FOREST MANAGEMENT

Recommended Updates to the Integrated Forest Management Plan

Prepared for:

The Woodlands Township

Recommended Updates to the
Integrated Forest Management Plan
The Woodlands, Texas

Production Team

Paul S. Howard, Project Manager
John Ross, Senior Resource Forester
Claudia T. Walker, Graphics and Design
Charles Burditt, Document Content & Edits

Table of **Contents**

THE WOODLANDS

TEXAS

The Woodlands Township is a community comprised of approximately 28,000 acres of residential, commercial and public lands creating an environment for residents to live, work and play. Public lands include parks, community facilities, pathways and open space reserves. The open space reserves serve as forested buffers between properties and roadways and create the uniquely wooded experience for residents and visitors that was envisioned from the inception of the development. These open space reserves are the subject of the Integrated Forest Management Plan developed between 2000 and 2003 to guide the management of the reserves for the safety and health of the forests, and residents. After ten years of use as a management tool, the time has come to update the plan to reflect current needs given the changes to the forest due to both natural and manmade influences including drought, natural growth and death of vegetation, and development. Key topics addressed in these recommendations include hazard tree removal, invasive species control, reforestation, wildfire prevention and community awareness.

Executive **SUMMARY**

The Integrated Forest Management Plan was created as a tool for managing the growth and health of the forests in The Woodlands. The document was developed by the Community Associations of The Woodlands in 2000 and adopted in 2003, and has since been the guidebook for management decisions related to the forest. After ten years of use, the Township engaged Burditt Consultants to review the plan and conduct site inspections to determine what components of the plan needed to be updated given changes in the forest over time, climate patterns, and community needs.

Executive SUMMARY 01

PRIORITY ACTION ITEMS

1. **Expand community awareness and volunteer activity through existing programs, offering education and tree planting opportunities.**

2. **Continue reforestation efforts with planting of drought-resistant tree species of the size and numbers outlined in these recommendations. Focus should be on smaller seedlings which have a proven track record of higher performance.**

3. **Conduct an inventory of hazard trees on all open space reserves. GPS locate and schedule for removal all dead trees that have the potential to fall on persons or property.**

4. **Address wildfire risk through development of "defensible space" on larger reserves (many acres) by clearing understory vegetation to a distance of 30 feet between forests and structures.**

5. **Address invasive/non-native species through continued eradication of excessive accumulation of vines. Remove large accumulations of Chinese Tallow.**

6. **Coordinate with The Woodlands Development Company, San Jacinto River Authority and other entities to address management needs for properties in the community not owned by The Township.**

Site Inspections

Site inspections were conducted of the open space reserves at the 30 original locations sampled in 2000. Additional inspections were made of 4 reserves located within areas of the community that were developed since the drafting of the original plan. Each site was evaluated to determine the current condition of the forest, maintenance needs, presence of hazards, and opportunities for reforestation.

Plan Review

The existing plan was reviewed to determine the overall relevance with regards to management recommendations therein given changes in the community over the last decade. The plan remains a useful tool based on the standard practices used in the field of forest science. Key findings for updating the plan are listed as follows:

Key Findings

1. Forest Health - Overall the forests of The Woodlands are healthy and recovering well from the 2011 drought. Forests are always in a state of change as trees and other vegetation grow and die in response to factors in the natural environment. There is significant variation in the age and stand composition in open space reserves throughout the community.

Forest Health

Community Awareness

2. Community Awareness - A key tool for garnering support for management activities and assistance with tasks such as reforestation efforts is educating and engaging the public. Recommendations for increasing community awareness include the following:

- Continued support for Arbor Day, including support for tree seedling giveaways in coordination with The Woodlands Development Corporation.
- Expansion of the Adopt-A-Path program, adding tree planting opportunities including tree seedlings and planting instructions. The current program has secured 60 miles of trail adoption whereby volunteers pick up litter. This program could also serve as a means of monitoring for potential hazards and excessive debris accumulation.
- The Cleanup/Greenup program has been a successful program for removal of excessive landscape debris that has been dumped behind fences. The program has volunteers with "boots on the ground" that aid in the management of the forest. Such a program could be expanded to include reforestation efforts with proper coordination.
- Signage could be used to educate the public about forest management activities such as reforestation efforts, vegetation control and hazard identification. Such signage can alleviate concerns the public might have when management activities are going on.


Hazard Tree Management


Reforestation


Drought


Wildfire Risk

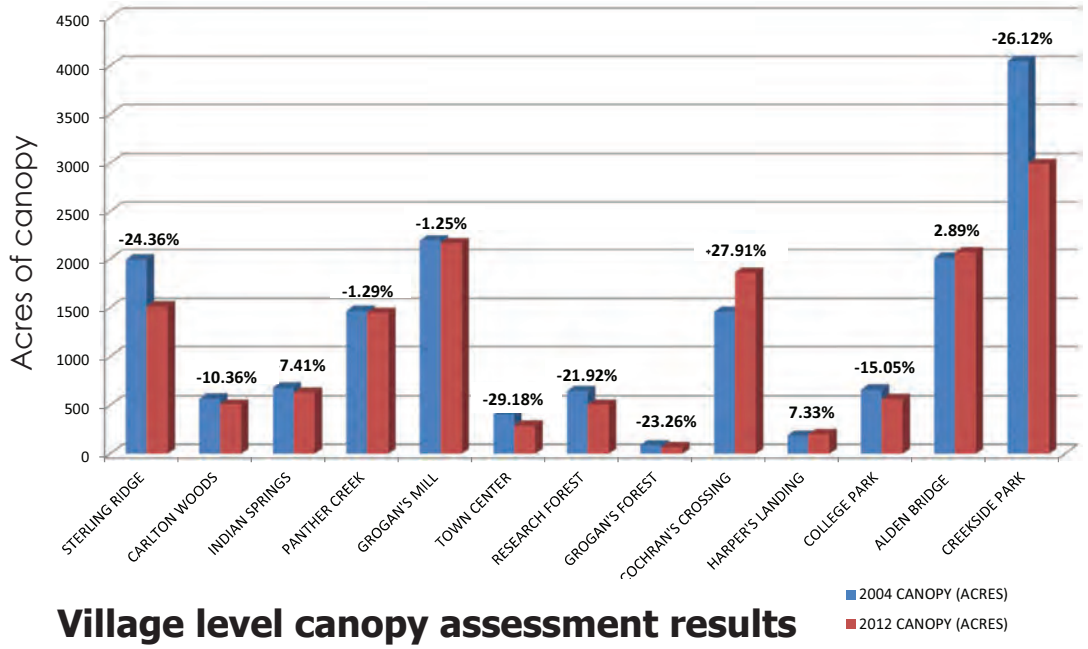

Invasive Species

- A Big Tree Registry should be established such as the one maintained by the Texas Forest Service. A big tree registry is a way of engaging the public to celebrate significant trees in a community. These trees are verified by designated officials when they are found to be of a certain "Champion Tree" size.

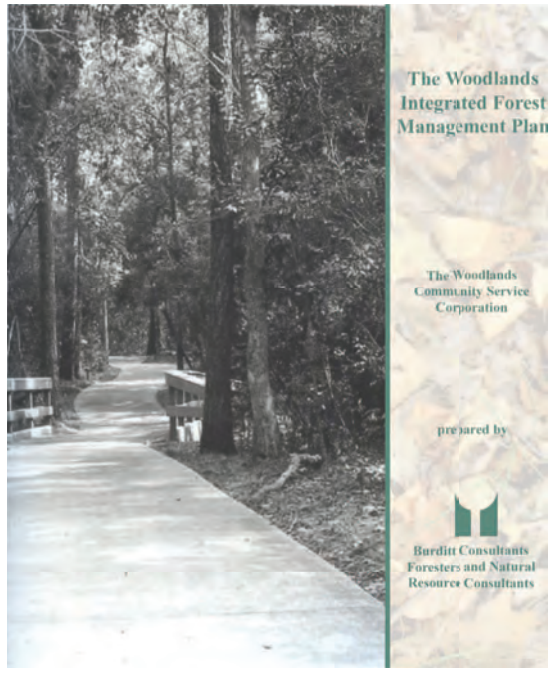
3. Hazard Tree Management - The effects of the drought (2011) and the natural order of life in the forest have and always will, create potentially hazardous situations when trees die and have the potential to fall on people or property. It is recommended to conduct an annual or bi-annual (as currently practiced) assessment of all of the open space reserves and other public properties to identify potential hazards and schedule for timely removal. This inventory should include GPS location of the hazard and notation of the extent of work necessary to remove it. The inventory can be done as a stand-alone undertaking or during the course of daily work by staff, provided that it is documented to ensure all areas have been visited.

4. Reforestation - The Woodlands Township has been actively addressing reforestation needs in conjunction with the removal of dead trees from the 2011 drought. The current practice is to plant 2 trees for every tree that is removed. Based on the tree removal records to date and a study conducted in 2012 by American Forest Management, LLC, an approximate 8,000 trees will need to be planted in the 2013-2014 year. The period of 2014-2018 will require an additional 2,500 to 4,000 trees of various sizes to be planted from container grown to seedlings.

5. Drought - The effects of the 2011 drought have been quite visible. An estimated 53,000 trees have died due to lack of moisture. Drought is a condition that all forests endure from time to time however, practices such as planting of drought-resistance species can help the forest to be better prepared in the future. Additionally drought resistant landscaping in residential and public properties can reduce water consumption. A list of drought resistant species has been provided for use in reforestation efforts.



Village level canopy assessment results

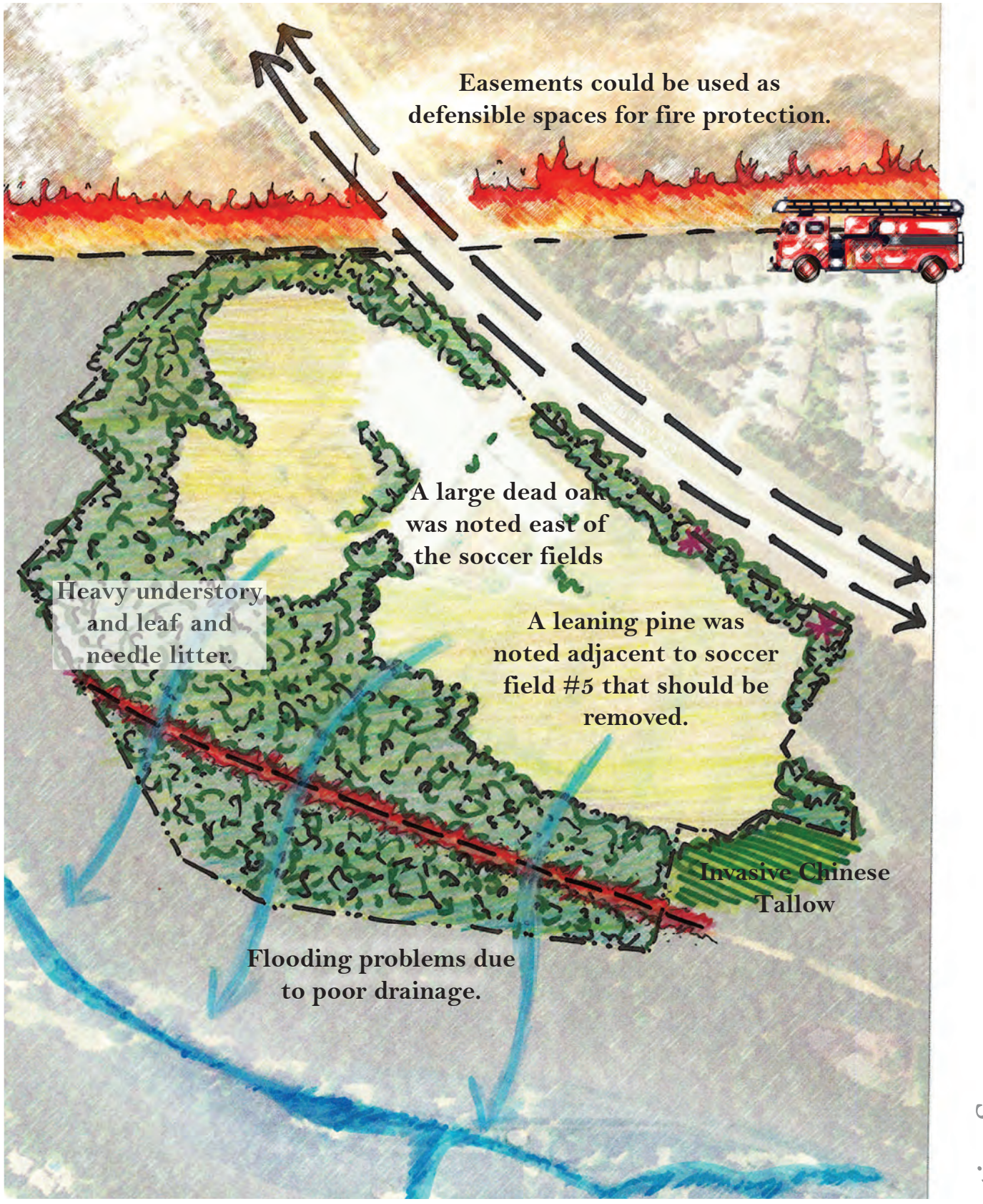


6. Wildfire Risk - Wildfire continues to be a concern for many people living within the forests of The Woodlands. The 2011 drought brought with it an unusually destructive wildfire season across the State of Texas. Remarkably, The Woodlands Township did not lose a single structure to wildfire or even experience any significant wildfires during that period. The Woodlands Fire Department has a 24/7 staff of 37 firefighters at 8 fire stations with access to water throughout the community, thereby reducing the risk of fire substantially. Though always at some level of risk, natural and manmade firebreaks such as roads, and drainageways assist in preventing the spread of fire. It is recommended to install firebreaks of 30' width on larger open space reserves (many acres) to reduce the potential for spread of wildfire if one should occur. It should be noted that many of these larger areas are not on Township property.

7. Invasive Species - Site inspections indicated that there are some invasive/non-native species within open space reserves. There were no major infestations noted however, some species such as Chinese Tallow are found scattered throughout the community. Due to the sporadic distribution of these species, no recommendation is made for complete eradication. Some species noted were tropical and/or non-native landscape plants that have escaped from residential yards. The best approach to managing these types of plant introductions is through community education. To help to control the spread of invasives, the Township should continue the program of educating the public through the variety of available media such as mail-outs, newsletters, community events and the Township Website.

8. Forest Canopy Study - A forest canopy study was conducted using infrared aerial photography from the years 2004 and 2012. Forest canopy was extracted from the remaining landcover and the total acreage of canopy was calculated for each year. In the year 2004 there was approximately 20,904 acres of tree canopy. In the year 2012 there was approximately 18,593 acres of canopy. This represents a loss of 11% of the forest.

The canopy was also calculated at the "Village Level" to identify patterns of change within the community. Although there was a general pattern of loss throughout the community, three villages actually gained canopy. The Villages of Cochran's Crossing, Harper's Landing, and Alden Bridge showed increases in forest canopy during this period.



Analysis Diagram of Key Findings for Alden Bridge Sports Park: Key findings are typical for all inspected reserves and included reforestation, tree health, safety, drainage, fire risks, and invasive species.

INTRODUCTION

SELECTED SITE INSPECTIONS

The following 34 sites were inspected in 2013 to determine current conditions and maintenance needs:

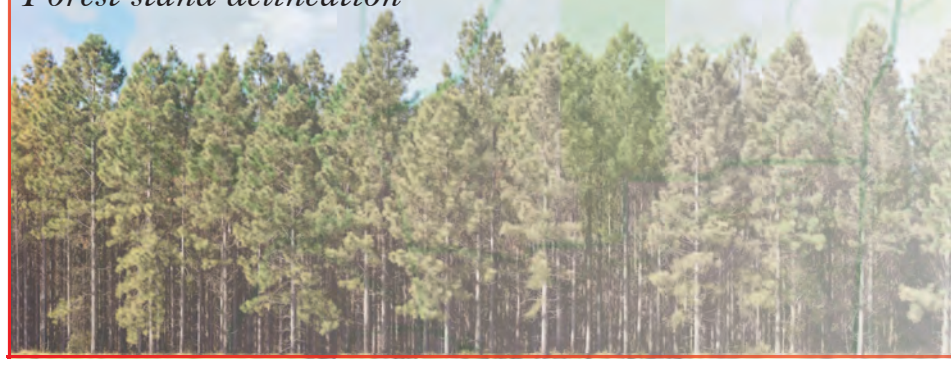
1. Major thoroughfares in Grogan's Mill and Panther Creek
2. Nature Trail
3. Edgewood Forest
4. Loggers Hollow
5. Tamarac Park
6. Gosling Road
7. Camberwell Court/West High Oaks
8. Woodfarm Common
9. Alden Bridge Park
10. Shadow Lake Marsh Experience
11. Alden Bridge Section 23, "B"
12. Alden Bridge Section 53, "A"
13. Cochran's Crossing Section 10, "C"
14. Cochran's Crossing Section 25, "A"
15. Grogan's Mill Section 28, "G"
16. Grogan's Mill Section 44, "D"
17. Alden Bridge Sports Park
18. Bear Branch Sports Field
19. Cochran's Crossing Path
20. Chandler Creek
21. Millbend Common
22. Indian Springs, Section 01 "P"
23. Panther Creek, Section 07, "G"
24. Falconwing Park (2 sites)
25. Southshore Park
26. Ridgewood Park
27. Indian Springs Section 03, "C"
28. Indian Springs Section 08, "G"
29. Panther Creek Section 11, "O"
30. Panther Creek Section 33, "C"
31. Creekside Park Section 3, "A"
32. Creekside Park Section 4,5, "F"
33. Sterling Ridge Section 29, "B"
34. Sterling Ridge Section 18, "B"

Wildlife

Each site was inspected, data collected, needs assessed, and recommendations made for the following:

- Timber stand types
- Identification of woody species both native and invader
- Understory
- Canopy
- Identification of soil types
- Determination of existing fuel types and makeup
- Types of targets for hazard and wildlife
- Forest stand delineation
- Evaluation of edge effect density
- Forest senescence and health

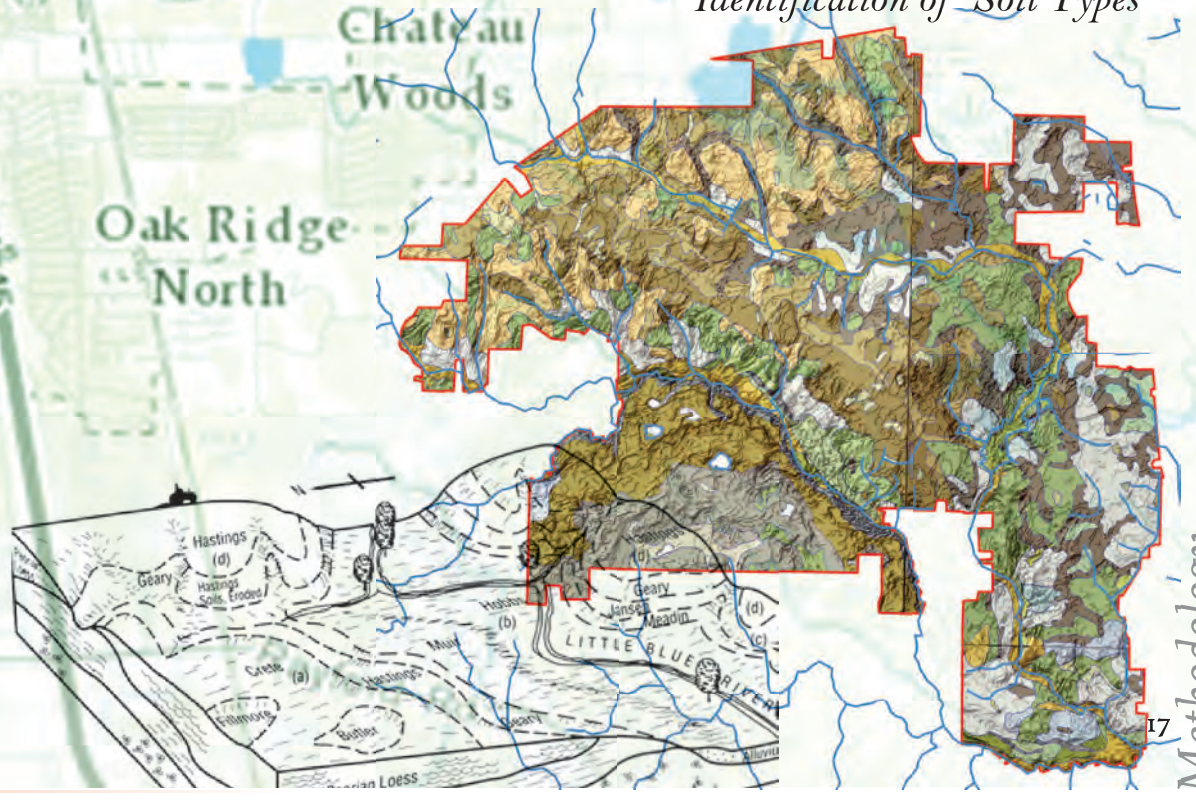
Forest stand delineation



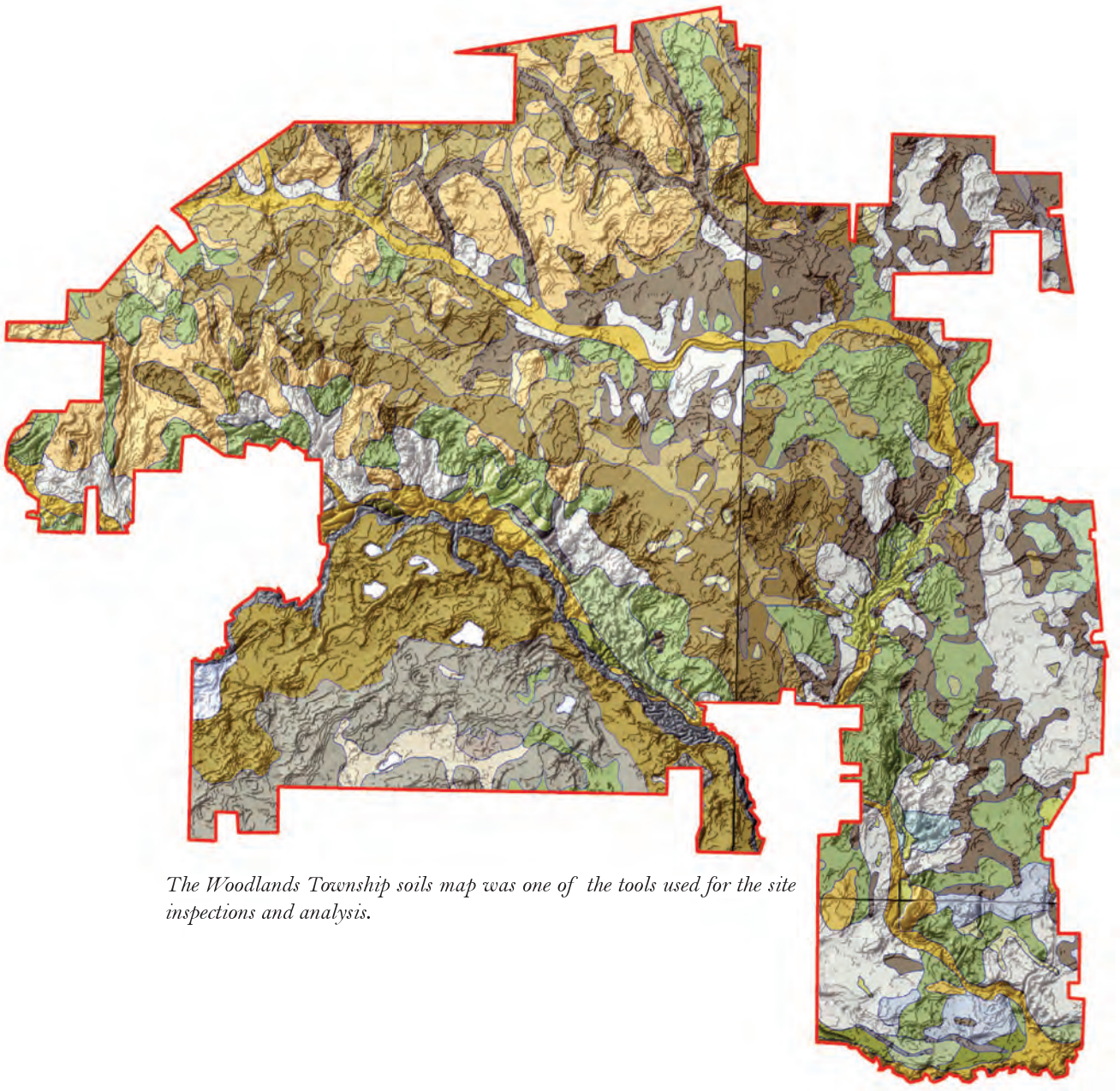
METHODOLOGY

An inventory was made of 34 randomly selected sites out of a total of approximately 1,800 sites throughout The Woodlands. Sites selected included Restricted Open Space Reserves (ROSRs), parks, medians, and woodlots. Inspections included visiting the 30 original sites from the year 2000 planning process and the addition of 4 new randomly selected sites within the Village of Creekside Park and the Village of Sterling Ridge.

