Reforesting Austin's Parks and Riparian Zones
Project Design Document – Year 4

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INSTRUCTIONS

Project Operators must complete and submit this Project Design Document (PDD) to request credits after the third anniversary of the Credit Commencement Date. City Forest Credits then reviews this PDD as part of the validation process along with all other required project documents. An approved third-party verifier then conducts verification. An amendment to the PDD will need to be submitted for future verification at Years 6 and 26.

Project Operators will enter data and supporting attachments starting on page 3 under Project Overview where you find "[Enter text here]" as thoroughly as possible and provide numbered attachments for maps and other documentation (ex: 1 – Regional Map).

PROJECT OVERVIEW

Basic Project Details

Project Name: Reforesting Austin's Parks and Riparian Zones
Project Number: 002
Project Type: Planting Project (under the City Forest Credits Tree Planting Protocol – Version 6, August 11, 2018)
Project Start Date: 3/31/2018
Project Location: Austin, TX
Project Operator Name: TreeFolks
Project Operator Contact Information Valerie Tamburri, valerie@treefolks.org, 512-443-5323

PROJECT AND PLANTING DESIGN UPDATES

Include information on changes to the project including tree survival, ownership, or other relevant updates.

TreeFolks planted 47 trees at two sites, Davis White and Patterson Parks in the City of Austin in March 2018 using the Single Tree Approach. TreeFolks also planted 1,250 trees in 2018 at a third City of Austin site, Onion Creek, using the Canopy Approach.

There have been no changes in ownership on any of the project sites. The planting sites at Davis White and Patterson Parks remain on land belonging to the Austin Parks and Recreation Department (PARD), and the Onion Creek planting site remains on land owned by the Austin Watershed Department.

Single Tree – Davis White & Patterson Park Plantings
Since 2018, TreeFolks and the City of Austin have replaced three trees with new species after the original trees planted at the site died.

- Tree ID# PAT-1 which was originally *Quercus macrocarpa* was replaced with *Eysenhardtia texana* sometime between March 2018 and May 2019.
- Tree ID# PAT-2 which was originally *Quercus polymorpha* was replaced with *Acacia farnesiana* sometime between November 2021 and May 2022.
- Tree ID# PAT-12 which was originally *Sophora secundiflora* was replaced with *Continus obovatus* between August 2020 and November 2021, but the replacement has since died as well.

The rest of the Project Design Document considers the replacement trees when assessing the status of the 47 trees planted, not the originally planted trees.

As of tree sampling conducted on October 3, 2022, 8 of the 47 trees (17.0%) were marked as either standing dead or vacant. These eight trees have not been replaced and there is no plan for these trees to be replaced at this time.

Seven different species of trees account for the eight losses, so it appears that no specific species bore the brunt of the die-offs. Two major events could have resulted in these tree mortalities:

- Severe winter storm, Uri, which lasted from February 13 – 17, 2021, bringing with it an all-time low of 6^{o} F in Austin, and a total of 144 hours of below-freezing temperatures
- Drought conditions across Texas the summer of 2022. From March 2022 until the time of writing this report (November, 2022), over 50% of Travis County was registered by the U.S. Drought Monitor to be under some kind of drought condition, with the time period between July 2022 and September 2022 designating over 50% of the county as experiencing either exceptional or extreme drought

Canopy – Onion Creek Plantings

As of October 3, 2022, there have been no major die-off or tree survival issues at this site. The Project Area was adjusted based on the presence of older canopy at the time of planting. See the Carbon Quantification section for more details.

CARBON QUANTIFICATION DOCUMENTATION (Section 9 and Appendix B)

Describe and summarize the planting design, sampling, and appropriate quantification/measurement method for the project – Single Tree, Clustered, or Area Reforestation. Include the project's climate zone and data collection. Outline the estimated total number of credits to be issued to the project over 25 years as well as the amount to be issued upon successful validation and verification in Year 4. Attach the quantification tool and appropriate sampling tool.

List of quantification Tools by planting method (CFC to provide guidance and resources):

1) *Single Tree - single tree quantification tool*
2) *Canopy- quantification with CO_2 calculated per acre*

To ensure performance of the credits, Project Operators must commit to the following at Year 4, with additional requirements at Year 6 and after Year 25 based on the appropriate quantification method.

