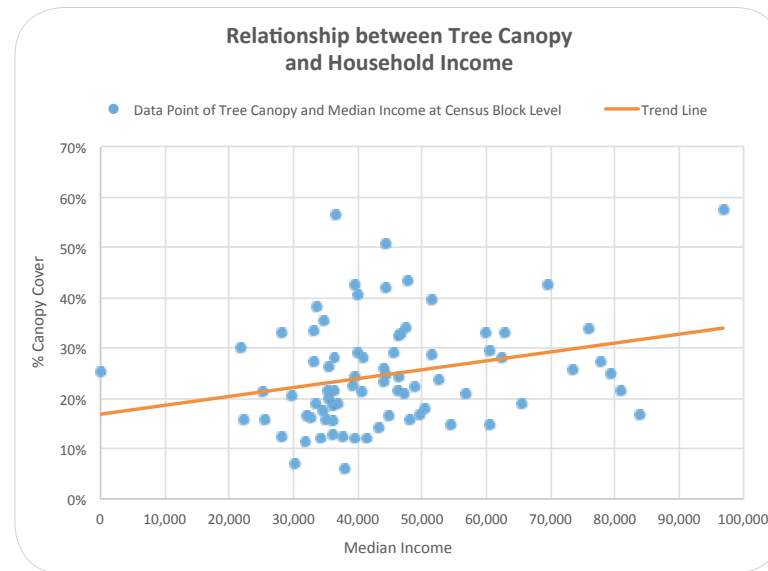
FIGURE 18 (Right Top)

Tree Canopy & Renter-Occupied Homes
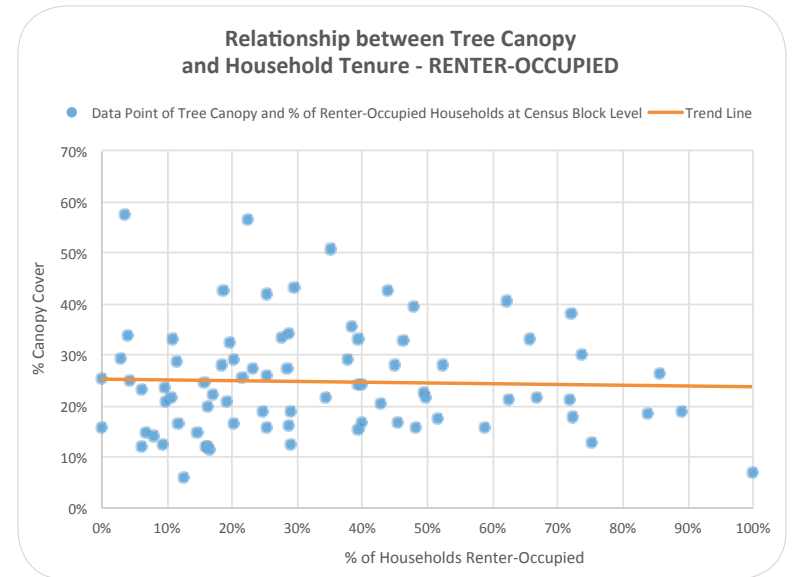
FIGURE 19 (Right Bottom)

Tree Canopy & Owner-Occupied Homes

Relationship between Tree Canopy and Household Income

● Data Point of Tree Canopy and Median Income at Census Block Level ── Trend Line

Relationship between Tree Canopy and Household Tenure - RENTER-OCCUPIED

● Data Point of Tree Canopy and % of Renter-Occupied Households at Census Block Level ── Trend Line

Relationship between Tree Canopy and Household Tenure - OWNER-OCCUPIED

● Data Point of Tree Canopy and % of Owner-Occupied Households at Census Block Level ── Trend Line