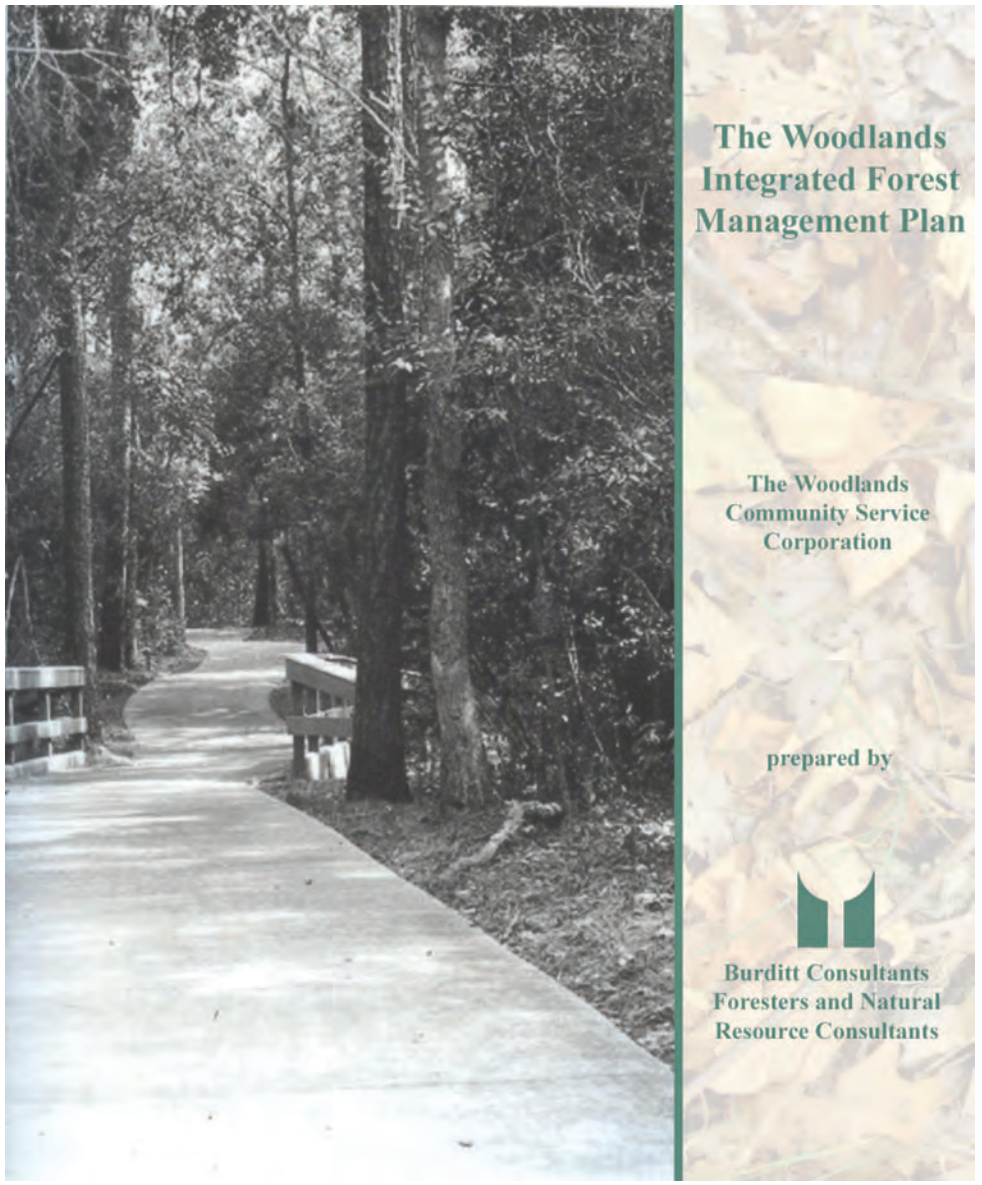
Identification of Soil Types



Woodlands Forest **STUDIES**



The Woodlands Township soils map was one of the tools used for the site inspections and analysis.



The Woodlands Integrated Forest Management Plan was developed to ensure the preservation of existing forest land during development and provide tools for the long-term management of the forest for health and safety of the vegetation, wildlife and community residents. The plan serves as a blueprint for quality stewardship of the interface between the built and natural environments.

In managing the "Community" forest, The Woodlands Township must continuously examine the needs of both residents and the natural systems that make up its green infrastructure. Management of natural resources is not only about the ecosystems and cover, but also about the economies of resource use within the community and the individuals who inhabit and settle. Needs of residents are considered in order to serve the community's expectations.

After the 2011 drought, one of the worst recorded one-year droughts for the State of Texas, an estimated 30,000 dead trees were removed from public spaces in The Woodlands. To understand the initial impact of the 2011 Drought, American Forest Management was commissioned to assess the forest health through an inventory of trees and create a reforestation plan. To date only 1,350 30-gallon trees have been planted in high visibility public areas. The Township encouraged people to plant 121,000 seedlings in public areas which were provided free at the annual Arbor Day Festival on January 19, 2013.

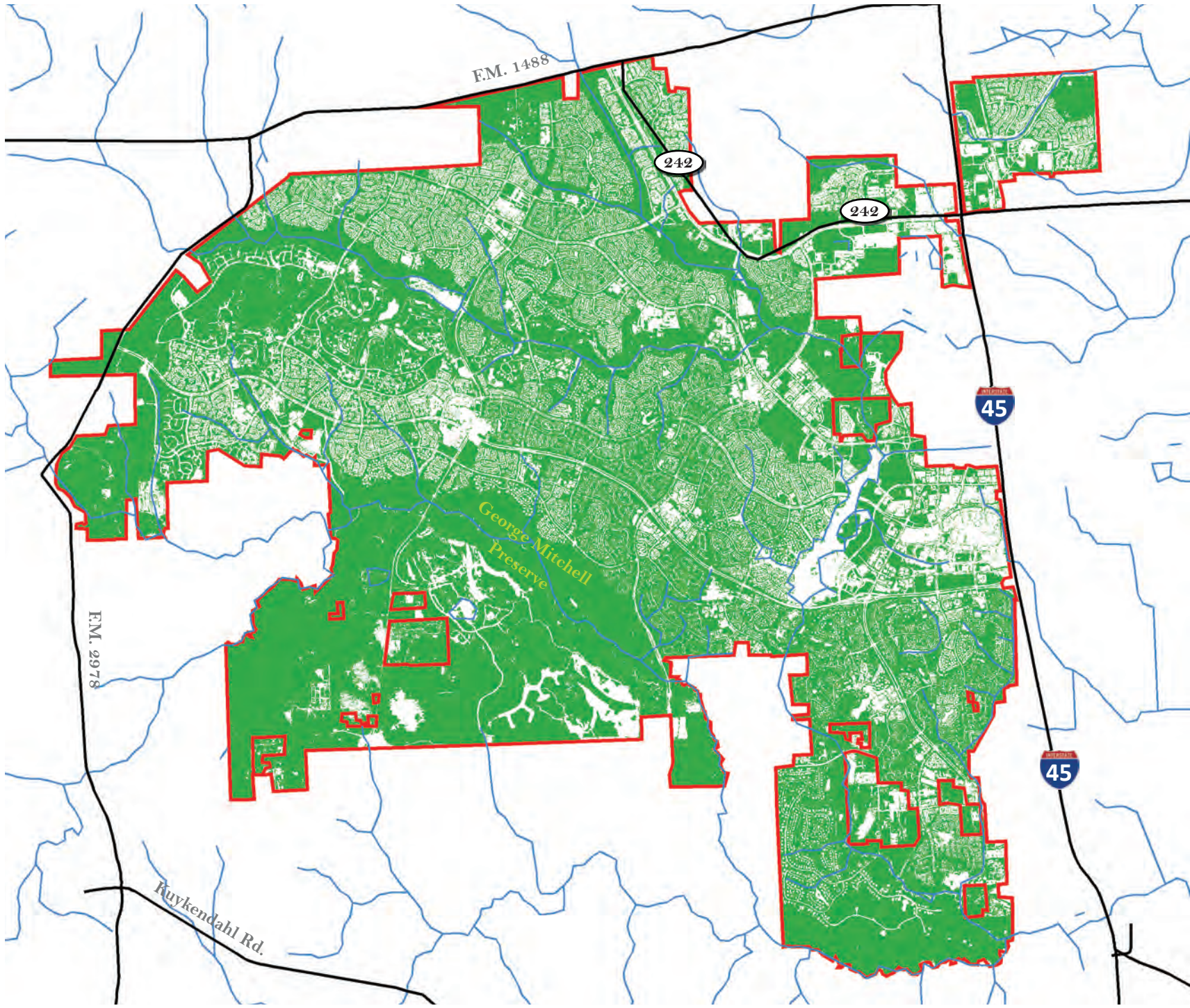
Burditt staff reviewed the 2003 Integrated Forest Management Plan, the 2012 American Forest Management-Forest Health Inventory and Reforestation Plan, and visited/inventoried 34 sites throughout the Woodlands to understand the impact of the 2011 drought. For each location visited, the following data was collected: site description, soil type, eco system, topography, vegetation, ecotone and reforestation needs.

FOREST CANOPY ANALYSIS

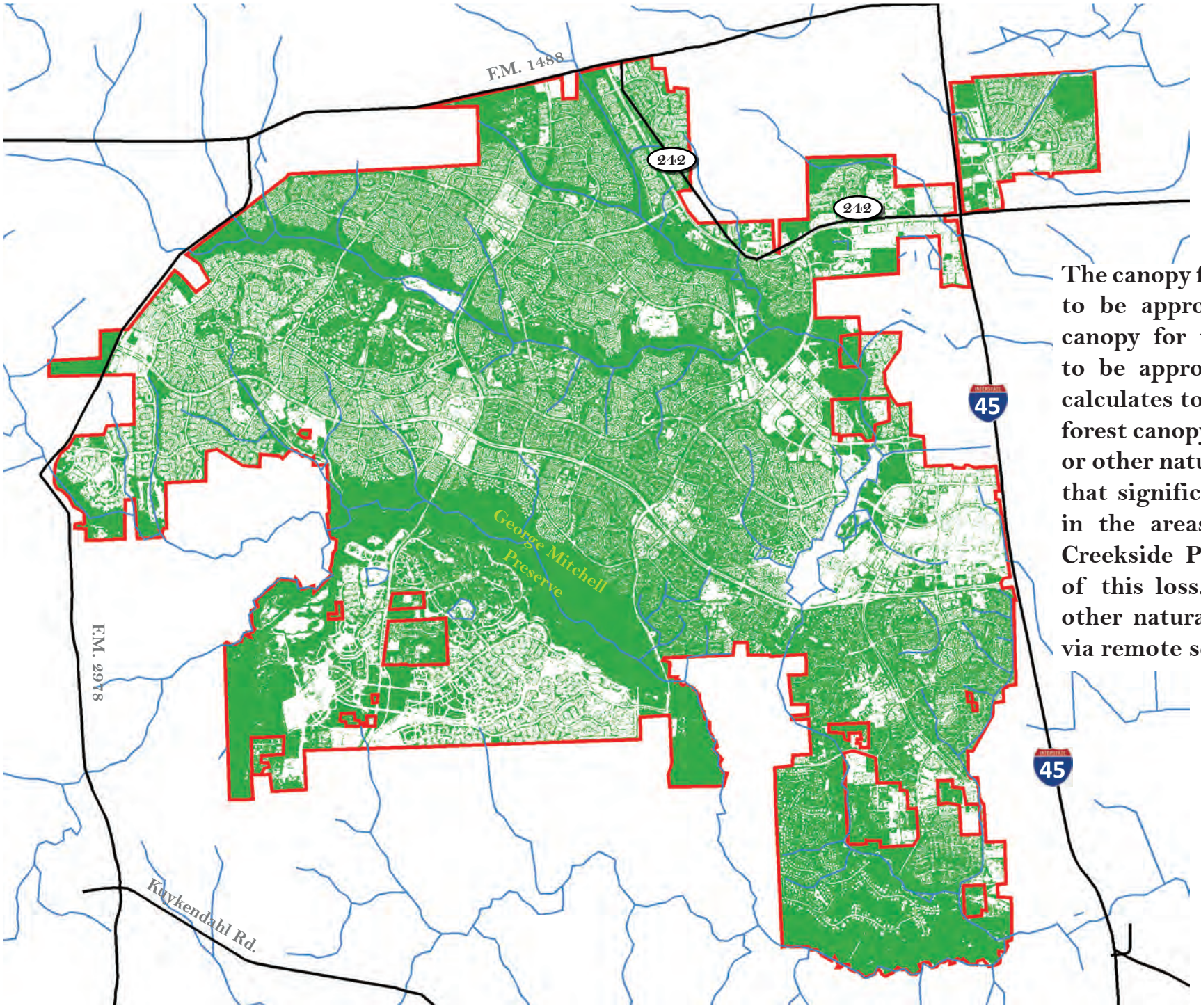
In order to visualize the extent of change in the forest canopy since the development of the Integrated Forest Management Plan, it is useful to gain a perspective of the community as a whole. Over the course of the last ten years, The Woodlands has undergone new development as well as endured a significant drought.

Using multispectral color-infrared aerial photography (flown in the summer months), and analysis utilizing geographic information systems technology, the infrared light reflected by the forest canopy can be isolated from that of impervious surfaces such as pavement and rooftops to generate a clear visualization of the change in canopy over time.

Aerial photography was selected from the summer of 2004 and the summer of 2012 for analysis. The canopy extraction for each selected year was conducted using a maximum likelihood algorithm yielding a accuracy probability of 95% or greater. The results were clipped to represent only canopy within the boundaries of The Township.



2004 LAND COVER ANALYSIS = FOREST CANOPY

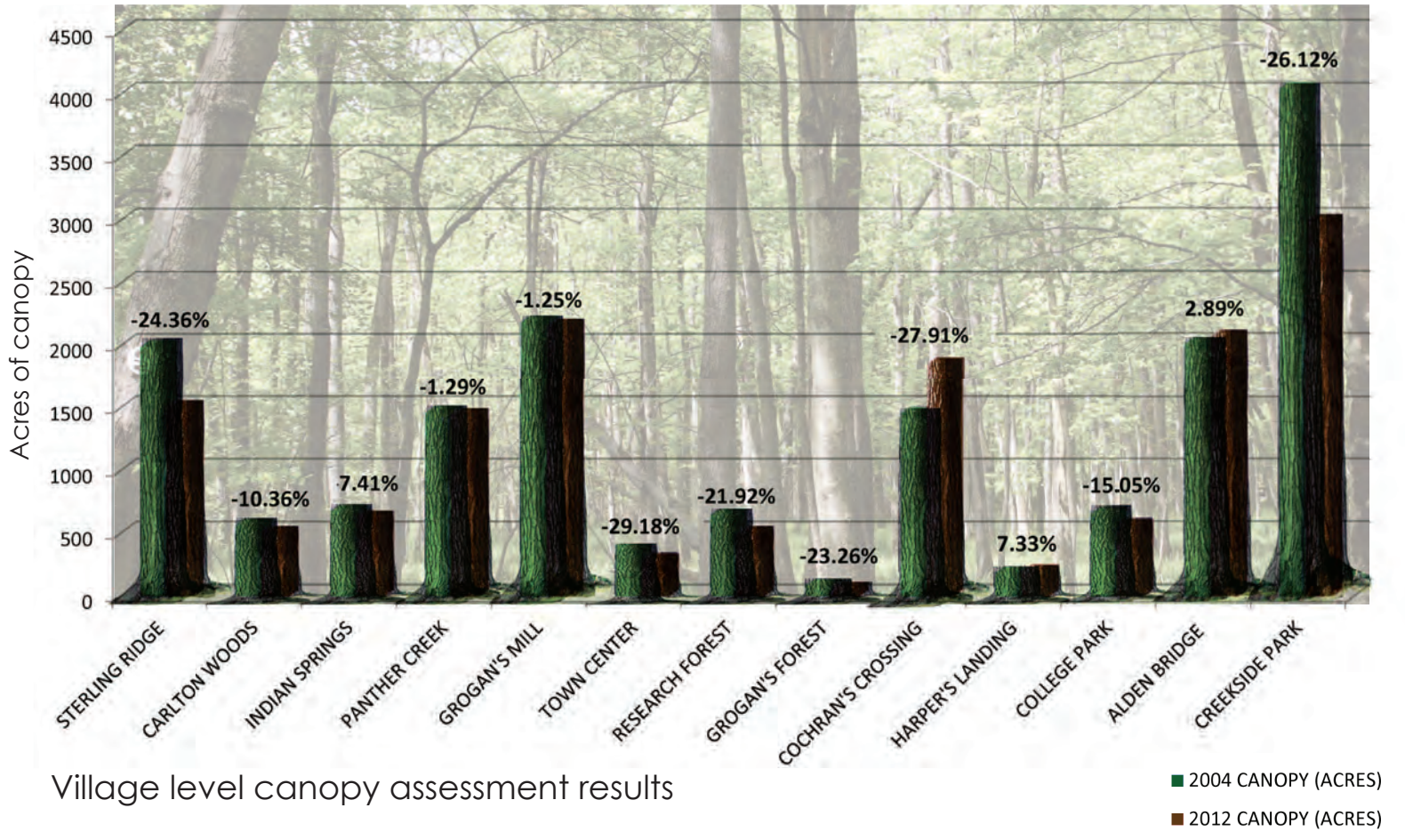


2012 LAND COVER ANALYSIS = FOREST CANOPY

The canopy for the year 2004 was calculated to be approximately 20,904 acres. The canopy for the year 2012 was calculated to be approximately 18,593 acres. This calculates to a loss of 2,311 acres (11%) of forest canopy due to development, drought, or other natural factors. It should be noted that significant development has occurred in the areas around Sterling Ridge and Creekside Park which accounts for much of this loss. Losses due to drought and other natural factors cannot be separated via remote sensing.

FOREST CANOPY ANALYSIS CHANGE BY VILLAGE

In addition to evaluating canopy change community-wide, a study was conducted to extract the forest canopy for each of the major villages in the Township. The results do correspond with the overall loss of canopy community-wide however, on an individual village basis, a few areas have shown growth over the last 8 years.