1) Single Tree
    a. Year 4: Project Operators must generate a random sample of project tree sites using the Single Tree Quantification Tool. Project Operators must visit those sampled tree sites and collect data on whether the sample contains a live tree, standing dead tree, or no tree. Provide geocoded photos or imaging of a minimum sample of 20% of the trees. The tracking file includes a column where each tree is assigned a unique serial number to help with tracking each coordinate and tree picture or image.
        i. Based on this data, the number and species of project trees is adjusted and a new CO_2 projected amount after Year 25 is generated.

2) Canopy
    a. Year 4: Project Operators must either conduct a physical tree count using plots or use imaging to determine canopy coverage at Year 4.
        i. If the canopy coverage equals or exceeds 2.8% (400 trees per acre with an average canopy area of 3.14 square feet per tree (2-foot diameter of canopy) is 2.8% of an acre), then the credits projected in the Quantification Tool may be

issued. If canopy coverage is below 2.8%, then the number of credits issued is reduced by the same percentage as the canopy coverage falls below 2.8%.

Single Tree - Davis White & Patterson Single Tree Plantings

In March 2018, TreeFolks planted 47 trees in Davis White Park and Patterson Park in partnership with Friends of Patterson Park and many volunteer groups. 15 different species of trees were planted between the two parks, the most common being *Cercis canadensis* (Texas Redbud)*, Chilopsis linearis* (Desert Willow), *Vachellia farnesiana* (formerly known as *Acacia farnesiana*, or Huisache), *Carya illinoinensis* (Pecan), and *Platanus Mexicana* (Mexican Sycamore), in that order. TreeFolks used the single-tree planting design and quantification method for this planting.

Data Collection

All planting sites were assessed for tree status (Healthy, Stressed, Root Sprout, Dead, Vacant, or Recently Replaced) and findings were recorded in the Single Tree Year 4 Carbon Quantification Tool. As of sampling on October 3, 2022, 39 of the 47 trees planted are alive and eight are either dead or vacant and have not been replaced.

The Observed Mortality Rate is therefore at 17.02%. Per Registry guidance, if the Observed Mortality at Year 4 exceeds the 20% Anticipated Mortality Deduction used at Initial Crediting to forecast CO_2 storage over 25 years, the Observed Mortality is used to re-calculate carbon storage at Year 4; otherwise, the Anticipated Mortality is used. Because the 17% Observed Mortality is less than the Anticipated Mortality Deduction, the 20% Anticipated Mortality Deduction was used in the carbon quantification tool.

A digital ArcGIS database has been created to track the single tree project with accurately georeferenced points. Each of these points contains data regarding the status of the tree (Alive, Dead, etc.) for each monitoring year. The map is included as a shapefile attachment.

Ten geocoded photos (or 20% of sites sampled) were required for this Year 4 Project Design Document. The ten geocoded photos are included as a zip file attachment. The photos were also mapped onto a KML file, which is included as an attachment.

Based on monitoring, there were no major changes to the Project Area, or the trees planted as a part of this project. Friends of Patterson Park is providing tree maintenance at Patterson Park while the City of Austin Parks and Recreation Department watering trucks are providing tree maintenance at Davis White Park.

Attachments:

1 – Austin Single Tree Year 4 Credit Tool
2 – Austin Single Tree Year 4 Geocoded Photos
3 – Austin Single Tree Year 4 Map – Geocoded Photos
4 – Austin Single Tree Year 4 Shapefiles

Carbon quantification

Total number of trees planted	47
Project area (acres), if applicable	N/A
Total number of trees per acre, if applicable	N/A
Total number of sites alive now	39
Credits attributed to the project (tCO2e)	134
Credits after mortality deduction (20%)	107
Contribution to Registry Reversal Pool Account (5%) (tCO2e)	5
Total credits to be issued to the Project Operator (tCO2e)	102
Total credits requested to be issued at Year 4 (40%)	41

GHG Assertion:
Project Operator asserts that the Project results in GHG emissions mitigation of 102 tons CO_2e over the 25-year Project Duration. Project Operator asserts that the Project results in GHG emissions mitigation of 41 tons CO_2e at Year 4.

The Project's total GHG emissions mitigation was revised to 102 credits from the 103 credits projected during Initial Crediting. The revised quantification is due to the species change of the three replacement trees compared to the original trees planted. Two of the oak trees originally planted were replaced with smaller species.