FIGURE 20

Tree Canopy & Age Groups
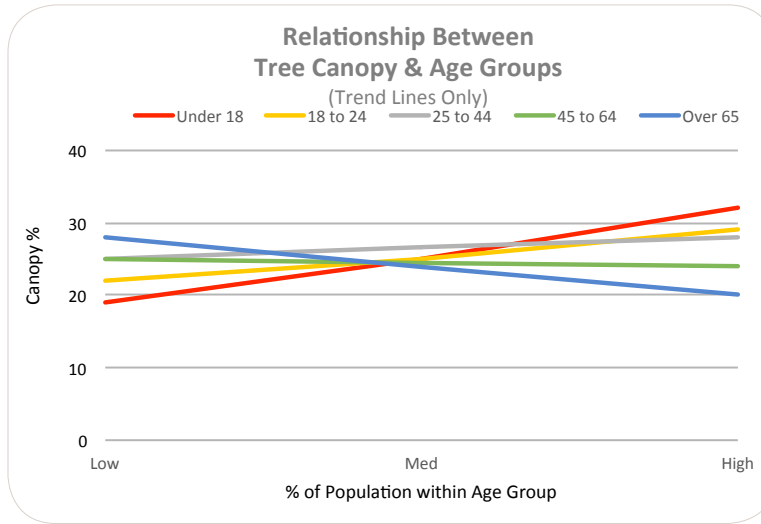
FIGURE 21 (Right)

Tree Canopy & Education Levels

Relationship Between Tree Canopy & Age Groups
(Trend Lines Only)

Under 18 — 18 to 24 — 25 to 44 — 45 to 64 — Over 65

Canopy %

% of Population within Age Group

Relationship Between Canopy & Education Levels

HS Diploma or Less — Some College
Undergrad Degree — Graduate Degree

Canopy %

% of Population at Education Level
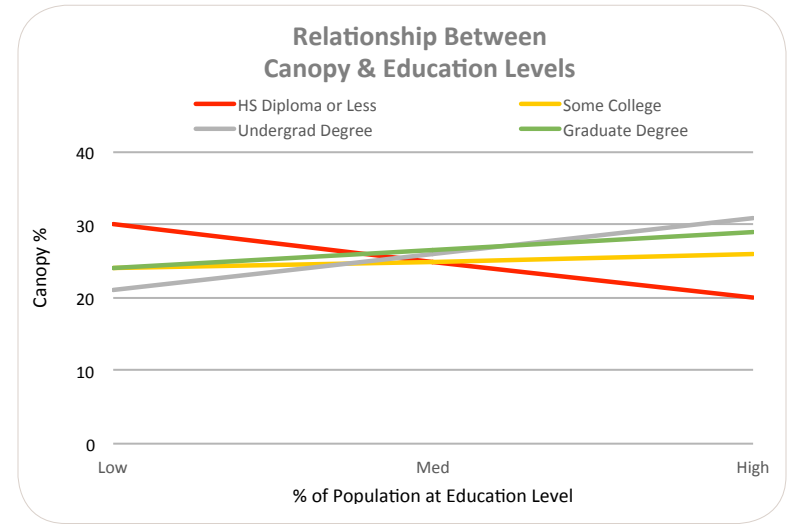
FIGURE 22

Tree Canopy & Population Density

Relationship between Tree Canopy and Population Density

● Data Point of Tree Canopy and Density (pop per sq mi) at Census Block Level — Trend Line

% Canopy Cover

Population Density (people per sq mile)
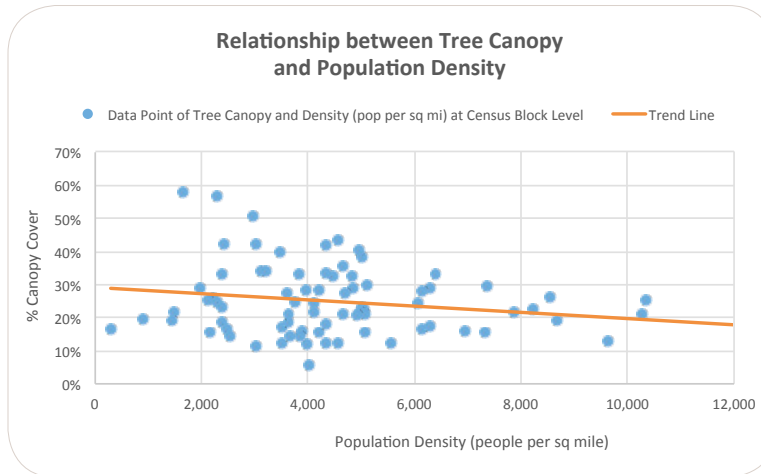
THE TREES MATRIX