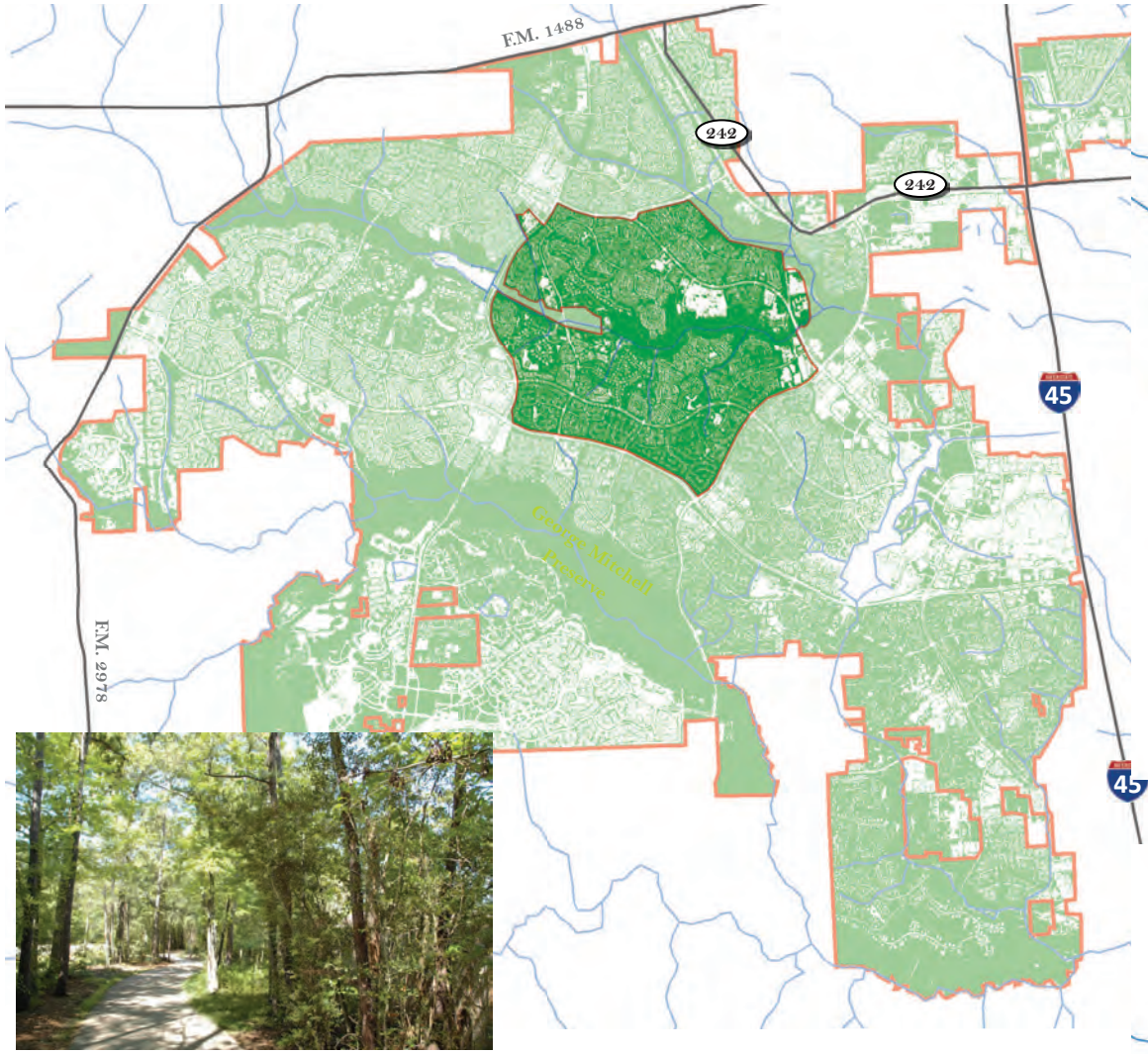


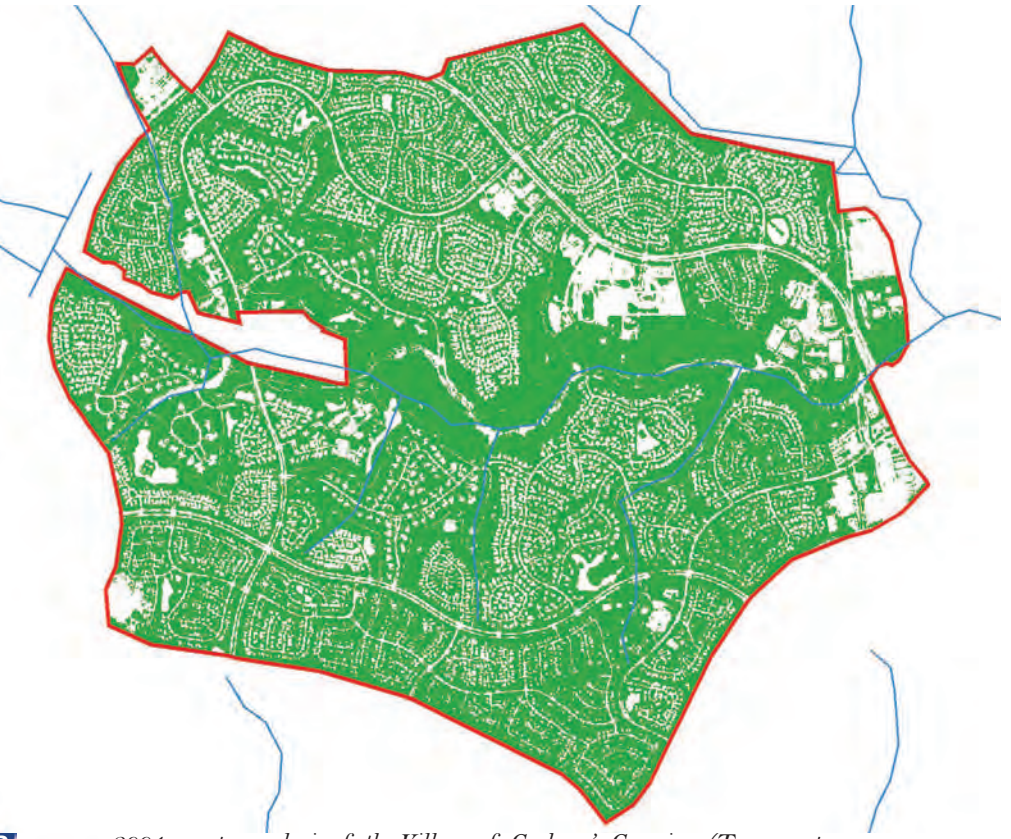
Village level canopy assessment results

The results in the table above show the total acreage of canopy lost or gained between the years 2004 and 2012. In most villages, a loss was identified however, the Villages of Cochran's Crossing, Harper's Landing and Alden Bridge actually gained canopy in that time period.

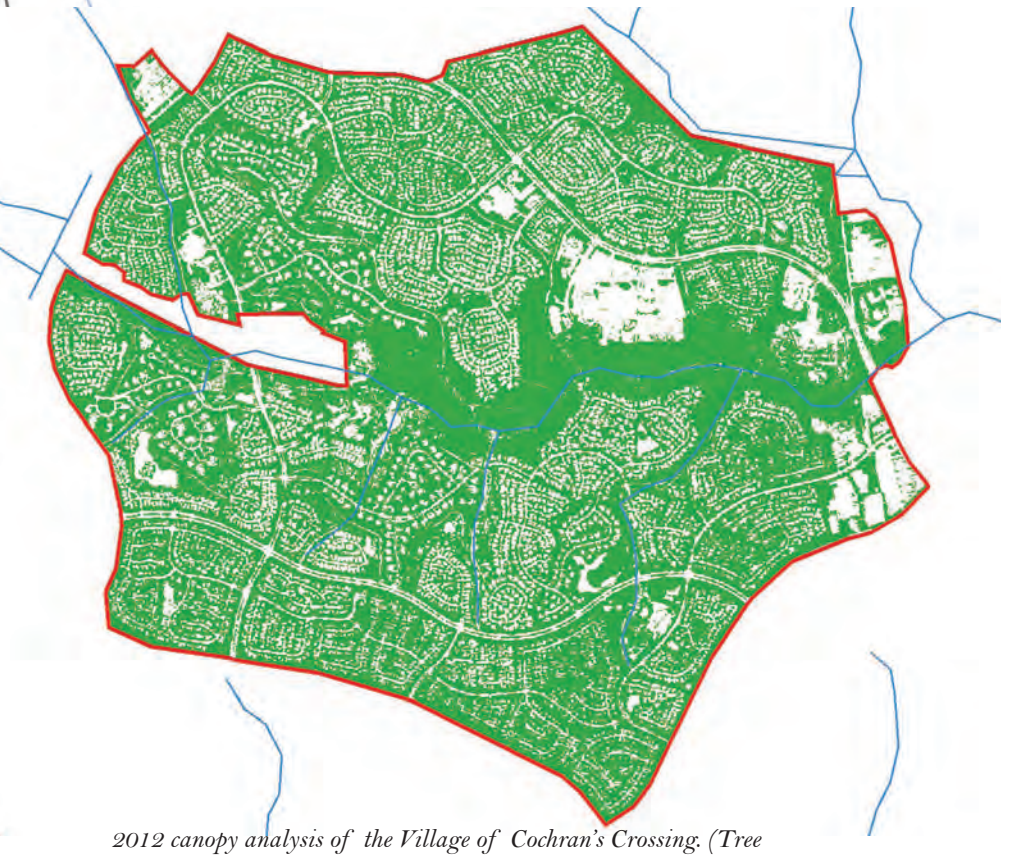
Cochran's Crossing showed the greatest increase in canopy with a remarkable gain of 27.91% over 8 years. The changes in canopy appear subtle and are small gains at the individual tree level however, collectively they add up to a large overall increase. This increase may be due to the soils and available moisture in the area.

The Woodlands Township 2012 Canopy Analysis





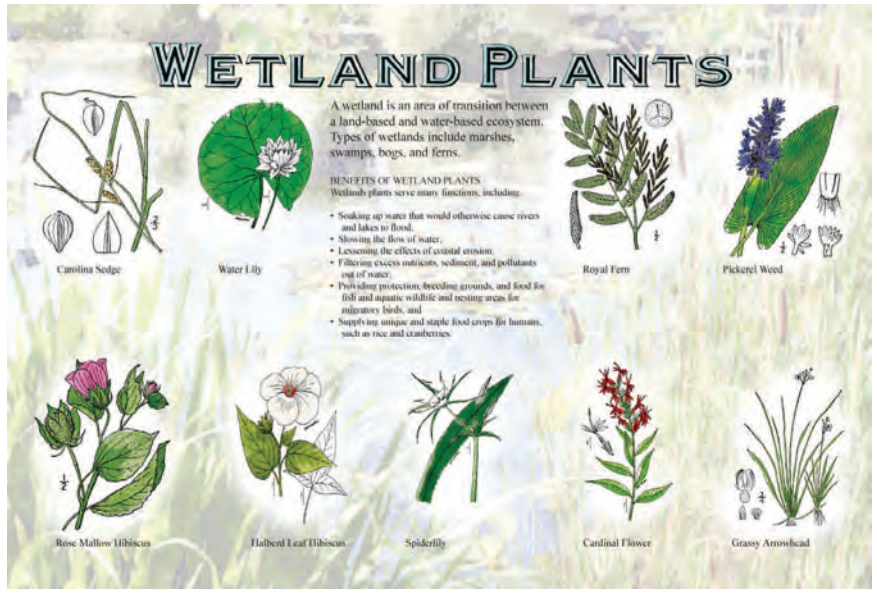
2004 canopy analysis of the Village of Cochran's Crossing. (Tree canopy shown in green)



2012 canopy analysis of the Village of Cochran's Crossing. (Tree canopy shown in green)

THE GEORGE MITCHELL NATURE PRESERVE (1,800 ACRES)

The George Mitchell Nature Preserve is part of the Montgomery County Spring Creek Greenway which will connect and preserve up to 12,000 acres of forest on both sides of Spring Creek and is located in Creekside Village. The Preserve covers nearly 1,800 acres and occupies 8 miles of Spring Creek in both Montgomery and Harris counties. It currently includes a 2 mile main hiking trail loop, 3 miles of bike trails, and has a natural surface with sustainable tracks by Talon Trails.

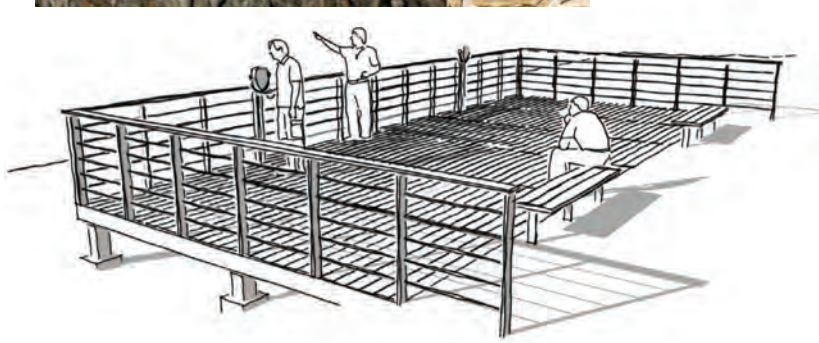


Educational signage gives opportunity to teach the visitors about the ecology of the preserve.

EDUCATION

Current management consists of maintaining the trails and keeping it in its natural state. It will also provide access to Spring Creek for canoes and kayaks. It is a joint project from the Woodlands Development Company, Montgomery County Precinct 3, The Woodlands Township, and the Texas Parks and Wildlife Department.

Currently the George Mitchell Nature Preserve does not have a management plan in place for incidents such as wildfires. Homes and neighborhoods may be put in hazardous Conditions. There are no access points or routes, other than the trails which are not large enough to accommodate fire fighting equipment. There are also areas where the forest abuts developed areas. Using the AFM inventory as a baseline for the region, there is likely extensive mortality and heavy fuel buildup particularly in the larger fuels. We recommend that a Wildfire Mitigation Plan be developed coordinating The Woodlands Development Company, The Woodlands Fire Department and the Texas Forest Service. Since it is a part of the Spring Creek Greenway project, the other partners need to be involved including Montgomery and Harris county precincts and the Texas Parks and Wildlife Dept.



Bird watching platforms situated at different areas of the preserve allow for a variety of bird viewing experiences.

"In the creation of healthy environment nature's collaboration is not only important, but also indispensable"

Eliel Saarinen

The George Mitchell Nature Preserve, situated immediately north of the Village of Creekside Park, is a rich resource for wildlife habitat, recreation and conservation. A biodiversity study may aide in the development of a Recreation Master Plan for education, restoration and expansion in recreation.

Public **AWARENESS**

THE STATE OF THE FOREST

The forested open space reserves of the Woodlands are a mixture of pine and hardwood species from plantation and natural forests growing prior to development. Most areas of the forests are considered to be relatively mature with mixed age stands. Forest stands are generally healthy with varied density of canopy and understory vegetation. Older sections of The Woodlands such as the Village of Grogan's Mill, Panther Creek and Alden Bridge tend to have more mature canopy with heavy understory.

Other areas such as the Village of Creekside Park and Sterling Ridge have some residual forest areas with lower canopy density and some planted areas. Creekside Park has a significantly different composition of forest compared to other Villages due to the nature of its land use and composition prior to development. Some sections of Creekside Park were previously pine plantation and, therefore relatively even-aged and a monoculture of pines. Other areas, closer to Spring Creek were bottomland forest composed primarily of hardwoods. Given the nature of development within bottomland areas, much fill soil was brought in to keep development out of the floodplain. This necessary practice can sometimes present challenges for tree establishment, but plantings seem to be doing well.

COMMUNITY AWARENESS

Currently, The Woodlands has a population of 105,283 encompassing 44 square miles. The Woodlands Township has numerous avenues of information outreach via its website, the Community Relations Department, the Environmental Services Department, Parks and Recreation, Community Services, Public Safety and Fire Departments. The Woodlands Township also puts out news releases on various subjects affecting residences and the biennial survey is an excellent tool for connecting with residents for opinions on the current needs of the community.

Direct

The current system in place is doing a very good job of providing information to residents, particularly the hazard tree update, the environmental services, and the neighborhood services sites on the home page of the community website. This technology is excellent for residents who are computer savvy and generally obtain their information in this manner. The questions that come up are 1.) How to reach that segment of the population that do not utilize this type of information to keep updated, and; 2.) Is that sector large enough to warrant the expense of reaching this group. Current demographics show that 36% of the population is in the 25-44 age group; (meaning that they most likely receive their information electronically.) 39% of the residents are in the 45-64 age group; (meaning they are likely to get their information electronically and other sources such as radio, newspaper, and television.) 14% are in the 64+ age class (more likely to get their information from traditional sources.).

Website

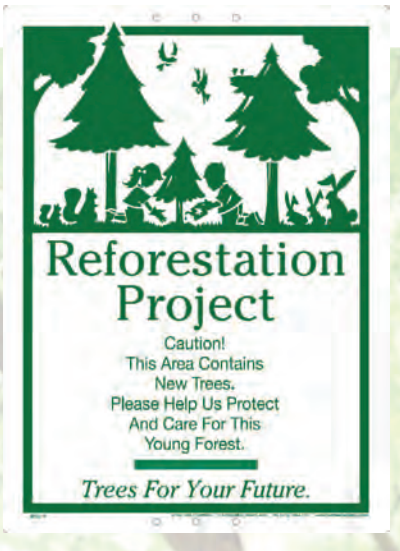
The website is a tremendous asset for the Township. It contains an incredible amount of information and should be continued in its current format. Special consideration could be given to simplify the format and decrease the amount of information presented, to make it easier to navigate and find specific topics or concerns to address. This plan should be placed on the website, along with current information on tree planting activities, forest inventories and tree planting events.

Speakers Bureau

Many organizations have a speaker's bureau to disseminate information on a direct basis. We recommend that you develop a group of speakers to attend village meetings, public forums, etc. to speak on a specific concern or need that is being undertaken by the Township (ie. drought, reforestation, current activities, budget items, etc.). This could consist of township employees or designating someone in each village to update the residents on township and local concerns. This could also include volunteers who are very adept at communicating to groups. This would not be on a monthly basis; but more on an as needed type of operation.

Arbor Day

The Woodlands Development Company coordinates Arbor Day in Creekside Village each year. The Woodlands Township supplemented this with a $5,000.00 donation to buy additional trees in 2013. This support should be continued. Also recommended would be the development of a one page sheet explaining the need to re-forest the ROSR's, the efforts of the Township and to delineate the areas that are high priority in need of trees.



Cleanup/Greenup
The Cleanup/Greenup program should be maintained for community awareness. The date should be moved to the Fall, in early November, so you can hand out 1 gallon container and/or plug seedlings along with the cleanup activities to help with the reforestation effort in the ROSR's. To do this, the name may need to be changed to 'Fall Cleanup' or if you continue to have it in the spring, we recommend that you give away 1 gallon container trees.

Expand 'Adopt a Path' program
This is an excellent program that currently has secured approximately 60 miles out of the 200 miles of pathways in The Woodlands. This program needs to be expanded in the form of publicity to all of the Villages to provide more input and assistance on monitoring the green areas. In addition to the increased awareness, small containerized trees should be given to the current and new path adopters to help with the tree planting. The planting should be documented to coordinate with the Township reforestation to prevent 'double planting'.

Signage
The Woodlands is well designed, with traffic flow in mind, and residents are very mobile throughout all parts of the Township. When planting areas, as part of the reforestation project, put a tasteful, well designed sign that lets residents know what is going on at the particular location. This works well for non-mowed wildflower areas and it would work well for areas that appear to overgrown with brush and vines where new trees have been planted. Costs – Until an inventory is completed, the cost estimate is difficult to determine. We estimate $25.00 - $200.00/sign that will provide a suitable design to coordinate with the rest of the Township signage.

Develop a 'Big Tree' registry for The Woodlands
This was recommended in the original document and remains a very viable option for The Woodlands to develop a list of the largest trees, by species, in The Woodlands Township and Reserves. This could be coordinated by the 'Woodlands Green' and assistance from the Texas Forest Service. Trees that are located can be identified with a small sign and put in a registry. We recommend that the Environmental Services Department oversee this program if it is implemented.

http://texasforestservice.tamu.edu/uploadedFiles/FRD/Urban_Forestry/Big_Tree_Registry/nomform.pdf

Costs
The majority of the programs can be done with current staffing levels. The major costs will be in providing signs for specific 'high visibility' areas and providing additional trees for the 'Adopt a Path' and the Cleanup/Greenup programs. We recommend providing Tree seedlings (plugs) to be planted by trail volunteers by providing 2"x4" hardwood plugs and estimate a need of 1,500 trees for a cost of approximately $2,000.00.

Sabal Palm Illustration

in·va·sive -

A species that is not native to the ecosystem under consideration whose introduction causes or is likely to cause economic or environmental harm or harm to human health.

National Invasive Species Council. 2001.

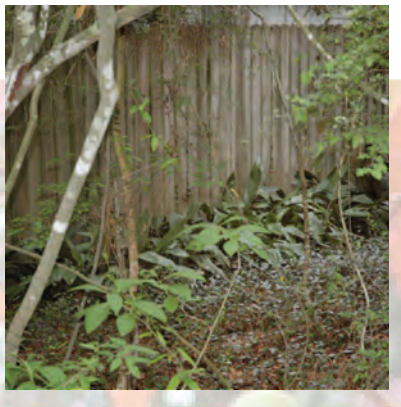
INVASIVE SPECIES

Forests within an urban environment are often hosts to a number of invasive and/or introduced species of trees, shrubs, vines, and herbaceous plants. Often these plants are introduced intentionally or unintentionally from maintained landscapes whether by dumping of landscape debris or seed dispersal via wind and wildlife. Plants from other ecosystems can sometimes become problematic as they compete with native vegetation for water, sunlight and nutrients. During the inspection of selected ROSR's in the community, a number of such species were found growing within the reserves. Plants such as bamboo, Asian Jasmine, Nandina, Chinese Privet, Chinese Tallow, Alligatorweed, and a variety of tropical ornamentals were noted during the inspections. Of these species, Chinese Tallow is the most prevalent. It can be found along the roadways and in motts where there is an old field or clearing.

Removal of invasive species across the entire community would be impractical and prohibitively expensive. Given the extent of invasives found, there is no major cause for concern, rather an opportunity to educate the community about planting native species and thereby limiting the propagation of the invasives. Educating maintenance staff can be beneficial as well, providing an opportunity to remove invasives during the course of routine or on-call maintenance.

The Woodlands Township has done an excellent job of removing understory vines and vegetation for the past decade since the plan revision in 2003. Each year 120 days are spent on vine and understory vegetation removal. This reduces the competition with trees and shrubs for water and nutrients and reduces fire hazard from understory fuels.