The updated Projected CO_2 stored and credit issuance over 25 years is outlined below:

Single Tree Plantings	Projection at Initial Crediting	Projection accounting for replacement trees
Total credits issued at Initial Crediting (10% CO2 (t))	10	10
Total credits to be issued At Year 4 (40% CO2 (t))	41	41
Total credits to be issued At Year 6 (30% CO2 (t))	31	31
Total credits to be issued after Year 25 (20% CO2 (t))	21	20
Total credits to be issued (tCO2e)	**103**	**102**

Attachments:
1 – Austin Single Tree Year 4 Credit Tool

<u>Onion Creek Riparian Canopy Planting – Canopy</u>

In January 2018, 1,250 trees were planted in Onion Creek using the canopy planting design and quantification method. During the initial planting, the Project Area was 4.3 acres, with approximately 291 trees planted per acre to create full canopy regeneration through a combination of surviving trees and natural regeneration. The most commonly planted trees were *Sophora secundiflora* (Texas Mounatin Laurel), *Fragula caroliniana* (Carolina Buckthorn), *Senegalia berlandeieri* (formerly known as

Acacia berlandieri, or Guajillo), and *Vachellia farnesiana* (formerly known as *Acacia farnesiana*, or Huisache).

Data Collection and Project Area Adjustment

To analyze tree growth in the Project Area, random point sampling and satellite imagery accessed through iTree were used to estimate percent canopy cover of the new canopy in the Project Area. Because there was notable edge encroachment of mature canopy into the bounds of the Project Area, the Project Operator differentiated between four distinct class types during the random point surveying: Tree (old growth), Tree (new growth), Grass/Herbaceous, and Bare Earth.

After assigning classes to 300 random points, it was found that older growth trees made up 52.67% (±2.88) of the total landcover of the Project Area, followed by grass which comprised 37.67% (±2.80), newer growth trees which comprised 7.67% (±1.54), and finally bare earth which comprised 2.00% (±0.82). For the purposes of this study "Trees (old growth)" was defined as a tree whose canopy was judged to have been of a large enough statue that it could not have grown to that size solely within the four-year period since the trees were planted.

Attachments:

5 – Austin Canopy Year 4 Initial Project Area iTree Report.pdf

Because the iTree results showed that older growth trees made up a sizable portion of the canopy, historical images from 2018 and 2020 were inspected. Based on the iTree results and analysis of historical imagery, a 0.45-acre section of the Project Area was identified as having full canopy prior to the Project planting. Because the canopy planting design and quantification method uses tree canopy assessments to determine if tree growth is in line with the projected CO_2 storage, and imaging can't be used to assess new tree growth under existing canopy, the Project Area was adjusted to exclude that 0.45-acre portion.

Attachments:

6 – Austin Canopy Year 4 Initial Project Area Imagery.png
7 – Austin Canopy Year 4 Adjusted Project Area Map.pdf

With the Project Area boundary adjustment to 3.85 acres, the iTree analysis was repeated and found that older growth trees made up 23.92% (± 2.46) of the total landcover of the Project Area, from the original 52.67% cover. New growth trees comprised 13.62% (±1.98)) of cover, while grass comprised 47.84% (±2.88) and bare earth 14.62% (±2.04)

The 13.62% of new canopy growth in the Project Area exceeds the 2.8% canopy threshold required at Year 4.

Attachments:

8 – Austin Canopy Year 4 Adjusted Project Area iTree Report.pdf
9 – Austin Canopy Year 4 Adjusted Project Area iTree Data Points.csv
10 – Austin Canopy Year 4 Project Area Adjustment Mapping Files
11 – Austin Canopy Year 4 Adjusted Project Area Imagery.png

Carbon Quantification

	Initial Crediting	Year 4 Adjustment
Total number of trees planted	1,250	1,250
CO2 index, tCO_2e/acre	106.7	106.7
Project area (acres), if applicable	4.3	3.85
Total number of trees per acre, if applicable	291	324
Credits attributed to the project (tCO_2e)	459	411
Credits after mortality deduction (20%)	N/A	N/A
Contribution to Registry Reversal Pool Account (5%) (tCO_2e)	23	21
Total credits to be issued to the Project Operator (tCO_2e)	436	390
Total credits requested to be issued at Year 4 (40%)	174	156

GHG Assertion:
Project Operator asserts that the Project results in GHG emissions mitigation of 390 tons CO_2e over the 25-year Project Duration. Project Operator asserts that the Project results in GHG emissions mitigation of 156 tons CO_2e at Year 4.