FULL ASSESSMENT MATRICES FOR A SUSTAINABLE URBAN FOREST

TABLE 28

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Urban Tree Canopy (UTC)	Tree canopy cover is 26%. Relative tree canopy is 58% (amount achieved compared to what is possible). No canpopy goals are in place.	Existing relative canopy cover is <50% of what is desired (or possible) for the entire city.	Existing relative canopy cover is 50 to 75% of what is desired (or possible) for the entire city.	Existing relative canopy cover is above 75% of what is desired (or possible) for the entire city.	Achieve the desired tree canopy cover according to goals set for the entire city. Alternatively, if no canopy goals have been set, achieve 75% of the total canopy possible.
Canopy Location (Equitable Distribution)	There are gaps between the location of the urban forest and the neighborhoods that need urban forest benefits the most. Lower income areas have lower canopy, areas with more elderly have less canopy. Equitable distribution of trees and benefits is not currently a central component in tree project planning.	Tree planting, public outreach and education is not determined by tree canopy cover or benefits.	Tree planting and public outreach and education is focused on neighborhoods with low tree canopy.	Tree planting and public outreach and education is focused in neighborhoods with low tree canopy and a high need for tree benefits.	Ensure that the benefits of tree canopy are available to all, especially for those most affected by or in need of these benefits. Achieve low variation between tree canopy and equity factors citywide.
Condition of Public Trees	Almost 70% of public trees are in Fair or better condition. Roughly 7% are critical or dead, and tge condition of the remaining 23% is unknown.	No current information about tree condition or risk.	Condition is known, more than 50% of trees are in poor or critical condition, and/or gaps in data exist.	More than 75% of trees are in fair or better condition.	Possess a detailed understanding of tree condition and potential risk of all intensively-managed, publicly-owned trees. Maintain trees in fair or better condition and use to direct management efforts.

THE TREES MATRIX

TABLE 28 (Continued)

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Size and Age Distribution	Age distribution of public trees inventoried is shown to comprise of more younger trees and less mature trees than desired. However, overall distribution of sizes is not far from the recommended levels. 0-8" DBH: 51% 9-17" DBH: 34% 18-24" DBH: 9% Over 24" DBH: 6%	Age distribution is either evenly distributed across size classes or the majority of trees fall into the mature size classes (greater than 8" DBH).	Age distribution is unevenly distributed, with the majority of trees in the younger size classes (0-8" DBH).	Age distribution is generally aligned with the ideal standard diameter classes 0-8" DBH: 40% 9-17" DBH: 30% 18-24" DBH: 20% Over 24" DBH: 10%	Work to achieve a mix of young and mature trees to keep canopy cover relatively constant over time. An ideal age distribution: 0-8" DBH: 40% 9-17" DBH: 30% 18-24" DBH: 20% Over 24" DBH: 10%
Species Diversity	Street trees exceed recommended diversity thresholds by small amounts only: Live Oak (13%) and Queen Palm (11%) exceed 10% species threshold. Genus diversity threshold of 20% is exceeded by oak (22%). Diversity may be difficult due to limited nursery stock.	Fewer than five species dominate the entire tree population citywide.	No species represents more than 20% of the entire tree population citywide.	No species represents more than 10% of the entire tree population citywide.	Establish a genetically diverse population of publicly-owned trees across the entire city and for each neighborhood. Tree populations should be comprised of no more than 30% of any family, 20% of any genus, or 10% of any species.
Species Suitability	Data on the presence of overhead utilities is missing on more than half of the public tree inventory sites. Of those sites that are known to have overhead utilities, more than half unsuitable species (wrong tree, wrong place).	Less than 50% of trees are considered suitable for the site or limited data available.	50% to 75% of trees are considered suitable for the site.	More than 75% of trees are considered suitable for the site.	Establish a tree population suited to the urban environment and adapted to the overall region. Species are matched to the site using the "Right Tree for the Right Place" concept and incorporate pest and storm resistance factors.