The majority of the vine species consist of Greenbriar (*Smilax spp.*), Japanese Honeysuckle (*Lonicera japonica*), Trumpet Creeper (*Campsis radicans*), Poison Ivy (*Toxicendron radicans*), and Carolina Jessamine (*Gelsemium sempervirens*). Of these species, Poison Ivy and Greenbriar cause problems when residents come in contact with them.



Chinese Tallow leaves with their distinct heart shaped form. (Right)

Evidence of introduced plants that have escaped landscape environments, possibly due to dumping of landscape debris. (Left)

Vines accumulating in a tree within an open space reserve at Camberwell Court/West High Oaks. (Right)

Bamboo and palm species have been introduced in Millbend Common along with numerous other tropicals and citrus. (Left)

We recommend that you continue to conduct vine removal operations with emphasis on removal of vines from reforestation sites and the removal of noxious vines such as Greenbriar and Poison Ivy.

Chinese Tallow (*Triadica sebifera*), one of the most invasive and problematic species in the Southeastern United States was noted on the property. First introduced in colonial times as an ornamental and for soap making, it was brought to Texas in 1949 and has spread across the southeast. It is a prolific seed producer, shade tolerant and re-sprouts easily to out-compete native vegetation. It can be controlled with a variety of herbicides and the existing plants are fairly easy to eradicate. The seed source is what makes total elimination difficult as it must be treated yearly to remove seed sprouts. The best way to control Chinese Tallow species is with an approved herbicide by basal spray, foliar spray or frill and spray. Control depends on the size and number of stems to determine the most economical and efficient methods. Inspections should be made periodically to monitor for excessive understory cover, which, reduces opportunity for natural pine regeneration.

Chinese Tallow Illustration

Plan **IMPLEMENTATION**

FOREST MANAGEMENT GOALS

The current needs and future goals of the forested areas are to:

- **Monitor for mortality in both the pine and hardwood component and to remove the trees that create a hazard.**
- **Reforest the areas with a variety of different species to create a diversified and healthy urban forest.**
- **Protect high visibility areas from damage by drought, insects and disease and to maintain the aesthetic quality of these areas.**
- **Develop an inventory to identify and map the areas that are in need of reforestation and other cultural treatments.**
- **Educate The Woodlands Township employees on recognizing specific health concerns of the forest areas and determining whether immediate action is needed.**

A hazard tree has a structural defect that may cause the tree or a portion of the tree to fall on someone or something else of value.

For a tree to be a hazard, a "target" must be within the falling distance of the tree or its part that fails.

HAZARD TREES

Trees enhance a community through their aesthetic and physical contributions. Generally speaking, most species are opportunistic and, with a little luck and favorable conditions, can thrive under a variety of conditions. Eventually; however, trees succumb to an assortment of conditions that prove detrimental to their long-term health and vigor. These conditions include changes in available water, competition for nutrients, and compaction of soil structure necessary for proper aeration, among others.

When poor health results from stressful conditions, injury, or simply old age, a spiral of decline can be anticipated, if not always identified. Trees in extremely poor health may not necessarily be a hazard. An example could be a tree growing in a larger open space reserve with no pathways or development nearby. A tree that is in serious decline may prove beneficial to wildlife and add slowly to the nutrient cycle in decomposition. Conversely, a healthy tree may not always be considered safe. An example of which may be a tree that is in perfectly good health that is leaning over a picnic bench in an active park. By definition, a hazard situation requires the presence of both a tree with a potential to fail and a target. Unless a target is present, a tree cannot be hazardous. As a result, assessing hazard is not limited to evaluating failure potential. Hazard evaluation must consider the presence of a potential target.

Hazard trees, dead trees and deadwood in public right-of-ways, within Township parks, and on Township-owned or maintained facilities can pose a threat to both persons and property throughout the Township. Trees will not maintain a static condition and can and will succumb to insects, disease, construction damage, drought, and other damaging elements or agents.

These agents place the tree in stress conditions where the tree will shed limbs or even shut down and die from the resulting problems. However, annual monitoring practices can help reduce the risk of damage, injury and/or death from falling limbs or trees. This can be accomplished during the course of routine maintenance or through a targeted effort of inspecting the Reserves, one village at a time.

It is important to document the progress of inspections to ensure that all Reserves have been visited. Hazards should be located with a GPS receiver to assist tree removal crews in finding the tree and to identify patterns of tree losses geographically. In addition to hazard location, it is beneficial to also note the size of the tree and expected equipment needed to remove the hazard (i.e.: bucket trucks, etc.).

The Parks and Recreation Department should begin an annual monitoring program whereby all open space reserves are inspected for tree hazards. Inspections can be performed by staff or use of a consultant. Annual monitoring should specifically identify the following tree hazards:

Living Hazards

Those trees that have been injured through natural or manmade agents or have reached their mature status and have started a downward spiral of decline. These situations warrant the use of expert inspections and identification of the hazards to determine the trees that pose a threat to persons or property and are in need of removal or mitigative measures.

Dead Tree

Identification and removal –Procedures should be established to promptly locate and remove the trees that pose a threat to persons or property. The identification and removal procedures should have criteria for the urgency, method of removal and the disposal of the resulting material.

Hazardous Limbs

The identification and removal of such, is an integral portion of the urban forest management procedures.

Trees That Create Hazardous Conditions

Public safety in the public right-of-way includes management of trees that, by their natural growth habit, may obstruct the view of traffic flow, traffic signals/control devices, signs and other important elements such as children at play. Overhead clearance of streets and sidewalks for vehicular and pedestrian access, if not properly maintained, can create hazardous conditions. A process of identification and elimination tree hazards, should include the following:

- Identify trees with existing and potentially hazardous conditions during the inspection. Hazard trees should be located via global position system receivers (GPS) for ease of location by maintenance workers. GPS locations can also be used in the long-term to identify patterns of decline in the forests.
- Prioritize hazard conditions for response time (e.g. Emergency, ASAP, Scheduled, etc.) The highest priorities need to be identified (by flagging, signs, barricades, etc.) to notify and inform the public and limit access, until the hazardous condition can be eliminated.
- Low priority hazardous conditions shall be maintained only after the highest priorities have been addressed and/or eliminated.
- Trees that have a potential to create hazardous conditions shall be maintained through a predetermined schedule (maintenance cycle).

REFORESTATION
(based on AFM inventory 2012)

This is one of the highest priority initiatives on behalf of The Woodlands Township. Based on the numbers provided by the AFM plan and the township; 53,105 trees were dead. By the end of 2012, an additional 12,400 trees were removed leaving 40,700 dead trees at the beginning of 2013.

This does not take into account additional mortality. Using the mortality estimates retained from recent forestland appraisals in the area this year, we have estimated an additional 3%, for a total estimate of 41,921 trees that are dead. Based on the survey, 75% of these trees are less than 6 inches in diameter and most likely not hazard trees in need of removal. This leaves approximately 10,481 trees in the larger diameters. Based on your removal percentage of 43%; we are looking at an estimate of 4,000 trees that will need to be removed this year (2013). These numbers most likely represent a 'high end' figure as we expect the mortality numbers to continue to decrease and flatten out in the 1,500-2,000/year range.

At this point in time, 1,350 30-gallon trees and 43,000 seedlings will have been planted, providing a good start to the reforestation efforts; however, it is unknown how many of the planted trees have survived. Based on data of efforts done by other tree planting groups, we estimate 30% survival of the seedlings and 50-60% of the containerized (assuming there was no additional water). We feel that the reforestation approach can be implemented using varying techniques depending on budget and community perception.

Inventory

An inventory will be needed for any method used to accomplish the reforestation efforts. A simple inventory consisting of location; size of area; characteristics (high visibility, hazard trees, brush component etc.); and type of planting material needed for that location should be implemented. The locations should be mapped with a GPS; determined if it is a high or low visibility and estimate the number of trees and size needed. A data base should be set up to keep track of planted areas, to include updated maps and means to check survival. This can be performed by a staff member trained by a knowledgeable person in the Parks and Recreation Department and at a minimal cost; yet provide valuable information. An inventory should be made every 5 years which correlates with a planting cycle.

A database for reforestation is critical for budget planning and to keep up with an on-going yearly occurrence (ie. mortality). This should be done on a yearly basis, if budget allows, or once every two years for the tree plantings.

Reforestation Methods

We concur with AFM's recommendation of a five year plan to reforest all of the areas affected by the drought and to replant new areas created by additional mortality. Currently, The Woodlands Township is planting 2 trees for every tree removed and plans to continue this practice.

We recommend that the Township continue the current method of responding to calls and making periodic monitoring of different areas to replace trees 'as needed', particularly in high visibility areas and newer developed areas that have a sparse original canopy. This should continue until a working inventory is in place.

Planting Material - Size and Amount

Current reforestation needs for 2013 are estimated at 8,000 trees (2 for 1) based on first quarter removals. We estimate the mortality of trees in the next 5 years to decrease to an average of 1,500 – 2,000 trees per year.

We recommend that the percentages of planting material for reforestation consist of 10% large container stock (15-30 gallon); 40% small container stock (1-5 gallon); and 50% plug seedlings and bare-root seedlings.

We recommend planting smaller trees because of costs, planting densities are higher to offset mortality and smaller trees adapt better to the sites.

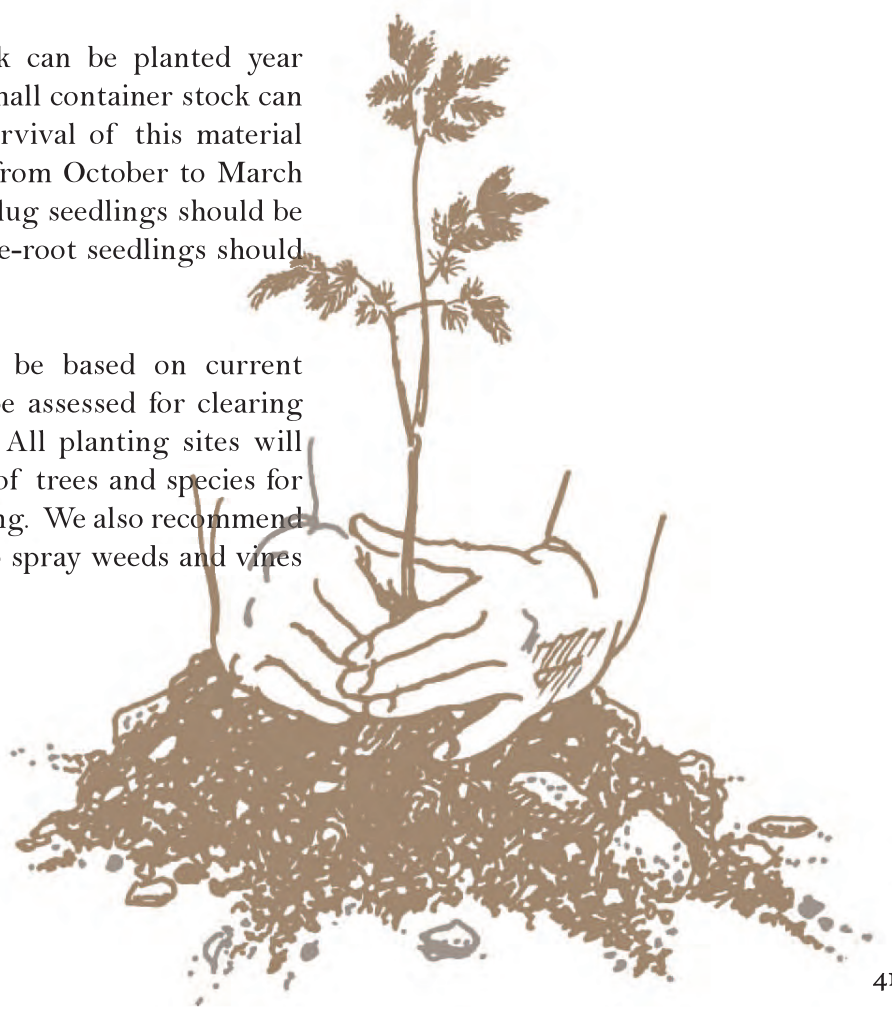
For the 2013-2014 planting season, we estimate the number trees needed for reforestation to consist of 800 large container trees, 3,200 small container trees; and 4,000 plug seedlings.

For the 2014 – 2018 planting cycle we estimate 300-400 large container trees; 1,400 – 1,600 small container trees; and 800 – 2,000 plug seedlings per year for reforestation needs.

Timing of Plantings

Large containerized planting stock can be planted year round from January – December. Small container stock can be planted year round; however survival of this material will be much better when planted from October to March when moisture is more available. Plug seedlings should be planted October to January and bare-root seedlings should be planted from January to March.

Planting areas and numbers will be based on current inventory data and each site will be assessed for clearing needs to be prepared for planting. All planting sites will be mapped along with the number of trees and species for follow up watering and/or monitoring. We also recommend follow up with backpack sprayers to spray weeds and vines competing with the trees.



SPECIES/SITE SELECTION –

Recommended species and sites

Species	Size	Site (Wet, Moderate, Dry)
Texas Redbud	S	Dry - Mod.
Texas Persimmon	S	Dry - Mod.
Texas Pistache	S	Dry – Mod.
Desert Willow	S	Dry – Mod.
Vitex	S	Dry – Mod.
Hawthorn	S	Dry - Wet
Lacey Oak	M	Dry – Mod.
Loquat Oak	M	Dry – Mod.
Eastern Redbud	M	Dry – Mod.
Chinese Pistache	M	Dry – Mod.
Mexican Sycamore	M	Dry – Wet
Red Maple	M-L	Mod. –Wet
Drake Elm	M	Dry – Mod.
Cedar Elm	M	Dry
Green Ash	L	Dry – Wet
Montezuma Cypress	L	Dry – Wet
American Sycamore	L	Wet
Blackgum	L	Wet
Loblolly Pine	L	Mod.-Wet
Shortleaf Pine	L	Dry – Mod.
Bur Oak	L	Dry - Mod.

Websites: www.arborgen.com/index.php/united-states-operations/nursery-locations/
www.rennerwood.com/

Chinese Pistache
Pistacia chinensis

Montezuma Cypress
Taxodium mucronatum

Blackgum
Nyssa sylvatica

Planting Sites

High Visibility Sites – Include the ROSR's along the major thoroughfares (Grogans Mill, Woodlands Parkway, Research Forest and Gosling); the entrances to subdivisions and areas around the parks.

Low Visibility Sites – Include all other ROSR's , low use areas and Woodlands Reserve areas.

Planting Material and Planting Specifications:

1. Large containerized stock (10-30 gallon) and small containerized stock (1-5 gallon).

2. Furnish nursery-grown plants true to genus, species, variety, cultivar, stem form, shearing, and other features complying with ANSI Z60.1; and with healthy root systems developed by transplanting or root pruning. Provide well-shaped, fully branched, healthy, vigorous stock, densely foliated when in leaf and free of disease, pests, eggs, larvae, and defects such as knots, sun scald, injuries, abrasions, and disfigurement.

3. Root-Ball Depth: Furnish trees and shrubs with root balls measured from top of root ball, which shall begin at root flare according to ANSI Z60.1. Root flare shall be visible before planting. (ANSI Z60.1-American National Standards Institute for Nursery Stock).

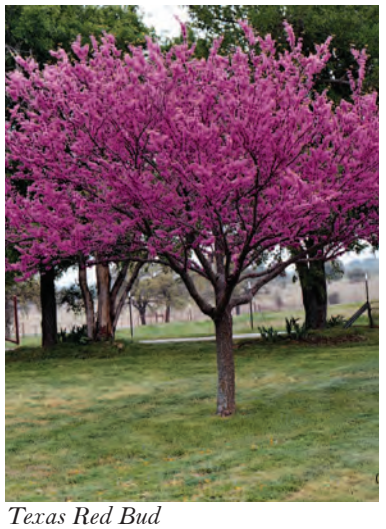
4. Excavate circular planting pits with sides sloping inward at a 45-degree angle. Do not further disturb base. Ensure that root ball will sit on undisturbed base soil to prevent settling. Scarify sides of planting pit smeared or smoothed during excavation. Excavate approximately three times as wide as ball diameter.

   Excavate at least 12 inches (304 mm) wider than root spread and deep enough to accommodate vertical roots for bare-root stock. Do not excavate deeper than depth of the root ball, measured from the root flare to the bottom of the root ball. Subsoil and topsoil removed from excavations may be used as planting soil in compliance with planting requirements. Before planting, verify that root flare is visible at top of root ball according to ANSI Z60.1.

5. Remove stem girdling roots and kinked roots. Remove injured roots by cutting cleanly; do not break.

6. Set stock plumb and in center of planting pit or trench with root flare as indicated on drawings, above adjacent finish grades. Use planting soil for backfill.

Loquat Oak
Quercus rhysophylla



Texas Red Bud
Cercis canadensis var. texensis

Mexican Sycamore
Platanus mexicana

7. Container-Grown: Carefully remove root ball from container without damaging root ball or plant. Backfill around root ball in layers, tamping to settle soil and eliminate voids and air pockets. When planting pit is approximately one-half filled, water thoroughly before placing remainder of backfill. Repeat watering until no more water is absorbed.

8. Place fertilizer in each planting pit when pit is approximately one-half filled. Do not place in bottom of hole. Continue backfilling process. Water again after placing and tamping final layer of soil.

9. When planting on slopes, set the plant so the root flare on the uphill side is flush with the surrounding soil on the slope; the edge of the root ball on the downhill side will be above the surrounding soil. Apply enough soil to cover the downhill side of the root ball.

Planting Costs

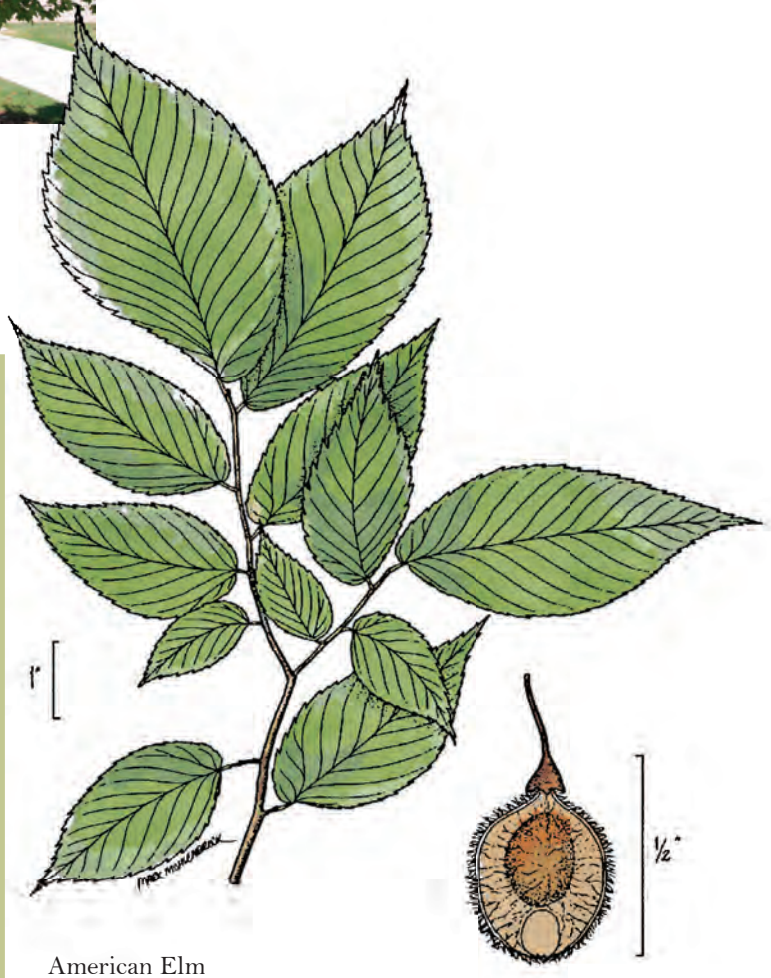
Large Container Material
(30 gallon) - $85.00 Wholesale
- $185.00 Installed
(15 gallon) - $40.00 Wholesale
- $135.00 Installed

Small Container Material
(3-5 gal) - $8.00 - $12.00 Wholesale
- $17.00 - $25.00 Installed
(1 gallon) - $5.00 – Wholesale
- $14.00 Installed

Plug seedlings
Loblolly pine - $0.27 plug - $0.47/plug planted.
Hardwood - $1.30/2”X4” plug - $1.50/plug planted

Bare-root seedlings
Loblolly pine - $0.14/seedling - $0.32/seedling planted, Hardwood - .25/seedling - $0.43/seedling planted

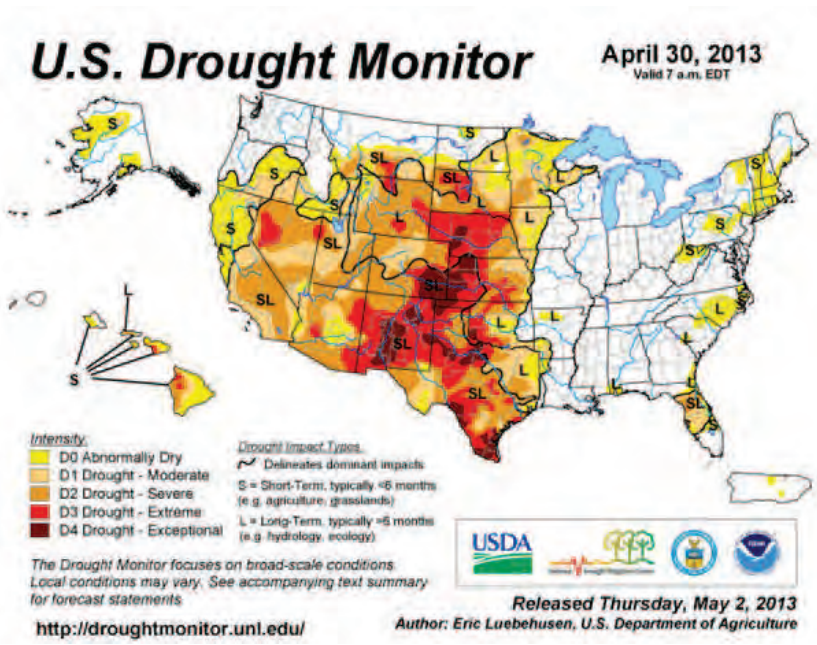
* Based on 2013 estimated prices.