The CO2 index rate was determined by Dr. Greg McPherson to be 106.7 tCO_2e/acre, based on local planting data. The rate is multiplied by the number of acres (3.85 acres) to provide the total number of credits attributed to the Onion Creek portion of this project (411 tCO_2e). Minus the Registry Reversal Pool Account contribution (21 tCO_2e), the total credits to be issued to the Project Operator over the Project lifetime is 390 tCO_2e.
The updated Projected CO_2 stored and credit issuance over 25 years is outlined below:

Canopy Planting	Projection at Initial Crediting	Projection accounting for replacement trees
Total credits issued at Initial Crediting (10% CO2 (t))	44	44
Total credits to be issued At Year 4 (40% CO2 (t))	174	156
Total credits to be issued At Year 6 (30% CO2 (t))	131	117
Total credits to be issued after Year 25 (20% CO2 (t))	87	73
Total credits to be issued (tCO2e)	**436**	**390**

Attachments:
12 – Austin Canopy Year 4 Credit Tool
13 – Austin Riparian Quantification Approach

Based on monitoring, there were no major changes to the trees planted as a part of this project. The long-term maintenance plan for this site is for the Austin Watershed Protection Department (WPD) to uphold the areas designation as an official grow zone, where mowing is prohibited. This should allow for natural regeneration of both woody and herbaceous vegetation to occur within the Project Area.

CO-BENEFITS QUANTIFICATION DOCUMENTATION (Section 9 and Appendix B)

Summarize co-benefit quantification and provide supporting documentation. If necessary, update the CFC-provided Co-Benefits Quantification spreadsheet to calculate updated rainfall interception, reduction of certain air compounds, and energy savings.

Davis White & Patterson Single Tree Plantings – Single Tree

Ecosystem Services	***Resource Units***	***Value***
Rainfall Interception (m3/yr)	468.28	$1,224.69
Air Quality (t/yr)	-0.0126	-$197.30
Cooling – Electricity (kWh/yr)	3,728.97	$283.03
Heating – Natural Gas (kBtu/yr)	14,455.96	$150.20
Grand Total ($/yr)		**$1,460.62**

The Single Tree Co-Benefits estimates have been revised to reflect the updated planting list that includes the three replacement trees.

Attachments:

1 – Austin Single Tree Year 4 Credit Tool

Onion Creek Riparian Canopy Planting – Area Reforestation

Ecosystem Services	***Resource Units***	***Value***
Rainfall Interception (m3/yr)	387.49	$1,013.51
Air Quality (t/yr)	0.0865	$209.08
Cooling – Electricity (kWh/yr)	19,712.35	$1,496.17
Heating – Natural Gas (kBtu/yr)	10,339.88	$107.44
Grand Total ($/yr)		**$2,826.19**

Attachments:

12 – Austin Canopy Year 4 Credit Tool

ADDITIONALITY (Section 2)

Complete and attach the Attestation of Additionality.

Additionality is demonstrated by Project Operators per the Protocol in the following ways and in the Attestation of Additionality. The Attestation of Additionality was not required to be signed in the Tree Planting Protocol Version 6, however Project Operator met the requirements and is submitting the Attestation with this Project Design Document update.

- Project trees are not required by law or ordinance to be planted (Protocol Section 2.2). See Attestation of Planting.
- The Project did not plant trees on sites that were forested and then cleared of trees within the prior ten years

- Project trees are additional based on a project specific baseline or the Performance Standard Baseline attached to this PDD.
- Project Operator has signed a Project Implementation Agreement with City Forest Credits for 25 years.
- The 25-year Project Duration commitment is additional to and longer than any commitment the Project Operator makes to non-carbon project tree plantings.
- Project Operator has signed the Attestation of Additionality.

Filenames:

14 – Austin Attestation of Additionality
15 – Performance Standard Baseline Methodology

ATTESTATION OF NO DOUBLE COUNTING OF CREDITS AND NO NET HARM

Complete and attach the following attestation: Attestation of No Double Counting of Credits and Attestation of No Net Harm. Provide any additional notes as relevant.

The Attestation of No Double Counting of Credits and No Net Harm was not required to be signed in the Tree Planting Protocol Version 6, however Project Operator met the requirements and is submitting the Attestation with this Project Design Document update.

Filename:

16 – Austin Attestation of No Double Counting and No Net Harm

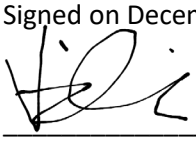
ADDITIONAL INFORMATION

Include additional information on changes to monitoring and reporting plans since the Initial Credit Planting Design Document was submitted.