THE PLAYERS MATRIX

TABLE 29

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Public Awareness	Public perception of trees appears to be mixed. Anecdotal evidence reports that elderly populations often avoid anything with maintenance requirements, especially when in residence for only for half the year. Common sentiment heard by city staff is centered on fear (trees falling especially in storms). However, many have expressed appreciation and need for trees.	Trees are generally seen as a nuisance, and thus, a drain on city budgets and personal paychecks.	Perception of trees is mixed. Trees are recognized as important and beneficial, while many do not want any trees nearby.	Trees are seen as valuable infrastructure and vital to the community's well-being. The urban forest is recognized for the unique environmental, economic, and social services it provides to the community.	The general public understands the benefits of trees and advocates for the role and importance of the urban forest.
City Department and Agency Cooperation	Urban forestry is incorporated into the planning stages of development projects through the Comprehensive Development Code. City departments appear to work well together as required, on an informal basis. No citywide goals set yet.	Conflicting goals and/ or actions among city departments and agencies.	Informal teams among departments and agencies are communicating and implementing common goals on a project-specific basis.	Common goals and collaboration occur across all departments and agencies. City policy and actions are implemented by formal interdepartmental and interagency working teams on all city projects.	All city departments and agencies cooperate to advance citywide urban forestry goals and objectives.
Neighborhood Action	Residents are currently engaged only when prompted by city staff for annual street tree plantings. Homeowners can vote for tree species choice or opt-out of street tree plantings. No active neighborhood level groups focused on trees (outside of parks), possibly due in part to lack of defined neighborhoods.	Little or no citizen involvement or neighborhood action.	Citizens are engaged on a short-term project basis. Few active groups are engaged in advancing urban forestry.	Multiple active groups are engaged in advancing clear and consistent urban forestry goals.	Citizens understand, cooperate, and participate in urban forest management at the neighborhood level. Urban forestry is a neighborhood-scale issue.

THE PLAYERS MATRIX

TABLE 29 (Continued)

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Large Private & Institutional Landholder Involvement	There is currently no outreach to large private landholders.	Large private land holders are unaware of issues and potential influence in the urban forest. No large private land management plans are currently in place.	Education materials and advice is available to large private landholders. Few large private landholders or institutions have management plans in place.	Clear and concise goals are established for large private land holders through direct education and assistance programs. Key landholders and institutions have management plans in place.	Large, private, and institutional landholders embrace citywide goals and objectives through targeted resource management plans.
Utility Engagement	The city is regularly in contact with Duke Energy reps, on an as-needed informal basis. Utilities have expressed willingness to work together. Largo is participating in larger, regional Wet Weather Project	Utilities and city agencies act independently of urban forestry efforts. No coordination exists.	Utilites and city agencies have engaged in dialogues about urban forestry efforts with respect to capital improvement and infrastructure projects.	Utilities, city agencies, and other stakeholders integrate and collaborate on all urban forestry efforts, including planning, site work, and outreach/education.	All utilities are aware of and vested in the urban forest and cooperate to advance citywide urban forest goals and objectives.
Green Industry Involvement	No current green industry involvement currently (lansdcapers, grounds management, landscape architect leadership).	Little to no involvement from green industry leaders to advance local urban forestry goals.	Some partnerships are in place to advance local urban forestry goals, but more often for the short-term.	Long-term committed partnerships are working to advance local urban forestry goals.	The green industry works together to advance citywide urban forest goals and objectives. The city and its partners capitalize on local green industry expertise and innovation.
Regional Collaboration	No current involvement in any regional activitiies in urban forestry related topics.	Little to no interaction between neighboring communities and regional groups.	Neighboring communities and regional groups share similar goals and policy vehicles related to trees and the urban forest.	Regional urban forestry planning, coordination, and management is widespread.	Neighboring communities and regional groups are actively cooperating and interacting to advance the region's stake in the city's urban forest.
Funder Engagement	State level support of urban forestry funded part of this plan, along with city funds. No long term funding intiatives/projects in place. No active private funding sources/partnerships in place.	Little to no funders are engaged in urban forestry initiatives.	Funders are engaged in urban forestry initiatives at minimal levels for short-term projects.	Multiple funders are fully engaged and active in urban forestry initiatives for short-term projects and long-term goals.	Local funders are engaged and invested in urban forestry initiatives. Funding is adequate to implement a citywide urban forest management plan.