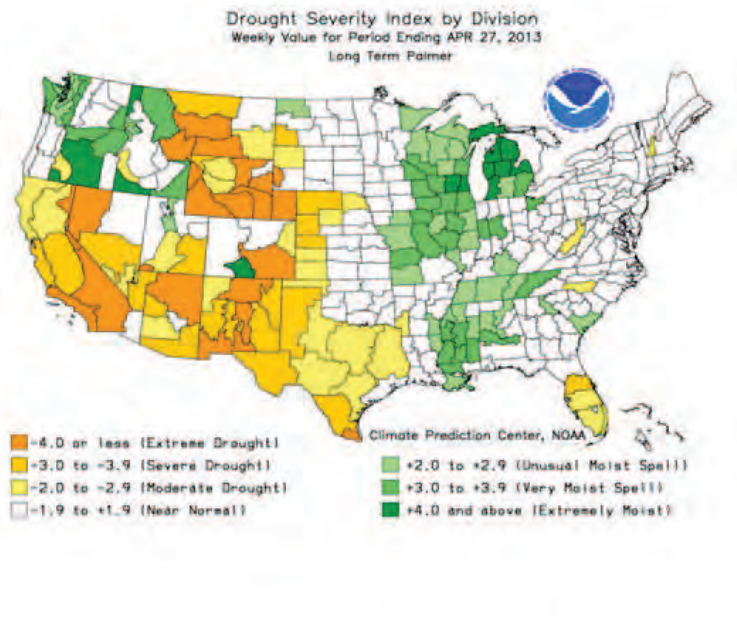


American Elm
Ulmus americana L.

DROUGHT

The drought of 2011 caused extensive mortality in The Woodlands forest resulting in the removal of 7,480 trees in 2011 and 24, 815 in 2012. The most recent inventory done by American Forest Management shows approximately 53,000 trees have died from the drought and The Woodlands Township has removed over 60% of that number. Most of the removals consist of larger diameter trees leaving the majority of dead trees left in the smaller size classes.





Currently, the region is still in a moderate drought despite the periodic rains we have received in the winter and spring of 2013. The current drought conditions are expected to continue; however, based on observations of forestland in the Montgomery County area, *we expect tree mortality to decline significantly*. This is based on line transect appraisals in this county and surrounding counties. This hypothesis is based on moderate to light drought conditions occurring into the summer/fall time period.

Drought is something that The Woodland Township has no control over other than to mitigate the effects. The following is recommended to prepare the forested areas for drought and to minimize the damage and expense caused by drought:

1. Plant drought resistant species as outlined in the Reforestation plan. Species include:
   Loblolly pine; Shortleaf Pine; Eastern Red Cedar; Winged Elm; Cedar Elm; Hickory; Persimmon; Sassafras, Live Oak; Mexican White Oak; Holly spp.; Redbay; Hawthorn and Bur Oak.
2. Newly planted trees within highly visible areas such as neighborhood entrances, parks, and esplanades within major thoroughfares should be watered during the summer months to assist with the establishment period. It is recommended to purchase an additional water truck and extend irrigation of newly planted trees at these locations during their first year of establishment.
3. Increase education and public awareness on the drought situation and emphasize xeriscaping in the landscape codes and covenants. Rainwater harvesting is another excellent addition to building specifications and should be emphasized. We recommend that commercial entities be encouraged to install xeriscapes and rainwater harvest systems as a means of drought adaptation.

Rainwater harvesting system with landscaping.

Xeriscaping with maples and elms and low-water ground covers.

A complete rainwater havesting system with first-flow filtration, underground cistern and irrigation connections. These systems can be installed with no visible intrusion in the landscape.

WILDFIRE RISK MANAGEMENT

The Woodlands Township's unique pattern of development can create both challenges and opportunities with regards to managing wildfire risk. Given the amount of forested areas and the natural character of the forests, opportunities can arise for the development of wildfires, especially during dry and windy periods.

The key components leading to development of wildfires are the presence of fuels, continuous stretches of vegetation and weather conditions. While the Woodlands has large amounts of fuels available for ignition, it also has a great number of natural and manmade firebreaks in the form of creeks, drainage areas and roadways that help to prevent the spread of wildfire to adjacent areas.

A small fire scar was noted in Logger's Hollow during site inspections. The cause of the fire is unknown however, the fire was limited to the space between the open drainage area and the walking path indicating the effectiveness of firebreaks.

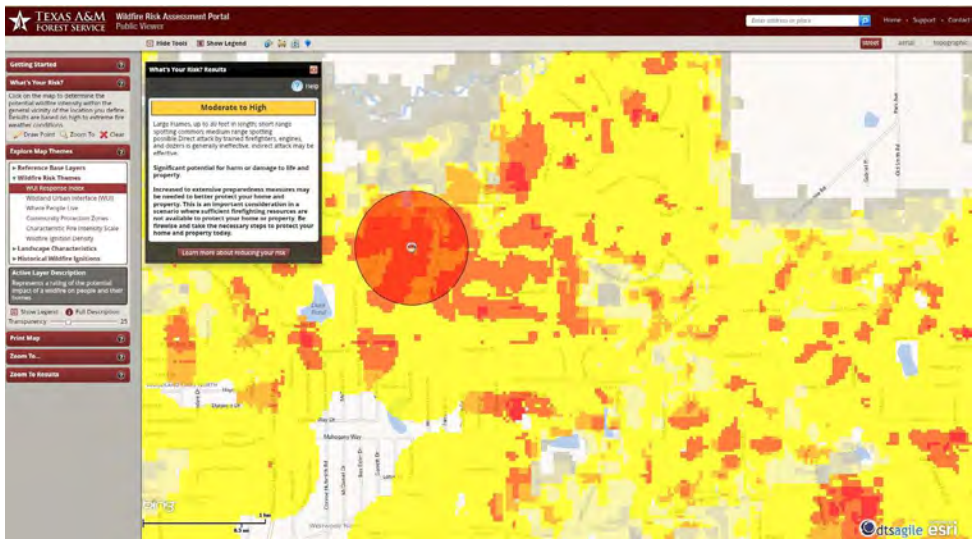
Natural firebreaks, such as this creek, are plentiful in The Woodlands.

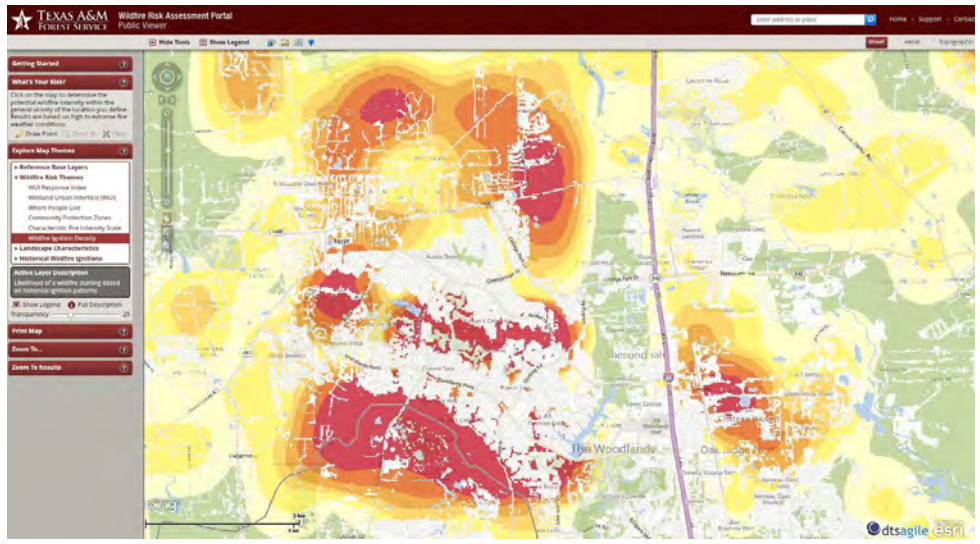
These firebreaks are the key reason why wildfires have not been a significant problem for The Woodlands in the past. The Woodlands Fire Department has a total of 8 firestations and a staff of 37 firefighters on duty 24 hours a day, 7 days a week. With an experienced team of firefighters, almost 4,000 points of access to water and equipment access to most areas, wildfires can be responded to in short time. Additional support is provided by the Texas A&M Forest Service for off-road firefighting.

While a wildfire response strategy is in place, it is important to consider preventative measures. The challenge with wildfire prevention in The Woodlands is the very nature of how the community was developed. The character and charm of the community is in its forests. Given the close proximity to forests that almost all residential and commercial developments enjoy, it is difficult to recommend traditional Wildland Urban Interface (WUI) methods of prevention including creating defensible space between structures and vegetation. The traditional recommendation for defensible space is a minimum of 30 feet of distance between structures and vegetation. This space should be maintained debris-free and composed of non-combustible materials.

To implement defensible space measures on all property in The Woodlands would create a very different experience in the community. However, educating the residents as to how simple measures can be taken on their own property to reduce wildfire risk can be beneficial. Additionally, larger ROSR's could benefit from firebreaks between private property.

Wildfires tend to become catastrophic due to a combination of fuels, wind, dry weather and the opportunity to gain momentum, thereby increasing flame heights and intensity. With the extent of natural and manmade firebreaks in the community and the availability of access to properties and water, the most vulnerable properties will be ROSR's with larger expanses of vegetation that could allow a fire to gain momentum and become a serious hazard. These firebreaks need to be 30 feet wide strips where undestory vegetation is cleared and maintained annually.





Using the TXWRAP "Identify Your Risk" tool, a description is shown of the level of risk for a chosen area.

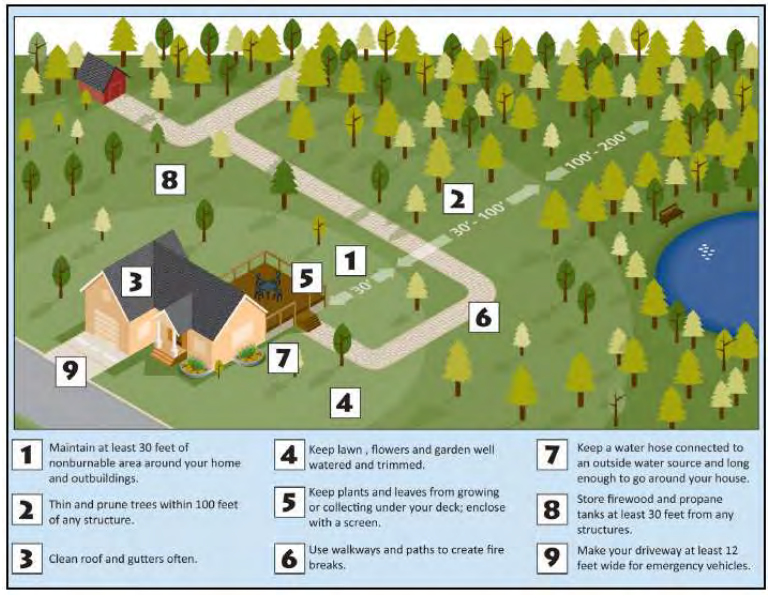
The Texas A&M Forest Service has created an online portal for Texans to evaluate their properties in terms of wildfire risk. The Wildfire Risk Assessment Portal is an online geographic information systems based tool that integrates the Forest Service's experience and studies of fire behavior with GIS-based analysis of vegetation cover across the state and historic fire occurrences.

The Wildfire Risk Assessment Portal is a valuable tool for understanding the nature of wildfire risks within a community. There is a publicly accessible portal as well as a professional site accessible upon completion of a simple application, giving the user additional tools for community planning. The site is available at:
http://www.texaswildfirerisk.com

Exploring the portal allows the user to navigate to an area of interest and view the level of risk of forests and structures at the location. The Wildland Urban Interface (WUI) Response Index evaluates the level of risk of a location based on the fuel levels, land cover, proximity to structures, and available fire-fighting resources in the area.

Some areas within the community are not under the management of the Township. Properties owned by the San Jacinto River Authority, Montgomery County, The Woodlands Development Corporation, and other entities are also at risk, and coordination with these groups is beneficial. The Woodlands Development Corporation owns a number of commercial reserves and the George Mitchell Nature Preserve. These properties are large forested areas that should also be taken into consideration during planning efforts through stakeholder meetings. Topics of discussion may include, development of firebreaks, defensible space where applicable, and emergency response planning.

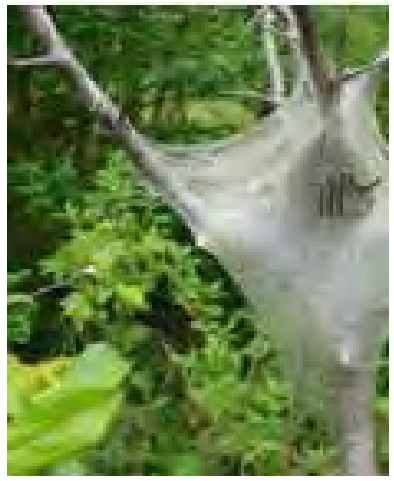
An additional toolset offered by the Texas A&M Forest Service is the Community Wildfire Protection Plan Guide. This guide is a planning tool that can be used for engaging stakeholder groups to create a community level wildfire protection plan. The plan can be as simple or complex as the community sees fit, offering assessment tools for evaluating properties' vulnerability and organizing community efforts to reduce risk. The guide is available at the following web address:
http://txforestservice.tamu.edu/uploadedFiles/FRP/New_-_Mitigation/Unsafe_Debris_Burning/CWPP2.pdf



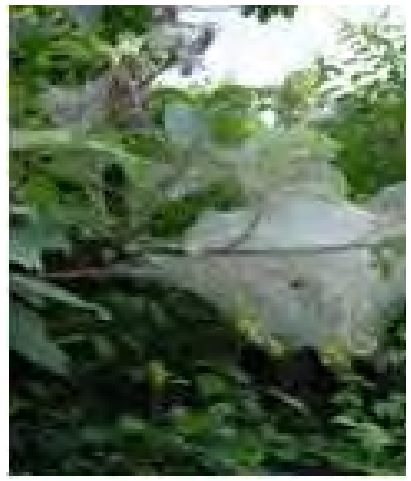
An example of defensible space. This is an excellent way to educate the public about wildfire prevention.

'H' galleries created by engraver beetles.

Pitch tubes created by Southern Pine Beetle.



Eastern Tent Caterpillar web.



Fall Webworm web.

Engraver Beetles

The primary insects that will affect the forest health of The Woodlands Township area and the outlying preserve are Engraver Beetles (*Ips calligraphus, grandicolis & avulses*). They attack Loblolly pine and Shortleaf pine trees during dry periods when the trees are under stress. The Woodlands has lost approximately 23,000 Loblolly pine (out of 53,000 total – AFM report, 4/2012), and the majority of the larger trees (16 inches +) were most likely attacked by Engraver beetles due to drought stress.

The most definite signs of Engraver beetles are partial dieback in the crowns of the pine trees. The top portion or the bottom portion of the tree will be brown while the rest of the crown is green. Once the tree is infested with engraver beetles there is no solution for removing them and the tree most likely will need to be removed. The other indicator is 'H or I' shaped galleries on the inside of the bark.

The best defense against engraver or Ips beetles is to keep the trees healthy and monitor the trees for signs of crown dieback to facilitate quick removal. The Township has kept beetle infestation damage to a minimum and there have been no heavy infestations within the past decade. The drought has caused more damage to the pine stands through beetle attacks of stressed trees than any other event.

Southern Pine Beetle and Turpentine Beetle

The Southern Pine Beetle (SPB) (*Dendroctonus frontalis*) was emphasized in the original plan due to its prevalence and likely occurrence in the southern pine stands. The SPB is also well documented as the most destructive pest of pine forests in the south, and traps are placed across the area each year to monitor the populations. Currently, the population densities of SPB have been very low for the past 10-12 years and trap estimates show no change in that dynamic.

Due to the patchy nature of The Woodlands forests and green space, the Southern Pine Beetle should not be a major factor in future tree mortality. Nonetheless, symptoms of SPB should be recognized by employees and residents due to its ability to kill trees quickly and build up populations.

The Turpentine beetle (*Dendroctonus terebrans*) is another beetle that can cause concern among residents and create numerous inquiries when found in pine trees in the urban area. It is the largest of the five bark beetles and generally attacks stressed pine trees on the lower portion of the trunk. It creates the largest pitch tubes and causes the most concern among homeowners with pines in their yards or green areas. It generally will not kill the tree, but can contribute to mortality as a secondary factor.

Bark Lice infestation.

Bark Lice closeup view.

Hardwood Insects

The majority of hardwood species (ie. Oak, Ash, Gum, etc.) are killed by a specific insect unless they contribute to an existing problem that has the tree in decline. Oaks suffer from a number of borers, leaf miners and leaf defoliators that may cause heavy defoliation but rarely kill the trees.

The majority of the insects in hardwoods is deleterious to the aesthetic nature of the tree and generally will cause concern with the residents. The primary insects are Eastern Tent Caterpillar (primary host - cherry and hawthorn spp.); Fall webworm (primary host – persimmon, sweetgum, and pecan spp.) and Forest Tent Caterpillars (primary host – Oaks). These create unsightly webs that house numerous caterpillars that defoliate the tree. They can be controlled by pruning the branches with the webs and removing it from the area.

High Value Trees – Trees greater than 12 inches diameter, with good form and crown spread in high visibility areas can be treated with systemics.

Bark Lice

This insect generally appears in late summer and is easily recognized by the silk stocking webs on the trunks of Water Oaks and Willow Oaks. Many residents become alarmed when they see the trees covered with webbing; however this insect is quite harmless and is cleaning up the trunk eating lichens and debris. The webbing will disappear in a few weeks.

Management recommendations include:

1. Plant only rust-resistant pine seedlings.
2. Wood-rotting fungi and insects invade large galls or large open wounds on pine. These will weaken the tree. Remove trees with larger galls or open wounds near buildings because of the possibility of damage from wind breakage.
3. Engage a certified arborist or other forest professional for proper disease identification and treatment.

STAFF TRAINING AND TREATMENT OF SPECIFIC INSECT AND DISEASE PROBLEMS

• The current staff of the Woodlands Township Parks and Recreation Department have the expertise to provide training to Township employees on recognizing the most common insect and disease problems encountered in the ROSR's and Parks.

•Treatments using specific herbicides and pesticides will require an applicator's license or may need to be implemented by an outside contractor.

Hypoxylon canker damage.

Hypoxylon fruiting body.

White Oak Borer damage.

Pinhole Borer damage.

Borers

There are numerous species of borers that affect hardwoods; although very few, if any, cause direct mortality. When borers or dust are detected, it is a sign that the tree is under stress and chemical treatment may be needed if it is a high value specimen tree of health, form, and location such that the tree warrants special consideration (i.d.: a tree in a park). Learn to recognize borer damage and contact a certified arborist for identification and treatment. In a forest situation, most borer damage will not kill the tree.

Diseases

There are numerous diseases that affect both pine and hardwood species in the The Woodlands. The majority are non-fatal and cause more aesthetic damage than mortality in the forest. The diseases that cause the most damage and mortality are Hypoxylon Canker in Oak trees and Fusiform rust in the pines.

Hypoxylon canker is classified as a white rot fungus that is usually considered a weak pathogen and not aggressive enough to take over healthy tree. It is only of consequence when the trees are under severe stress due to drought or other injury. As the fungus develops underneath the bark, it causes the bark to pop loose and slough off, exposing a mat of grey, tan olive green or black powdery spores. It is the main cause of mortality in both Red Oak and White Oak species; but has been particularly damaging in Water Oak and Willow Oak which is reflected in the mortality survey done by AFM. Once the tree becomes infected and begins to show the black and grey patches, it most likely will die and needs to be removed. Forestry workers for The Township need to learn to recognize trees that are infected with Hypoxylon canker and to take action by removing the tree if it may cause a hazard situation.

Fusiform Rust gall on pine branch.