No additional information.

SIGNATURE

Signed on December 13 in 2022, by Valerie Tamburri, for TreeFolks.



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Signature

Valerie Tamburri
512-443-5323
valerie@treefolks.org

ATTACHMENTS

1 – Austin Single Tree Year 4 Credit Tool
2 –Austin Single Tree Year 4 Geocoded Photos
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4 – Austin Single Tree Year 4 Shapefiles
5 – Austin Canopy Year 4 Initial Project Area iTree Report
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13 – Austin Riparian Quantification Approach
14 – Austin Attestation of Additionality
15 – Performance Standard Baseline Methodology
16 – Austin Attestation of No Double Counting and No Net Harm

ATTACHMENT 15
PERFORMANCE STANDARD BASELINE METHODOLOGY (Section 2, CFC Standard)

There is a second additionality methodology set out in the WRI GHG Protocol guidelines – the Performance Standard methodology. This Performance Standard essentially allows the project developer, or in our case, the developers of the protocol, to create a performance standard baseline using the data from similar activities over geographic and temporal ranges.

The common perception, particularly in the United States, is that projects must meet a project specific test. Project-specific additionality is easy to grasp conceptually. The 2014 Climate Action Reserve urban forest protocol essentially uses project-specific requirements and methods.

However, the WRI GHG Protocol clearly states that either a project-specific test or a performance standard baseline is acceptable.[1] One key reason for this is that regional or national data can give a more accurate picture of existing activity than a narrow focus on one project or organization.

Narrowing the lens of additionality to one project or one tree-planting entity can give excellent data on that project or entity, which data can also be compared to other projects or entities (common practice). But plucking one project or entity out of its regional or national context ignores all comparable regional or national data. And that regional or national data may give a more accurate standard than data from one project or entity.

By analogy: one pixel on a screen may be dark. If all you look at is the dark pixel, you see darkness. But the rest of screen may consist of white pixels and be white. Similarly, one active tree-planting organization does not mean its trees are additional on a regional basis. If the region is losing trees, the baseline of activity may be negative regardless of what one active project or entity is doing. Here is the methodology described in the WRI GHG Protocol to determine a Performance Standard baseline, together with the application of each factor to urban forestry:

Table 2.1 Performance Standard Factors

WRI Performance Standard Factor	As Applied to Urban Forestry
Describe the project activity	Increase in urban trees
Identify the types of candidates	Cities and towns, quasi-governmental entities like utilities, watersheds, and educational institutions, and private property owners
Set the geographic scope (a national scope is explicitly approved as the starting point)	Could use national data for urban forestry, or regional data
Set the temporal scope (start with 5-7 years and justify longer or shorter)	Use 4-7 years for urban forestry
Identify a list of multiple baseline candidates	Many urban areas, which could be blended mathematically to produce a performance standard baseline

[1] WRI GHG Protocol, Chapter 2.14 at 16 and Chapter 3.2 at 19.

The Performance Standard methodology approves of the use of data from many different baseline candidates. In the case of urban forestry, those baseline candidates are other urban areas.[2]

As stated above, the project activity defined is obtaining an increase in urban trees. The best data to show the increase in urban trees via urban forest project activities is national or regional data on tree canopy in urban areas. National or regional data will give a more comprehensive picture of the relevant activity (increase in urban trees) than data from one city, in the same way that a satellite photo of a city shows a more accurate picture of tree canopy in a city than an aerial photo of one neighborhood. Tree canopy data measures the tree cover in urban areas, so it includes multiple baseline candidates such as city governments and private property owners. Tree canopy data, over time, would show the increase or decrease in tree cover.

Data on Tree Canopy Change over Time in Urban Areas

The CFC quantitative team determined that there were data on urban tree canopy cover with a temporal range of four to six years available from four geographic regions. The data are set forth below:

Table 2.2 Changes in Urban Tree Canopy (UTC) by Region (from Nowak and Greenfield, 2012, see footnote 7)