THE MANAGEMENT APPROACH MATRIX

TABLE 30

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Tree Inventory	A recently updated GIS-based tree inventory is in place, and is regularly updated by city staff. Tree condition data is missing in 1/4 of records.	No inventory or out-of-date inventory of publicly-owned trees.	Partial or sample-based inventory of publicly-owned trees.	Complete, GIS-based inventory of publicly-owned trees.	Comprehensive, GIS-based, current inventory of all intensively-managed public trees to guide management, with mechanisms in place to keep data current and available for use. Data allows for analysis of age distribution, condition, risk, diversity, and suitability.
Canopy Assessment	The first urban tree canopy assessment was just recently completed and funded by a grant from the Florida Division of Forestry with matching funds provided by the City of Largo.	No tree canopy assessement.	Sample-based canopy cover assessment.	High-resolution tree canopy assessement using aerial photographs or satellite imagery.	Accurate, high-resolution, and recent assessment of existing and potential city-wide tree canopy cover that is regularly updated and available for use across various departments, agencies, and/or disciplines.
Management Plan	No formal, written plan exists. The city's public tree management program is largely reactive.	No urban forest management plan exists.	A plan for the publicly-owned forest resource exists but is limited in scope, acceptance, and implementation.	A comprehensive plan for the publicly-owned forest resource exists and is accepted and implemented.	Existence and buy-in of a comprehensive urban forest management plan to achieve citywide goals. Re-evaluation is conducted every 5 to 10 years.
Risk Management Program	Municipal tree work is primarily reactive. No formal risk management plan exists.	Request-based, reactive system. The condition of publicly-owned trees is either unknown, or known and not used.	There is some degree of active risk abatement, though generally still managed as a request-based reactive system.	There is a complete tree inventory with risk assesment data and a risk abatement program in effect. Hazards are eliminated within a set time period depending on the level of risk.	All publicly-owned trees are managed for maximum public safety by way of maintaining a citywide inventory, conducting proactive annual inspections, and eliminating hazards within a set timeframe based on risk level. A risk management program is outlined in the management plan.

THE MANAGEMENT APPROACH MATRIX

TABLE 30 (Continued)

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
Maintenance Program of Publicly-Owned Trees	No proactive cyclical pruning and maintenance program exists. Pruning is done based on requests and recommendations of needs from field staff.	Request-based, reactive system. No systematic pruning program is in place for publicly-owned trees.	All publicly-owned trees are systematically maintained, but pruning cycle is inadequate.	All publicly-owned trees are proactively and systematically maintained and adequately pruned on a cyclical basis.	All intensively-managed, publicly-owned trees are well maintained for optimal health and condition in order to extend longevity and maximize benefits. A reasonable cyclical pruning program is in place, generally targeting 5 to 7 year cycles. The maintenance program is outlined in the management plan.
Planting Program	Annual tree planting is funded by the city (in the 8th year) and installed by contractors. No NGO partners lead any plantings. Sites are not currently chosen with purpose-based planting goals in mind (equity, stormwater, energy, etc.)	Tree establishment is ad hoc.	Tree establishment is consistently funded and occurs on an annual basis, though only by the city. Sites are primarily chosen without specific end-goals in mind.	Tree establishment is directed by needs derived from a tree inventory and other community plans and is sufficient in meeting canopy cover objectives.	Comprehensive and effective tree planting and establishment program is driven by canopy cover goals, equity considerations, and other priorities according to the plan. Tree planting and establishment is outlined in the management plan.
Tree Protection Policy	Protection and planting requirements are in place for private development projects, but little-to-no protection or focus is in place for public trees.	No tree protection policy.	Some policies are in place to protect trees, but improvements are needed.	Protection policies ensure the safety of trees on public and private land. The policies are enforced and supported by significant deterrents and shared ownership of city goals.	Comprehensive and regulary updated tree protection ordinance with enforcement ability is based on community goals. The benefits derived from trees on public and private property are ensured by the enforcement of exisitng policies.