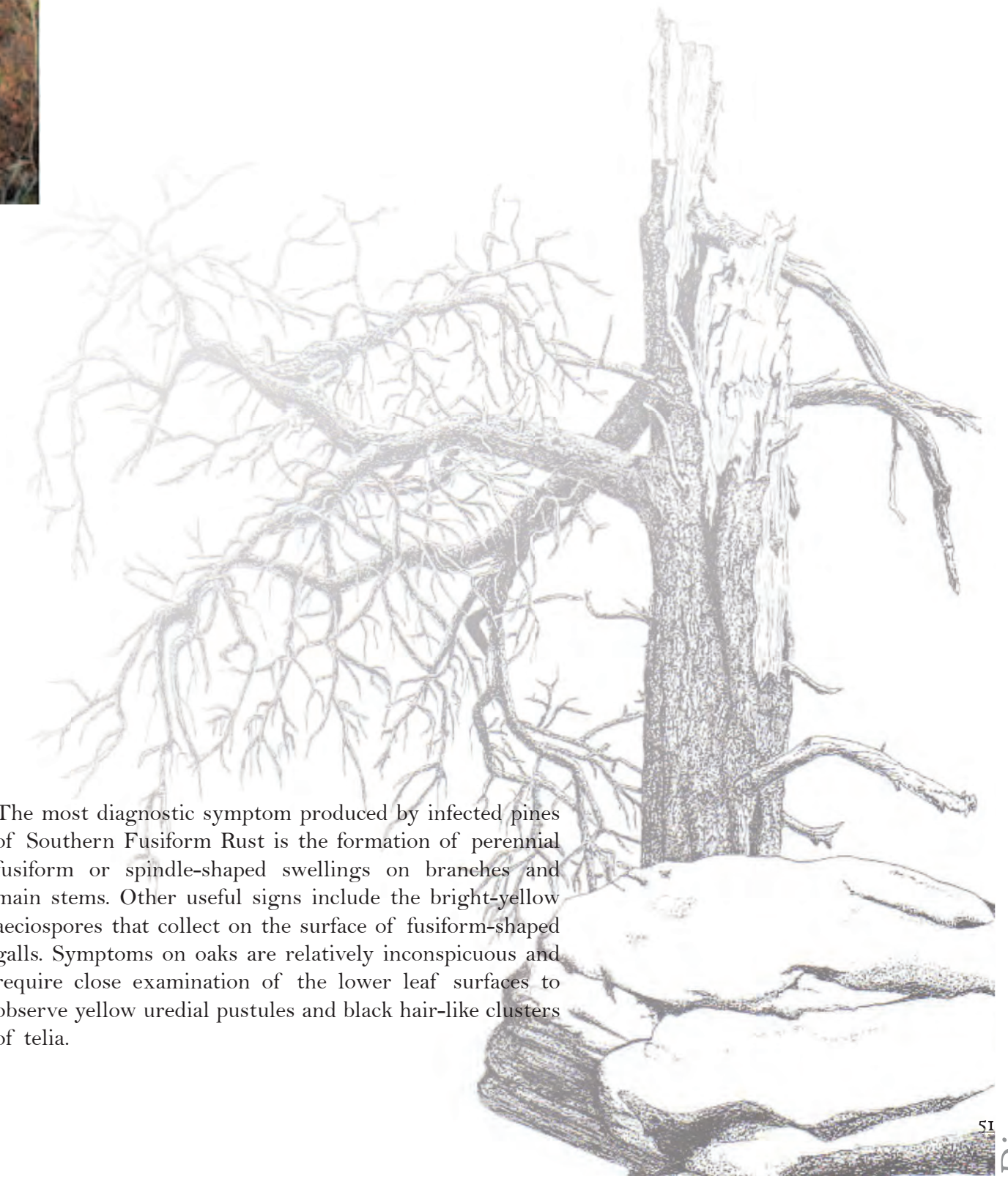
Rust gall on pine trunk.

Southern Fusiform Rust

Fusiform rust is a disease that affects the southern pines and is most prevalent in Loblolly and Shortleaf pines, which are the major pine species in The Woodlands. The Village at Creekside has been developed in an existing Loblolly pine plantation and this disease has been noted in the pine trees in that area. This is less of a problem in the other areas that have more of a mixed mature forest situation.

Southern Fusiform Rust is a fungus-caused (Cronartiium quercuum f. sp. fusiforme) disease found only in the southeastern portion of the United States, from Maryland south to Florida and west to Texas and southern Arkansas. It is a major obstacle in seed orchard, nursery, and plantation management. Considerable genetic variation exists between and within the southern pine species in the way they react to the fusiform rust fungus. As species, loblolly and slash pine are susceptible; pitch, pond, and longleaf pines are moderately resistant, and shortleaf pine is immune.

The fusiform rust fungus is macrocyclic and heteroecious, that is, it produces five spore types and requires two different hosts (pine and oak) to complete its life cycle. A life cycle takes approximately 2 years to complete. Black, white, water, willow, laurel, black-jack, southern red and turkey oaks are affected but not seriously damaged.



The most diagnostic symptom produced by infected pines of Southern Fusiform Rust is the formation of perennial fusiform or spindle-shaped swellings on branches and main stems. Other useful signs include the bright-yellow aeciospores that collect on the surface of fusiform-shaped galls. Symptoms on oaks are relatively inconspicuous and require close examination of the lower leaf surfaces to observe yellow uredial pustules and black hair-like clusters of telia.

APPENDIX

ALDEN BRIDGE SPORTS PARK

Observations:

The site has experienced significant development with the addition of sports fields and parking. Overall the forests are in healthy condition with scattered dead trees. The southern portion along Panther Branch experiences frequent flooding. Dead trees were found scattered throughout the forest areas, with a few potential hazards adjacent to sports fields. Chinese Tallow encroachment is occurring with scattered individuals throughout the park and a large stand of Tallow at the eastern boundary.

Needs:

Reforestation - No significant need for reforestation was noted.
Tree Health - Some dead trees due to drought and/or natural causes. Upland forest areas are healthy and mature.
Safety - A large dead oak was noted east of the soccer fields and a leaning pine was noted adjacent to soccer field #5 that should be removed.
Drainage - Flooding problems due to poor drainage.
Fire - Heavy understory and leaf and needle litter. Easements could be used as defensible spaces for fire protection.
Invasive Species - Invasive Chinese Tallow should be controlled through mechanical and/or chemical means.

Chinese Tallow stand at eastern boundary.

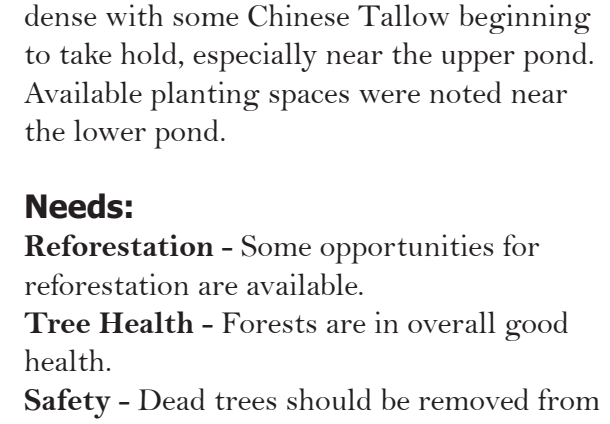
ALDEN BRIDGE PARK

Observations:

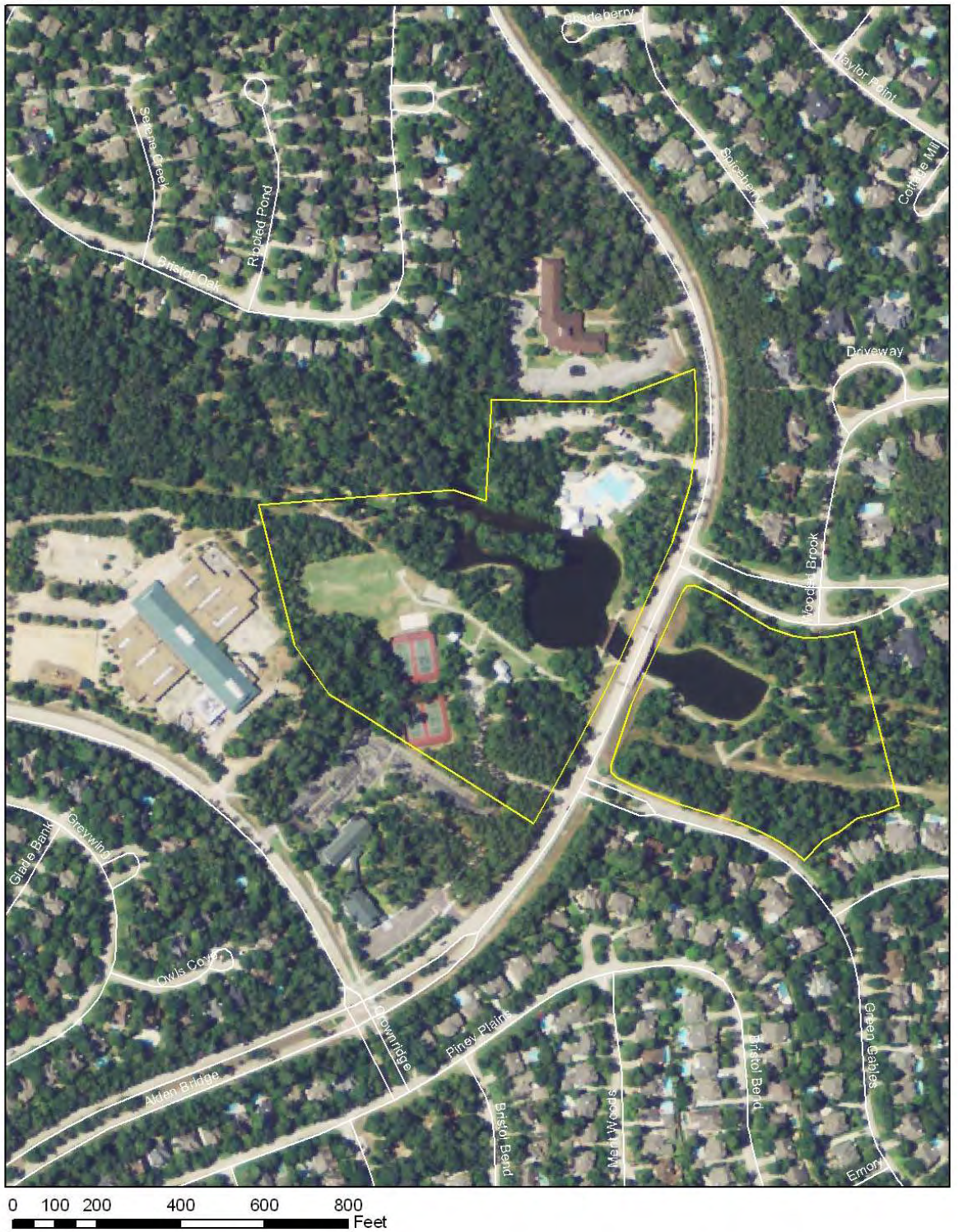
Forest stands were noted to be of varied ages throughout the site. Two dead trees were noted near the parking lot by the pool. The understory vegetation is moderate to dense with some Chinese Tallow beginning to take hold, especially near the upper pond. Available planting spaces were noted near the lower pond.

Needs:

Reforestation - Some opportunities for reforestation are available.
Tree Health - Forests are in overall good health.
Safety - Dead trees should be removed from this high-use area.
Drainage - Drainage seemed adequate given the available ponds and adjacent creek.
Fire - No fire hazards were noted.
Invasive Species - Invasive Chinese Tallow should be monitored for continued encroachment. Trees in a park setting are of value to the community regardless of species, however significant encroachment should be brought under control.



Available planting space found near the lower pond.



BEAR BRANCH SPORTS PARK

Observations:

Forest areas of the park are primarily along the perimeter. These forests are frequently flooded with drainage into Bear Branch. Overall the stands are in healthy condition with occasional dead trees, though not significant in numbers. The understory is moderate in density in most areas. Some Chinese Tallow was noted near forest edges that should be removed. Significant erosion was noted within the disc golf course areas of the forest and near the pond, likely due to foot traffic.

Reforestation - Planting sites are limited due to the use of the site.
Tree Health - Overall health is good with no current management needs. Erosion should be remedied with grass seeding in open areas. Mulch can be used in the forested areas for erosion.
Wildlife - The forests offer significant wildlife benefits due to proximity to the creek and available pond. The site offers excellent "edge" environment for songbirds and deer which were noted during inspection.
Safety - A few potential hazards exist due to dead trees near forest edges.
Drainage - The site has relatively poor drainage within forest areas, that may not be avoidable.
Fire - Fire risk appears to be minimal due to natural and manmade fire breaks from roads, parking, meadow and creek.

Erosion noted within disc golf areas of the forest.

CAMBERWELL CT./WEST HIGH OAKS

Observations:

Camberwell Ct. is composed of mostly younger hardwoods with a heavy understory that limits the amount of regeneration of trees. One dead tree was noted near the entrance to the neighborhood. The West High Oaks Reserve is a larger tract with limited access for recreation or fire control. This reserve is a well-stocked mature forest with mixed age areas. Both reserves border residential lots and vegetation is growing up to the edge of fences.

Reforestation - Reforestation efforts are only feasible within the Camberwell Ct. reserve, but would require removal of understory vegetation to facilitate establishment.

Tree Health - The West High Oaks forest is in good health. The Camberwell Ct. forest is understocked and would benefit from reforestation.

Wildlife - Excellent wildlife habitat exists with the nearby easement and drainage corridor.

Safety - Dead trees within the Camberwell Ct. reserve should be removed, as they present potential hazard due to proximity to backyards.

Drainage - Drainage appears to be adequate.

Fire - Fire risk is relatively low however, limited access to the West High Oaks Reserve could create complication should fire outbreak occur.

Dead trees noted within Camberwell Ct. reserve.

CHANDLER CREEK

Observations:

The site hosts a park with playground, pathways and passive areas. Reforestation opportunities exist within passive areas, but would possibly reduce the usefulness of the areas if too aggressive. The forest is overall healthy with mixed ages of pines and hardwoods. The understory is dense with a wide variety of vines, shrubs, young hardwoods and herbaceous species. The site is well-maintained with no noted hazards or maintenance concerns.

Reforestation - Opportunities exist, if desired, to plant within passive open areas.
Tree Health - Trees are in good health, some with minor deadwood.
Wildlife - Limited wildlife potential exists, except for songbirds and small mammals.
Safety - No safety issues were noted.
Drainage - Drainage appears to be adequate.
Fire - Fire risk is low due to relative size and roads acting as firebreaks on all sides.

A natural footpath was found running through the center of the site.

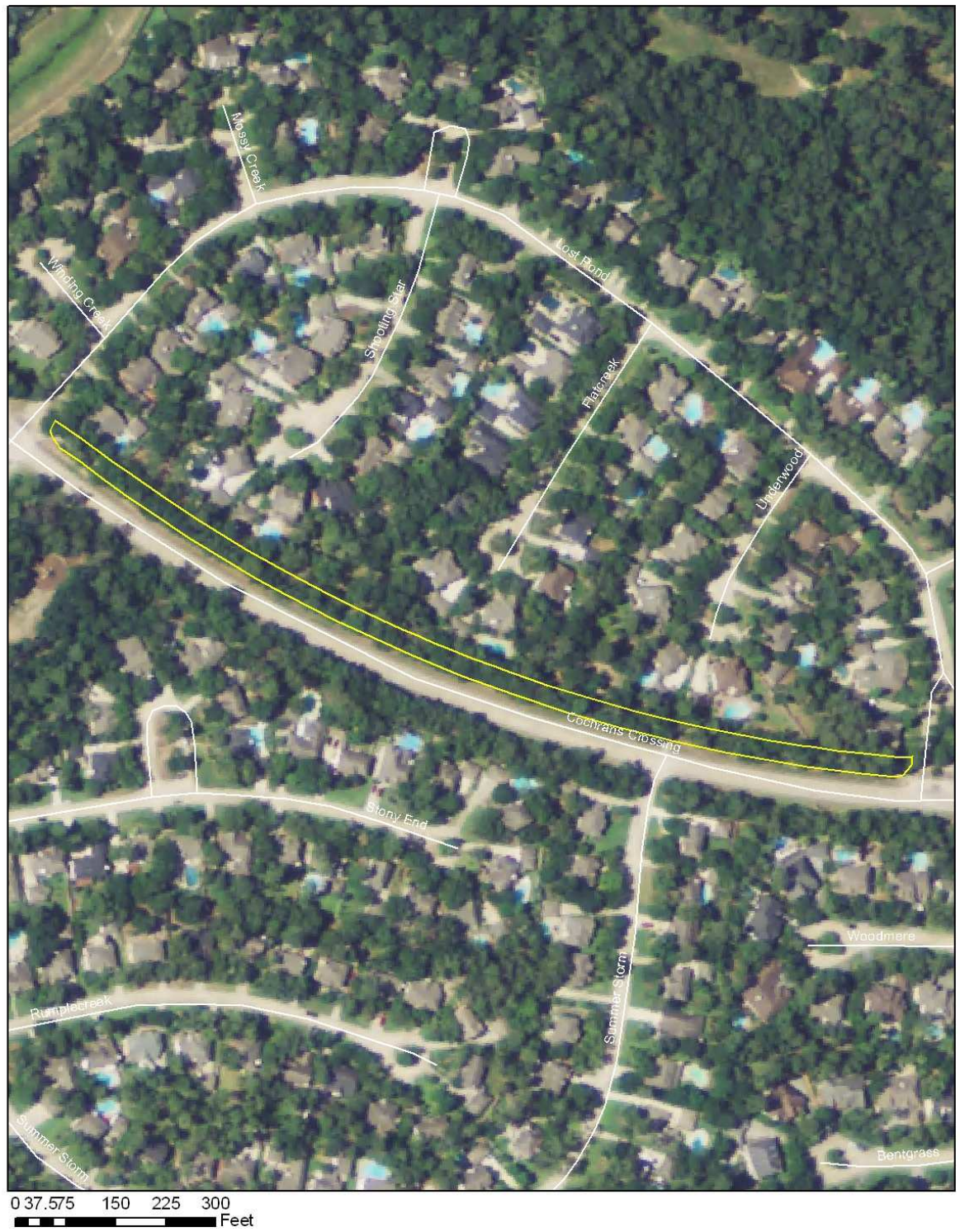
COCHRAN'S CROSSING PATH

Observations:

The site is a narrow strip of forest in between a road and residential lots. A path runs through the center of the reserve. The canopy is beginning to mature with a relatively light understory. Some minor accumulation of deadwood was noted on the forest floor, though it presents no apparent hazard. One dead Sweetgum was found that should be removed in a timely manner.

Reforestation - Little planting spaces are available.
Tree Health - Trees are in good health and becoming mature.
Safety - The dead Sweetgum should be removed due to proximity to residences and the adjacent roadway.
Drainage - Drainage appears to be adequate.
Fire - Fire risk is low due to relative width and roads acting as firebreaks on all sides.

A typical view along Cochran's Crossing Path.



EDGEWOOD FOREST

Observations:

The reserve is a narrow drainage easement running between residential lots. The site appears to have experienced some loss due to drought, with several downed trees that remain on the forest floor. The site is a relatively wet area with growth of emergent wetland vegetation. Access to the site for maintenance or fire control is limited to road access on either end. Significant Chinese Tallow growth was noted. The forest is considered to be understocked, with some poorly formed remaining trees. Some landscape debris was noted behind fences.

Reforestation - The site offers great opportunities for reforestation with moderate brush control.
Tree Health - A few dead trees were noted on site, otherwise the forest is of moderate health and understocked.
Safety - No significant hazard potential was noted.
Drainage - Drainage appears to be adequate, but could benefit from brush removal within the swale.
Fire - Fire risk is relatively low due to width, but site access is limited for any control measures.
Invasive Species - Chinese Tallow is encroaching significantly on this understocked/disturbed site and should be controlled.

Edgewood Forest is ready for reforestation with some brush control measure for preparation.

FALCONWING PARK

Observations:

This site is a relatively immature forest with mixed ages and a moderately dense understory with some areas very dense and growing up to the back of residential fences. In the forest areas around the basketball court and playground some dead trees were noted in need of removal due to proximity to high-use areas. The understory in most areas is as high as 10' tall with significant debris on the forest floor.

Reforestation - There are limited opportunities for reforestation without brush control, though the forest is reasonably well-stocked.
Tree Health - The forest is healthy, but young trees area competing heavily with understory vegetation.
Safety - Noted dead trees with potential hazards were reported to Staff for timely removal.
Drainage - Drainage appears to be adequate.
Fire - Fire risk is relatively low due to width, though understory vegetation is tall and capable of creating 'fuel ladders' should a fire break out.
Invasive Species - No invasives were noted during inspection.

Tall understory vegetation with debris accumulation.

GOSLING ROAD

Observations:

This site is a mixed-age forest between Gosling Rd. and a residential neighborhood. The site has varied levels of understory vegetation and a linear powerline easement running along the length of the reserve. There were several dead trees noted during inspection, a few of which were near residential lots and the road. The site offers wildlife habitat and screening for the residents. Some Chinese Tallow were noted during inspection.

Reforestation - No significant reforestation opportunities exist on this site.
Tree Health - The forest is healthy with the exception of a small number of dead trees.
Safety - Dead trees near the road and within target distance of backyards should be removed.
Drainage - Drainage is mostly adequate with some low spots along the powerline easement.
Fire - Fire risk is low to moderate and could benefit from some clearing of brush along the backs of fences.
Invasive Species - Minor amounts of Chinese Tallow were found.

View along Gosling Rd. facing north.

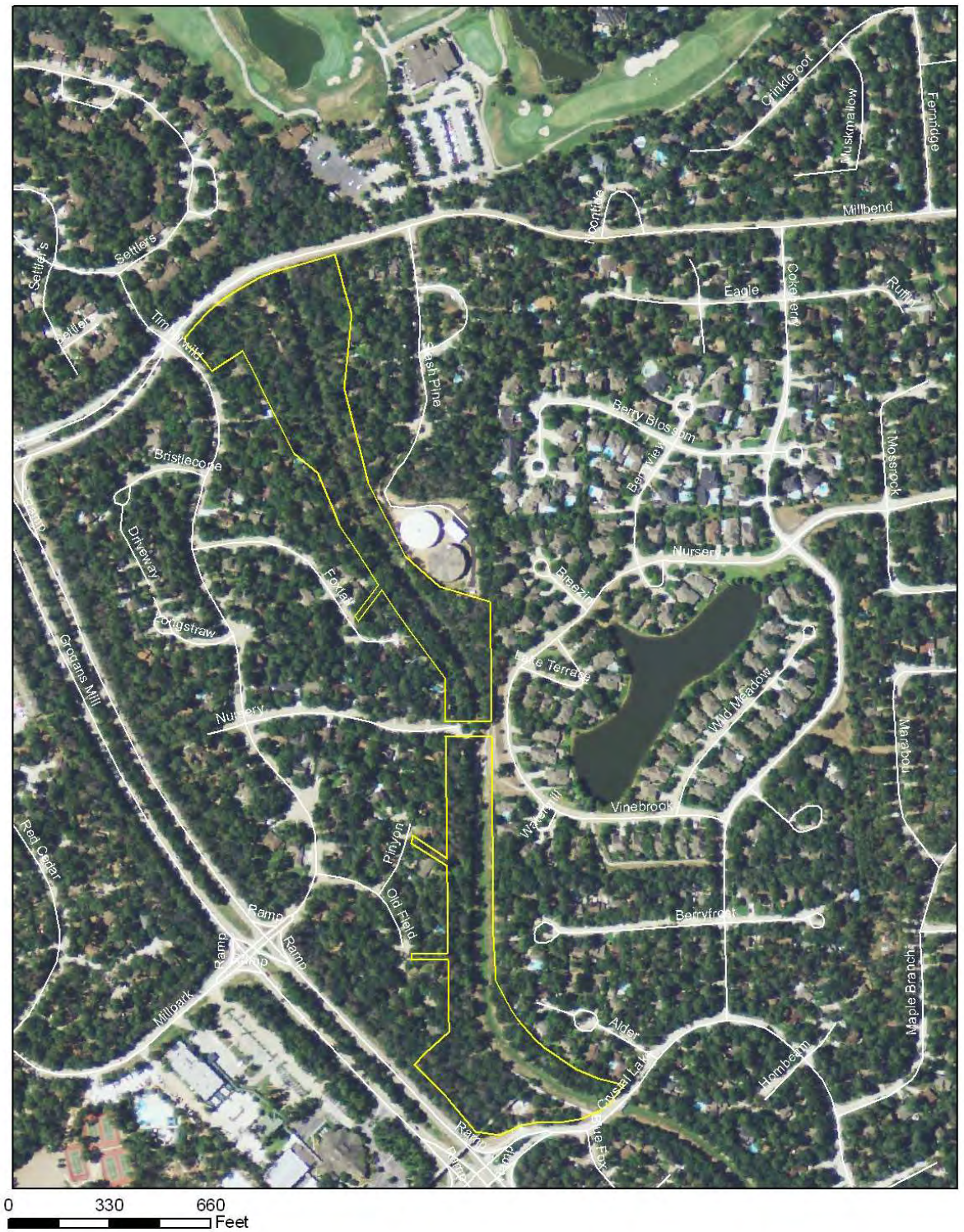
LOGGER'S HOLLOW

Observations:

Logger's Hollow is a linear reserve running between a residential neighborhood and a drainage ditch. The site has a mixed-age forest with varied levels of understory vegetation. The forest is healthy with minor dieback on some mature trees. Growth of vegetation is all the way up to property lines in most areas. There are available planting spaces where trees have recently been removed. Numerous dead trees were found on the ground where they had been taken down and left to decay in the forest. A small fire scar was noted during inspection that did not burn beyond the natural and manmade firebreaks provided by a walking path and the drainage easement.