THE MANAGEMENT APPROACH MATRIX

TABLE 30 (Continued)

INDICATORS OF A SUSTAINABLE URBAN FOREST	LARGO TODAY	PERFORMANCE LEVELS			SUGGESTED OBJECTIVE AND/OR INDUSTRY STANDARD
		LOW	MODERATE	GOOD	
City Staffing, Contracting, and Equipment	Planting and hazardous tree care tasks are outsourced. All other maintenance tasks are handled by Parks staff, which employs certified arborists. Staff includes a tree crew, inspector and the equivalent of one manager. Staffing and contracts are insufficent for proactive tree care.	Insufficient staffing levels, insufficiently-trained staff, and/or inadequate equipment and vehicle availability.	Certified arborists and professional urban foresters on staff have some professional development but are lacking adequate staff levels or adequate equipment.	Multi-disciplinary team within the urban forestry unit, including an urban forestry professional, operations manager, and arborist technicians. Vehicles and equipment are sufficient to complete required work.	Adequate staff and access to the equipment and vehicles to implement the management plan. A high level urban forester or planning professional, strong operations staff, and solid certified arborist technicians.
Funding	Funding levels do not allow for a fully proactive management program (current 90% reactive, 10% proactive).	Funding is largely reactive work only in the absence of a management plan.	Funding levels allow for risk management and some proactive management and planting based on a management plan.	Dynamic, active funding from engaged private partners and adequate public funding are used to proactively manage and expand the urban forest.	Appropriate funding in place to fully implement a comprehensive urban forest management plan.

FURTHER DETAIL AND BEST PRACTICES ON DEVELOPING A TREE ORDINANCE

DEVELOPING A TREE ORDINANCE

As described in Strategy 13: Institute Policy Improvements, a dedicated tree ordinance does not currently exist, though is strongly recommended in Largo.

As it stands today, Largo has a Community Development Code (CDC) that effectively protects and manages private trees during development, though has very little regulation (almost nothing) dictating the management and protection of public trees for which the city is actually responsible and liable.

Well written tree ordinances, even in their most basic form, create formal communication around all tree activity (via permits, best practices) and result in a proactive program that reduces threats to public safety. This reduces the liability of the city, while creating a revenue stream for future tree management. Additionally, the little regulation that does exist is located in multiple Chapters and Sections throughout the code. Because of this "decentralized" organization of tree regulations, the city's authority or responsibility is unclear (what they can and cannot do regarding public trees) and the urban forest does come across as a priority for the city (as viewed by citizens and businesses). Therefore, it is recommended that Largo create a simple but separate Tree Ordinance chapter that consolidates and clarifies tree regulations.

Largo's ordinance should at least convey the following:

1. Define and set the authority of the city over public trees (it can reference the Development Code concerning trees on private property).

2. State the goals for the community forest. Those might include goals ranging from maintaining a safe urban forest to climate-change sustainability to working to achieve canopy cover goals (whether no-net-loss or a referring to a canopy gain goal defined in the city's comprehensive plan).

TREE ORDINANCE BASICS

In its most basic form, a tree ordinance establishes standards and sets guidelines for the management of public trees. It is the legal framework which governs local tree management activities. It also sets the standard for tree care, serving as a solid example of how Largo residents should manage all trees within the community (both public and private).

Although ordinances may vary widely in form, content, and complexity, an effective public tree ordinance should cover and define the following:

1. Goals should be clearly stated and ordinance provisions should address these goals.

2. Responsibility should be designated, and authority granted commensurate with responsibility.

3. Basic performance/proactive standards should be set.

4. Flexibility should be designed into the ordinance.

5. Enforcement methods and penalties for violations should be specified.

Two additional criteria reflect the background in which the ordinance is developed:

1. The ordinance should be developed as part of a comprehensive management strategy.

2. The ordinance should be developed with community support.

Although an ordinance meeting these criteria does not guarantee success, ordinances lacking one or more of these elements will definitely be challenged to achieve its goals.

3. Define activities, both allowed and disallowed, regarding the removal, pruning, planting, damaging or other treatment of public trees.

4. Require a "public tree work permit." This does not necessarily require an associated fee. It is important primarily for keeping urban forestry managers informed about what is going on in the city affecting trees. The permit can be required for these and other activities performed by third parties:

    a. Removing, pruning, or planting a public tree by citizens.

    b. Routine, annual aerial utility line clearance pruning by power and telecommunication companies.

    c. Infrastructure and utility repair, improvement, or new construction projects in the right-of-way by non-municipal entities.

5. Define penalties and require compensatory payments (based on CLTA appraised tree value) for damage to public trees and violations of the tree ordinance and/or tree work permits granted. For example, as it stands currently, a homeowner could remove a large public street tree in front of his/her house for only $250 in fines, which is often well-worth the fee to the homeowner. With a well-written tree ordinance, that fee could change to $2,000-$5,000 based on the assessed value of the tree. This is a solid way to protect the existing canopy while creating an equitable and reasonable revenue stream to fund urban forestry initiatives.

6. Include resources for implementation, enforcement and education. Any tree protection and regulation requires an

overall strategy for implementation, enforcement, and public education. Without these supports in place, inefficient and ineffective management is likely and the community forest will suffer. This master plan can serve as a strategy document, impetus and foundation for the effective implementation of a new public tree ordinance.

POLICY RESOURCES:

• 2012 Florida Urban Forestry Institute University of Central Florida Orlando, Florida Tree Ordinances - Developing Tree Policy
http://www.fufc.org/downloads/Developing_Tree_Ordinances_Abbey.pdf

• ISA Guidelines for Developing and Evaluating Tree Ordinances
http://www.isa-arbor.com/education/resources/educ_treeordinanceguidelines.pdf

• Urban Forestry Network - Model Tree Ordinance
http://urbanforestrynetwork.org/ordinances/model%20ordinance.htm

• Florida-Friendly Landscape Guidance Models for Ordinances, Covenants, and Restrictions
http://www.dep.state.fl.us/water/nonpoint/docs/nonpoint/ffl-mo-ccr-1-09.pdf.

MAINTENANCE BUDGET ADJUSTMENTS

As described in Strategy 11, a proactive tree care plan is the ultimate goal for any municipal urban forestry team, though it requires funding reallocation and/or increases. As it is often more realistic to gradually increase funds, the following table (31) illustrates potential budget adjustments to achieve a higher rate of proactive work.

TABLE 31
POTENTIAL BUDGET REALIGNMENTS

| | CURRENT PROGRAM | | | 10% BUDGET REALIGNMENT* (30% Removal, 60% Routine Pruning and 10% Structural Pruning) | | | | | | 20% BUDGET REALIGNMENT* (30% Removal, 60% Routine Pruning and 10% Structural Pruning) | | | | | | NO REALIGNMENT** (30% Removal, 60% Routine Pruning and 10% Structural Pruning) | | | | | |
| | Current Budget | | | No Budget Change | | | 10% Maintenance Budget Increase Allocated to Planned Removal and Pruning | | | No Budget Change | | | 20% Maintenance Budget Increase Allocated to Planned Removal and Pruning | | | 10% Maintenance Budget Increase Allocated to 100% Proactive Items (Planned Removal and Pruning) | | | 20% Maintenance Budget Increase Allocated to 100% Proactive Items (Planned Removal and Pruning) | | |
	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget	Tasks Performed***	Cost****	Percent of Operating Budget
PROACTIVE: Removals ($2,000 per)		$0	0%	4	$8,468	3%	11	$22,581	7%	8	$16,936	6%	23	$45,162	13%	4	$8,468	3%	8	$16,936	5%
PROACTIVE: Pruning ($100 per)	200	$20,000	7%	369	$36,936	13%	$10	$51,049	16%	539	$53,871	19%	821	$82,097	24%	369	$36,936	12%	539	$53,871	16%
PROACTIVE : Program Cost/ Structural Pruning ($30 per)	250	$7,500	3%	344	$10,323	4%	344	$10,323	3%	438	$13,145	5%	438	$13,145	4%	344	$10,323	3%	438	$13,145	4%
REACTIVE: Inspection	n/a	$47,840	17%	n/a	$47,840	17%	n/a	$47,840	15%	n/a	$47,840	17%	n/a	$47,840	14%	n/a	$47,840	15%	n/a	$47,840	14%
REACITVE: Gen. Maintenance Contract Removals ($2,000 per)	25	$50,000	18%	20	$40,591	14%	20	$40,591	13%	16	$31,183	11%	16	$31,183	9%	25	$50,000	16%	25	$50,000	15%
REACTIVE: Gen. Mainetenance Contract Pruning ($100 per)	280	$27,960	10%	186	$18,551	7%	189	$18,551	6%	91	$9,143	3%	91	$9,143	3%	280	$27,960	9%	280	$27,960	8%
REACTIVE: City Maintenance Pruning and Removal	n/a	$128,960	46%	n/a	$119,552	42%	n/a	$119,553	39%	n/a	$110,142	39%	n/a	$110,142	33%	n/a	$128,960	42%	n/a	$128,960	38%
Total Proactive Tree Maintenance		$27,500	10%	-	$55,726	20%	-	$83,952	27%	-	$83,952	30%	-	$140,404	41%		$55,726	18%		$83,952	25%
Total Reactive Tree Maintenance		$254,760	90%	-	$226,534	80%	-	$226,534	73%	-	$198,308	70%	-	$198,308	59%		$254,760	82%		$254,760	75%
Maintenance Program Total		$282,260	69%	-	$282,260	69%	-	$310,486	71%	-	$282,260	69%	-	$338,712	73%		$310,486	71%		$338,712	73%
Administration		$46,592	11%	-	$46,592	11%	-	$46,592	11%	-	$46,592	11%	-	$46,592	10%		$46,592	11%		$46,593	10%
Tree Planting*****		$78,155	19%	-	$78,155	19%	-	$78,155	18%	-	$78,155	19%	-	$78,155	17%		$78,155	18%		$78,155	17%
TOTAL PROGRAM BUDGET	755	$407,007	100%	923	$407,007	100%	1,072	$435,233	100%	1,092	$407,007	100%	1,389	$463,459	100%	1,022	$435,233	100%	1,290	$463,459	100%