Reforestation - A few areas are available along forest edges for replanting.
Tree Health - The forest is healthy with the exception of a small number of dead trees.
Safety - No hazards were noted.
Drainage - Drainage is adequate with the adjacent ditch.
Fire - Fire risk is low to moderate due to firebreaks, but evidently possible. The cause of the fire is unknown.
Invasive Species - Minor amounts of Chinese Tallow were found.

A small fire scar was found near the northern half of the reserve. Notably the fire did not cross the pathway and the drainage easement which acted as manmade and natural firebreaks.



MILLBEND COMMON

Observations:

Millbend Common is a larger common area within a neighborhood that has walking paths running throughout. The forest is relatively healthy, but understocked with a dense understory. Planting space was noted to be available provided understory vegetation control was performed. The site provides excellent wildlife habitat for songbirds and small mammals. The most significant finding was the presence of non-native species that were both planted and those that escaped from nearby landscapes. Among these were Asian Jasmine, Nandina, Liriope, Sagitarius, Bamboo, Palms and other tropicals including citrus trees.

Reforestation - Several planting sites are available but will require understory clearing.

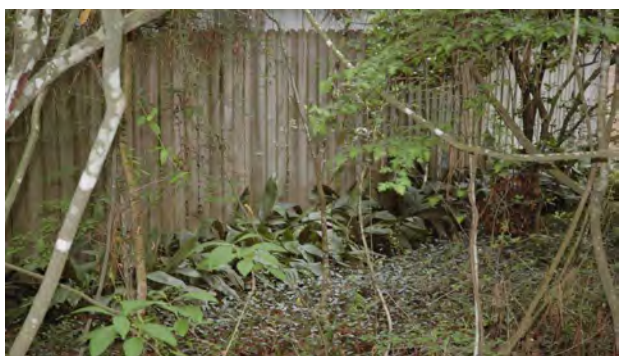
Tree Health - The forest is in overall good health but has experienced dieback in the past.

Safety - One dead tree was found near the playground that was reported, also a dead pine near a residence.

Drainage - Drainage appears adequate.

Fire - Fire risk is low to moderate, but access for fire equipment may be somewhat limited if needed.

Invasive Species - Non-native plants should be removed.



Non-native landscape materials have escaped from a neighboring landscape.

NATURE TRAIL

Observations:

This reserve is a linear trail with forested edges of varying depths composed of mixed pine and hardwood stands. The stands are mature with varied sections of more open canopy. The understory is moderate to dense with a healthy mix of native species. A significant amount of Poison Ivy was noted along the edges of the trail. Numerous dead trees were found throughout the forest representing the biggest safety concern within the reserve, though no immediate targets were present. There is a substantial creek running along most of the trail's length.

Reforestation - A few areas are available for replanting.
Tree Health - The forest is in overall good health experiencing only minor dieback.
Safety - Standing dead trees should be removed if within range of the trail or the golf course.
Drainage - Drainage appears adequate.
Fire - Fire risk is low to moderate. The golf course acts as a firebreak along the north side.
Invasive Species - No invasive species were noted.

Typical view along the nature trail.

NORTHSHORE POINT PARK - VOPC SECTION 33 "C"

Observations:

This reserve is a median within a cul-de-sac on North Shoreline Point Dr. The reserve is primarily immature hardwood and pine trees with a very dense understory of brush and vine species. The site offers good habitat for songbirds. There are a few mature Pines, Elms, Sweetgums and Water Oaks. The site has little room for reforestation without clearing understory vegetation.

Reforestation - No planting space available.
Tree Health - Young forest with high competition between understory species.
Safety - No noted hazards.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, as the small site is completely surrounded by roadway.
Invasive Species - Some Chinese Privet was noted, but not in significant amounts.

This reserve is dominated by understory vegetation with a few mature trees.

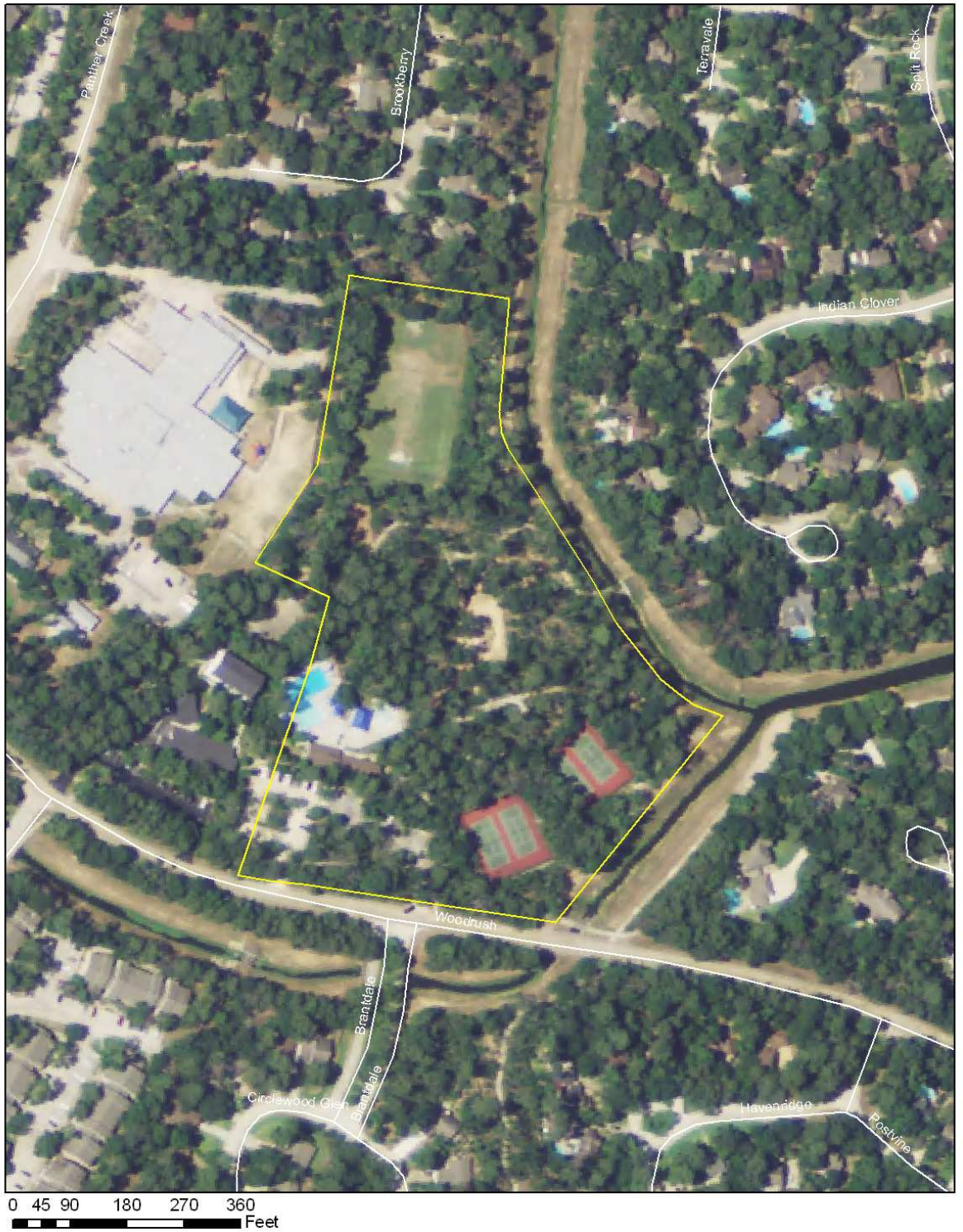
RIDGEWOOD PARK

Observations:

Ridgewood Park is a developed park with playgrounds, tennis courts, soccer fields, a pool, wheel-friendly areas, and trails. The forest is primarily pine-dominated with mature stands. Understory vegetation is moderate to heavy with a wide variety of vine, shrub and herbaceous species. A few Chinese Tallows were noted during inspection. A number of dead, potentially hazardous trees were found near the parking lot, wheel-friendly area and pool that should be removed.

Reforestation - Some planting space is available for reforestation if understory vegetation is controlled in understocked areas.
Tree Health - Overall healthy forest with no immediate needs.
Safety - Several hazard trees were reported to Staff for removal.
Drainage - Drainage appears adequate.
Fire - Fire risk is low to moderate. Trails, roads and a drainage easement limit the likelihood of a serious fire outbreak.
Invasive Species - A few Chinese Tallows were noted, however not sufficient to warrant removal.

The parking lot has numerous shade trees that should be monitored during the course of routine maintenance to prevent deadwood or other hazards from falling on cars or people.



SHADOWLAKE MARSH

Observations:

Shadowlake Marsh is a pine-dominated forest with a mixure of age classes and various hardwood species. The drainage patterns and pond provide a moist environment for various wetland species as well as additional moisture for tree species. The site is considered to be adequately forested and offers excellent wildlife habitat and viewing opportunities.

Reforestation - Planting space is available in the open area along the "beach" of the pond, however this may detract from the experience of the park.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate and beneficial to the site.
Fire - Fire risk is low due to the proximity to the pond and adjacent roadway and drainage easement.
Invasive Species - Some chinese tallow was found but not likely to become problematic.

A healthy young stand of pine regeneration is actively growing within the peninsular area of the site.

SOUTHSHORE PARK

Observations:

Southshore Park is an example of the varied types of forests within the community. The site is a maintained, turf-covered landscape within a park environment. The site is a popular destination for picnics, fishing and passive enjoyment. The site has a small assortment of Baldcypress, Live Oaks and Crepemyrtles. There are opportunities to plant additional trees without detracting from the park experience. This is an opportunity for planting larger trees due to the site's high visibility, provided supplemental watering is available during the establishment phase.

Reforestation - Planting space is available throughout the site. Larger containerized stock would be the most suitable.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is very low in maintained landscapes such as this.
Invasive Species - No invasive species were noted.

Significant planting space is available on this site, without detracting from the intended view.

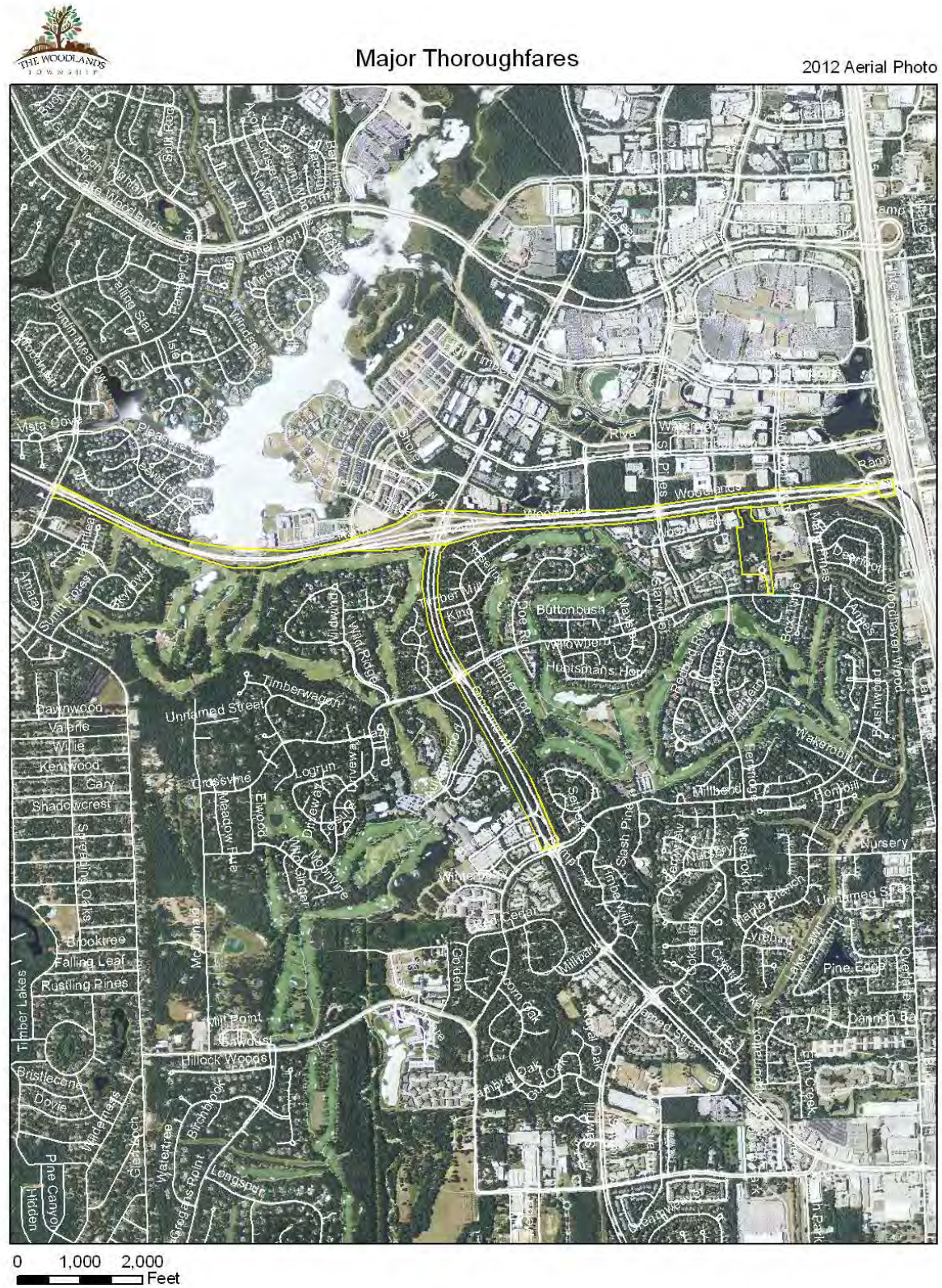
MAJOR THOROUGHFARES - WOODLANDS PARKWAY and GROGAN'S MILL RD.

Observations:

The rights-of-way along the major thoroughfares of Woodlands Parkway and Grogan's Mill Rd. have forested esplanades that, in most areas, serve as drainage swales. These esplanades are generally fully stocked with mature pines and hardwoods with the exception of a few areas. Approaches to the bridge on Woodlands Parkway offer some planting space for additional trees. Understory vegetation is moderate to dense with occasional open areas. Access for maintenance usually requires blocking a lane of traffic.

Reforestation - Some planting spaces are available, but most areas are fully stocked with no room for additional trees.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is very low with roads acting as firebreaks.
Invasive Species - Some Chinese Tallow and Chinese Privet were found, but have limited ability to become problematic.

Forested esplanades along major thoroughfares provide traffic calming, drainage, and filtering of stormwater for the community.



ALDEN BRIDGE SECTION 23, "B"

Observations:

This site is a narrow forested strip between residential yards and a roadway, typical of the majority of open space reserves in The Woodlands. There is limited space for additional plantings. The forest is mixed-age but relatively mature with pines dominating the canopy.

Reforestation - No planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.

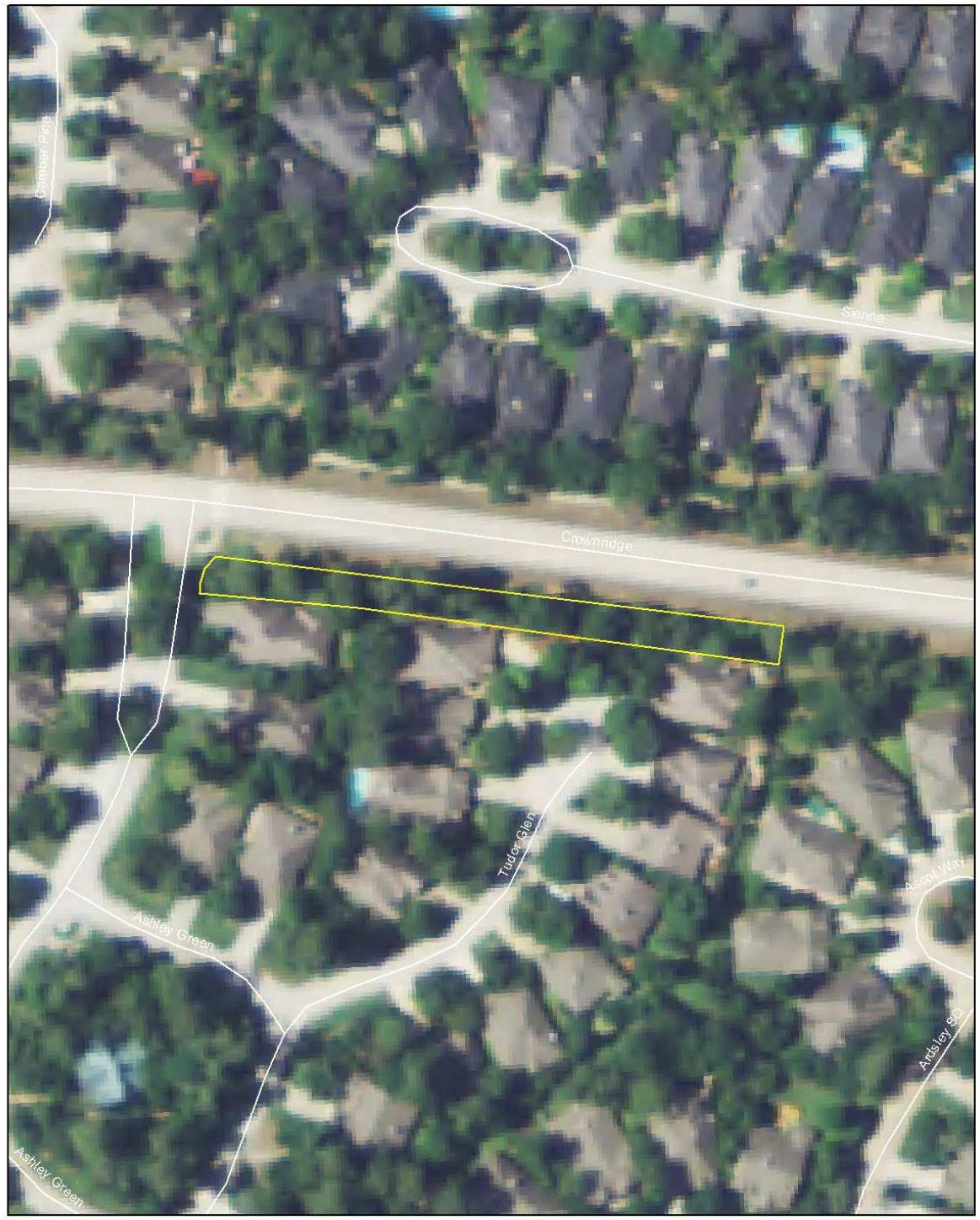
This narrow forested strip primarily serves as a buffer between the walking path and the road.

ALDEN BRIDGE SECTION 53, "A"

Observations:

This site is a mixed-age pine dominated forest between residential lots and a roadway. The understory vegetation is moderately dense with layers reaching 12' high. The forest is in overall good condition with no apparent hazards or maintenance concerns.

Reforestation - A few planting spaces are available for reforestation.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - Chinese Privet was noted in small quantities, but not enough to warrant concern.



COCHRAN'S CROSSING SECTION 25, "A"

Observations:

This reserve is a relatively immature forest with a dominant understory of native shrub, vine and herbaceous species. The site follows Green Bridge Dr. with a fairly steep slope allowing good drainage. Vegetation is growing up to the back of residential fences. The canopy is composed mostly of younger pines with occasional mature pine and hardwood trees.

Reforestation - No planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - Some Chinese Tallow was noted during inspection.

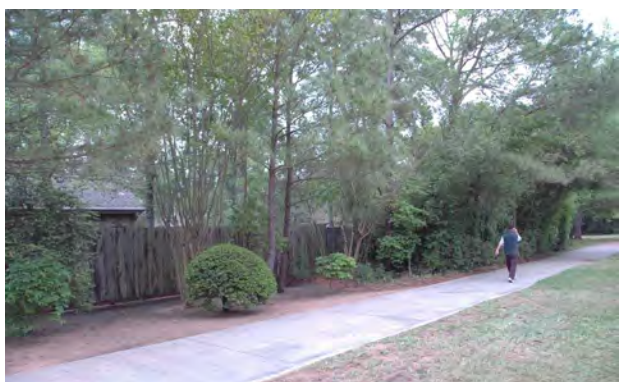
View of the reserve along the street right-of-way

COCHRAN'S CROSSING SECTION 10, "H"

Observations:

This site is a narrow reserve with a few mature trees and a relatively thin understory of shrubs with open, maintained areas. The site has room for some additional plantings.

Reforestation - Some planting spaces are available.
Tree Health - Overall this is a young, healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.

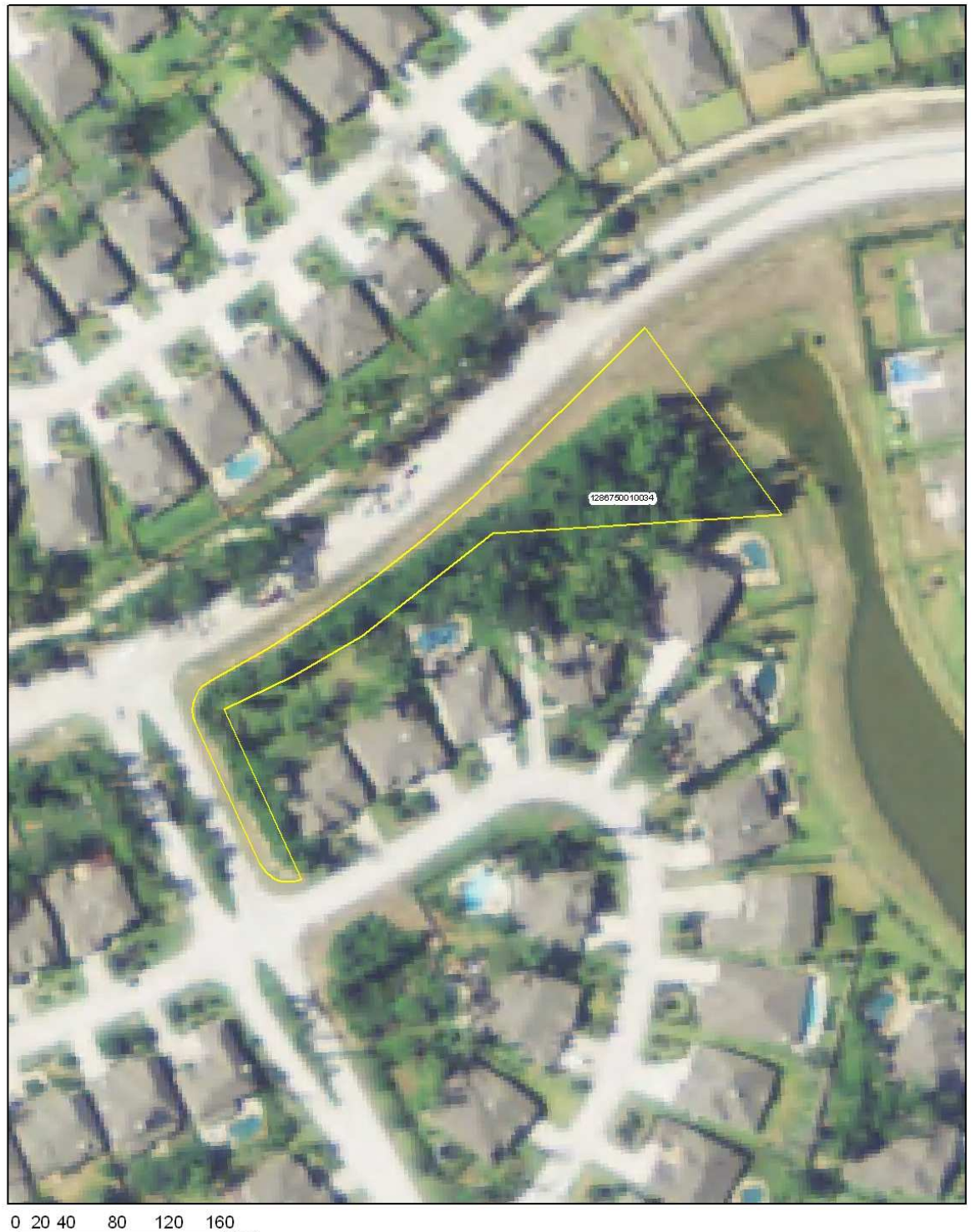


CREEKSIDE PARK SECTION 3, "A"

Observations:

This reserve is a narrow forested strip at the front of a neighborhood abutting a roadway, fences, and a small detention pond. The forest is composed of young pines and some residual, poorly formed hardwoods. The understory is dense and growing up to the back of residential fences. The overall condition of the forest is fair and in an early successional state. Pine regeneration is good and few planting spaces are available.

Reforestation - Little planting space is available.
Tree Health - Fair overall condition with poorly formed hardwood trees and healthy young pines.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.



CREEKSIDE PARK SECTION 4,5 "F"

Observations:

This site is a forested reserve between a roadway and residential backyards. A walking path runs through the center of the site. The forest is primarily pine with occasional hardwoods. The understory is the dominant vegetation. There are several available planting spaces for reforestation. A number of Chinese Tallows were noted during inspection.

Reforestation - Several planting spaces available.
Tree Health - This is a young, healthy forest.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - Several Chinese Tallows were noted.

GROGAN'S MILL SECTION 28, "G"

Observations:

This reserve is located next to a residential street and yards. The forest is a hardwood dominated stand of mature trees. The understory is moderately dense with Yaupon as the primary species. The forest is in healthy condition.

Reforestation - No planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - One dead pine tree was noted near a driveway.
Drainage - Drainage appears adequate, with slight ponding after rain events.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.

GROGAN'S MILL SECTION 44, "D"

Observations:

This reserve is a mixed pine and hardwood stand of varied ages of trees and generally considered mature. The understory is moderate to heavy with yaupon dominating. There is woody debris up against the back of fences. Some dead trees were noted, but no potential hazards were identified.

Reforestation - No planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards were noted.
Drainage - Drainage is via a swale leading to the street.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.

INDIAN SPRINGS SECTION 1, "P"

Observations:

This reserve abuts residential lots and a drainage easement. The forest is a mature pine forest with scattered hardwoods and a dense understory growing up to the back of fences. Some dead pines were noted that could hit fences if they failed.

Reforestation - No planting space is available.
Tree Health - Overall healthy forest but somewhat understocked.
Safety - Some dead pines are potentially hazardous to nearby fences.
Drainage - Drainage appears adequate.
Fire - Fire risk is moderate due to limited access, however adjacent drainage easement offers a firebreak.
Invasive Species - No invasive species were noted.

Vegetation growing up to back of fences.

INDIAN SPRINGS SECTION 3, "C"

Observations:

This site is a small reserve between a road, residence, and a drainage easement. The forest is mature, with pine dominating the canopy. The understory is moderately dense with a few non-native species noted including bamboo, nandina and some unknown tropicals.

Reforestation - A few planting spaces are available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - Some dead trees but not apparent hazards.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with natural and manmade firebreaks.
Invasive Species -A few non-native species were found in small quanitities.

Available planting space near the road.

INDIAN SPRINGS SECTION 8, "G"

Observations:
This site is a linear reserve between residential lots and a roadway with a walking path running through it. The forest is a mature stand with a dominant understory of yaupon and young hardwoods. There are available planting spaces along the road way and near some fences. One dead elm was noted that could potentially fall in the roadway.

Reforestation - Several planting spaces are available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - One dead tree near roadway was noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low, with good access for control if needed.
Invasive Species - No invasive species were noted.

View along walking path. Some planting space is available for shade tolerant species.

PANTHER CREEK SECTION 7, "G"

Observations:

This site is a linear reserve in between residential lots. The forest is a mature hardwood stand with a dense understory growing up to the back of fences. The forest canopy is understocked. The reserve is very narrow with limited access. Some dead trees were noted that could present a potential hazard of falling into adjacent yards.

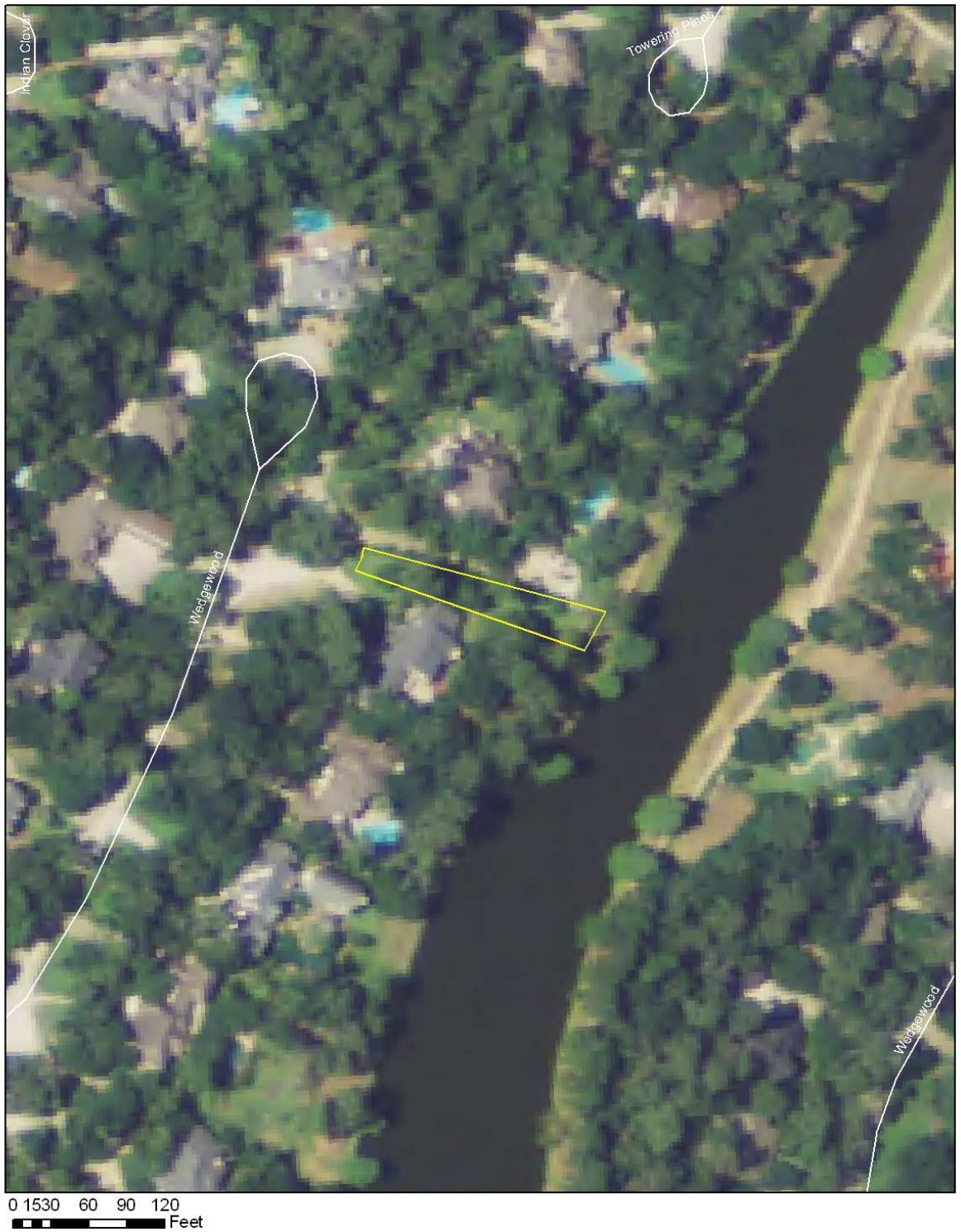
Reforestation - No planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - A few dead trees were noted that could fall into yards.
Drainage - Drainage appears adequate.
Fire - Fire risk is low to moderate. The reserve is very narrow, but has limited access.
Invasive Species - No invasive species were noted.

PANTHER CREEK SECTION 11, "O"

Observations:

This site is a small reserve in between two residential lots. The site is a maintained landscape with some mature pines and hardwoods. Access to the site is limited, as the reserve is being treated as a part of the residential landscape.

Reforestation -Planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low.
Invasive Species - No invasive species were noted.



The reserve is a maintained landscape in between two houses.

STERLING RIDGE SECTION 18, "B"

Observations:

This reserve is a primarily pine dominated forest with a moderate understory. The forest is mature with younger pines and hardwoods growing in. There were a number of newly planted young hardwoods in one location. Abundant space is available between the side-walk and the road to add additional plantings.

Reforestation - Abundant planting space is available.
Tree Health - Overall healthy forest with no immediate needs.
Safety - No hazards noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low to moderate, with good access for control.
Invasive Species - A few Chinese Tallow were noted in open areas.

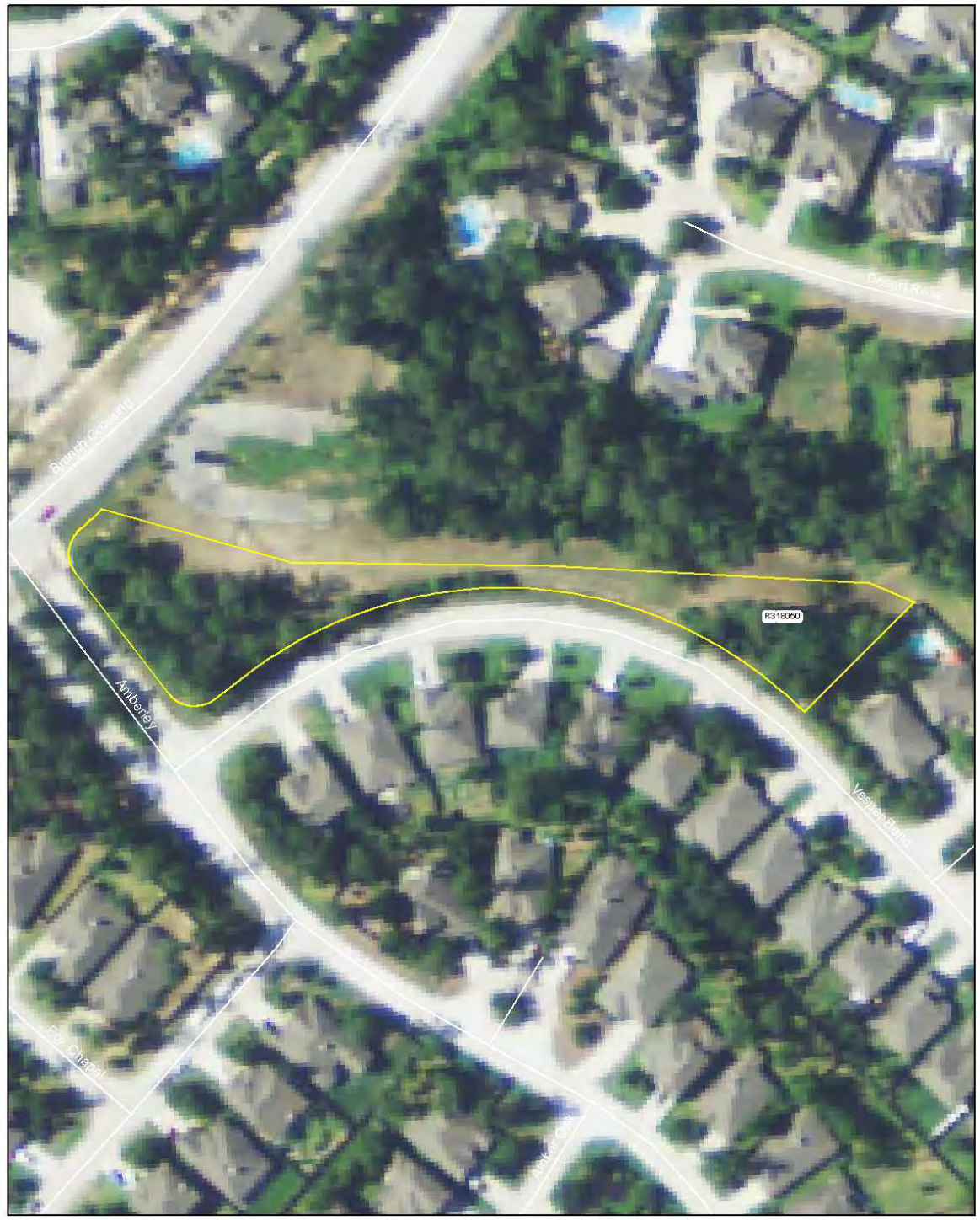
New hardwood plantings noted during inspection.

STERLING RIDGE SECTION 29, "B"

Observations:

This site is a reserve at the entrance to a neighborhood with a mixed pine and hardwood forest. The stand is somewhat understocked and has a dense understory primarily composed of yaupon. There are several planting spaces available.

Reforestation - Several planting spaces available.
Tree Health - Overall healthy forest but somewhat understocked.
Safety - No hazards were noted.
Drainage - Drainage appears adequate.
Fire - Fire risk is low to moderate with good access for control.
Invasive Species - No invasive species were noted.

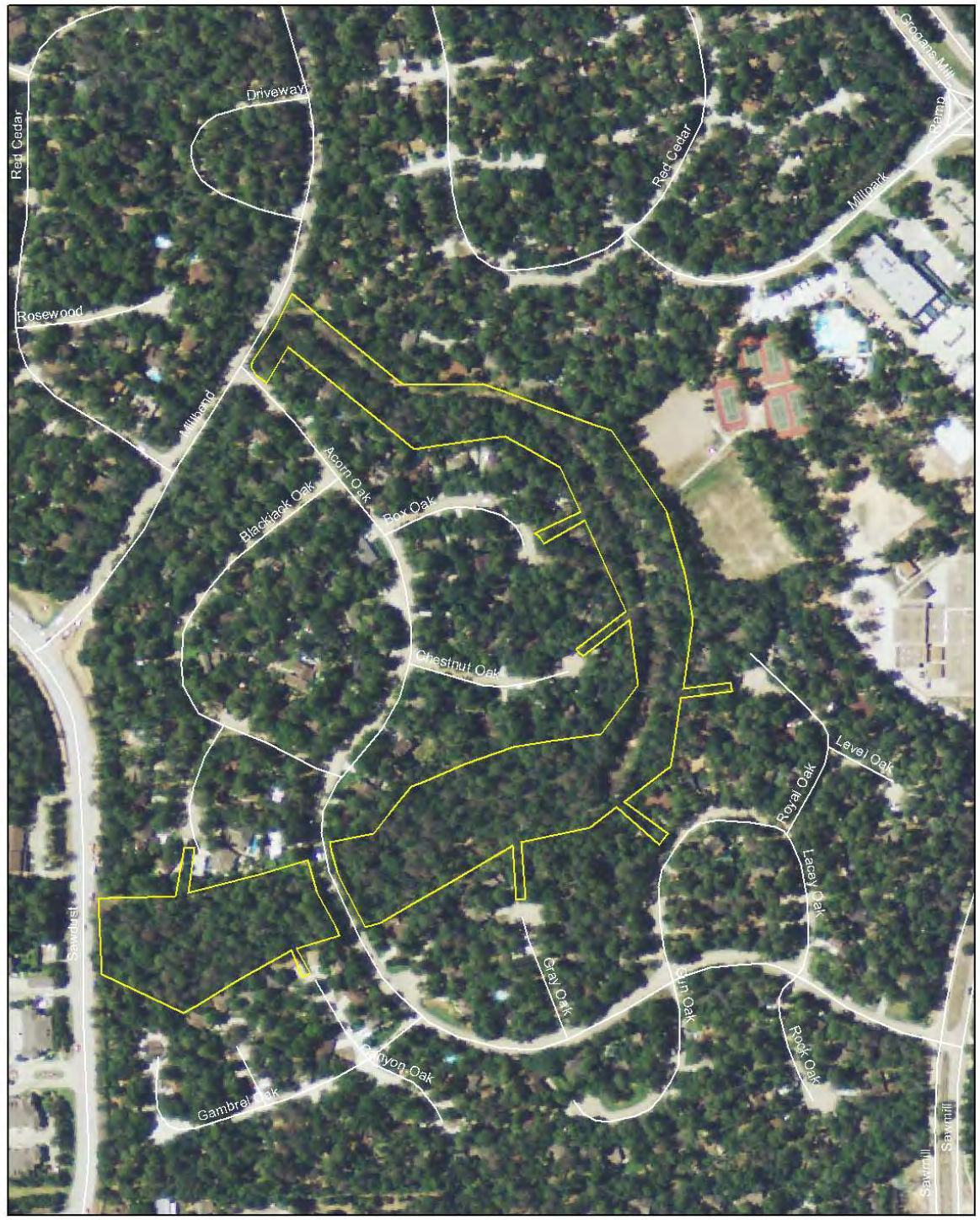


WOODFARM COMMON

Observations:

Woodfarm Common is a large reserve winding along a natural drainage through a neighborhood. The site has varied topography that offers both bottomland and upland forest stands. The forest is generally mature with open areas that are younger and dominated by understory vegetation. There is a rich variety of shrub, vine and herbaceous species. Some dead trees were noted, a few of which could present a hazard to neighboring yards. A number of trees have been removed recently. There is a walking path and some bridges running through the site. Excellent wildlife habitat is available with the access to water, browse and cover.

Reforestation - Abundant planting space is available. Some understory control may be needed prior to planting.
Tree Health - Overall healthy forest.
Safety - A few dead trees were noted that could fall into yards.
Drainage - Drainage is very adequate.
Fire - Fire risk is low to moderate. There is somewhat limited access.
Invasive Species - Confederate Jasmine, Burford Holly and Chinese Tallow were noted.



TAMARACK PARK

Observations:

Tamarack Park is a mature pine forest situated between commercial, school and residential properties. The forest has a dense understory of yaupon and vines. There are ponds and numerous trails, as well as a skatepark. There are a few planting areas available, but the site is considered fully stocked.

Reforestation - A few planting spaces are available.
Tree Health - Overall healthy forest.
Safety - No hazards were noted.
Drainage - Drainage is adequate.
Fire - Fire risk is low to moderate. The ponds and road act as fire breaks.
Invasive Species - No invasive species were noted.

Prepared by:

BURDITT

Land | Place Consultants