*Budget realignment equally removed dollars from all four categories of Reactive Work and distrubed those monies to across Proactive Work at the precentages indicated.

**The No Realignment section added new monies to Proactive Work at the precentages indicated.

***Tasks Performed is based on city contracts and local and industry knowledge; it should be used to compare and contrast outcomes of reallocating or increasing funds for proactive tree work and should not be used to estimate new work, budget for work, judge contractor performance or any other purpose.

****Cost and Total Progam Budgets are based on Largo's 2014 Tree City USA application.

*****Tree planting is from a separte funding source.

TREE SPECIES SELECTION MATRIX

The following steps and species list expands the concept described in Strategy 12: Improve and Streamline Tree Selection Process.

STEP 1: Approach potential tree planting site.

STEP 2: Ensure proper site distances from intersections, buildings, trees, and signage. Do not plant a tree if there is not adequate clearance.

STEP 3: Assess the potential tree planting site and determine how it is used (i.e., commercial, urban, or landscape).

STEP 4: Determine whether or not the site has overhead pole-to-pole electric wires.

STEP 5: Determine and measure the most appropriate tree bed width length.

STEP 6: Note the site's environmental constraints such as drainage, soil compaction, soil pH, soil salt content, salt spray, and wind that might affect tree survivability.

STEP 7: Select species group using the information regarding the site's usage, overhead clearance, and tree bed width.

STEP 8: Using data collected during the field visit about the site's environmental constraints, filter the master spreadsheet and match tree species to corresponding species groups and site conditions.

A full species list with assigned suitability types was electronically provided to the City of Largo, as part of this project.

TABLE 32

TREE SELECTION MATRIX TOOL

SITE CHARACTER		VERTICAL CLEARANCE		TREE BED WIDTH		SUITABILITY TYPE
Urban	→	Wireless	→	<3.5'	→	1
				3.5'-4.5'	→	2
				>4.5'	→	3
	→	Wires	→	All Widths	→	4
Commercial	→	Wireless	→	<3.5'	→	5
				3.5'-4.5'	→	6
				>4.5'	→	7
	→	Wires	→	All Widths	→	8
Landscape	→	Wireless	→	<3.5'	→	9
				3.5'-4.5'	→	10
				>4.5'	→	11
	→	Wires	→	All Widths	→	12

FIGURE 23

Urban Heat Island Analysis
Determined by Ratio of
Impervious Surfaces to Tree
Canopy

Urban Heat Stress
by Hot Spot Analysis

Very Low
Low
Moderate
High
Very High

*Heat stress identified by using a ratio
of impervious surface to tree canopy
within a 25x25 meter grid.