City	Abs Change UTC (%)	Relative Change UTC (%)	Ann. Rate (ha UTC/yr)	Ann. Rate (m2 UTC/cap/yr)	Data Years
EAST					
Baltimore, MD	-1.9	-6.3	-100	-1.5	(2001–2005)
Boston, MA	-0.9	-3.2	-20	-0.3	(2003–2008)
New York, NY	-1.2	-5.5	-180	-0.2	(2004–2009)
Pittsburgh, PA	-0.3	-0.8	-10	-0.3	(2004–2008)
Syracuse, NY	1.0	4.0	10	0.7	(2003–2009)
Mean changes	-0.7	-2.4	-60.0	-0.3	
Std Error	0.5	1.9	35.4	0.3	
SOUTH					
Atlanta, GA	-1.8	-3.4	-150	-3.1	(2005–2009)
Houston, TX	-3.0	-9.8	−890	-4.3	(2004–2009)
Miami, FL	-1.7	-7.1	-30	-0.8	(2003–2009)
Nashville, TN	-1.2	-2.4	-300	-5.3	(2003–2008)
New Orleans, LA	-9.6	-29.2	−1120	-24.6	(2005-2009)
Mean changes	-3.5	-10.4	-160.0	-7.6	
Std Error	1.6	4.9	60.5	4.3	
MIDWEST					
Chicago, IL	-0.5	-2.7	-70	-0.2	(2005–2009)
Detroit, MI	-0.7	-3.0	-60	-0.7	(2005–2009)
Kansas City, MO	-1.2	-4.2	-160	-3.5	(2003–2009)

[2] See Nowak, et al. *"Tree and Impervious Cover Change in U.S. Cities,"* Urban Forestry and Urban Greening, 11 (2012), 21-30

City	Abs Change UTC (%)	Relative Change UTC (%)	Ann. Rate (ha UTC/yr)	Ann. Rate (m2 UTC/cap/yr)	Data Years
Minneapolis, MN	-1.1	-3.1	-30	-0.8	(2003–2008)
Mean changes	-0.9	-3.3	-80.0	-1.3	
Std Error	0.2	0.3	28.0	0.7	
WEST					
Albuquerque, NM	-2.7	-6.6	-420	-8.3	(2006–2009)
Denver, CO	-0.3	-3.1	-30	-0.5	(2005–2009)
Los Angeles, CA	-0.9	-4.2	-270	-0.7	(2005–2009)
Portland, OR	-0.6	-1.9	-50	-0.9	(2005–2009)
Spokane, WA	-0.6	-2.5	-20	-1.0	(2002–2007)
Tacoma, WA	-1.4	-5.8	-50	-2.6	(2001–2005)
Mean changes	-1.1	-4.0	-140.0	-2.3	
Std Error	0.4	0.8	67.8	1.2	

These data have been updated by Nowak and Greenfield.[3] The 2012 data show that urban tree canopy is experiencing negative growth in all four regions. The 2018 data document continued loss of urban tree cover.

Table 3 of the 2018 article shows data for all states, with a national loss of urban and community tree cover of 175,000 acres per year during the study years of 2009-2014.

To put this loss in perspective, the total land area of urban and community tree cover loss during the study years totals 1,367 square miles – equal to the combined land area of New York City, Atlanta, Philadelphia, Miami, Boston, Cleveland, Pittsburgh, St. Louis, Portland, OR, San Francisco, Seattle, and Boise.

Even though there may be individual tree planting activities that increase the number of urban trees within small geographic locations, the performance of activities to increase tree cover shows a negative baseline. The Drafting Group did not use negative baselines for the Tree Planting Protocol, but determined to use baselines of zero.

Deployment of the Performance Standard baseline methodology for a City Forest Planting Protocol is supported by conclusions that make sense and are anchored in the real world:

- With the data showing that tree loss exceeds gains from planting, new plantings are justified as additional to that decreasing canopy baseline. In fact, the negative baseline would justify as additional any trees that are protected from removal.
- Because almost no urban trees are planted now with carbon as a decisive factor, urban tree planting done to sequester carbon is additional;
- Almost no urban trees are currently planted with a contractual commitment for monitoring. Maintenance of trees is universally an intention, one that is frequently reached when budgets are cut, as in the Covid-19 era. The 25-year commitment required by this Protocol is entirely

[3] Nowak et al. 2018. "Declining Urban and Community Tree Cover in the United States," *Urban Forestry and Urban Greening,* 32, 32-55

additional to any practice in place in the U.S. and will result in substantial additional trees surviving to maturity;

- Because the urban forest is a public resource, and because public funding falls far short of maintaining tree cover and stocking, carbon revenues will result in additional trees planted or in maintenance that will result in additional trees surviving to maturity;
- Because virtually all new large-scale urban tree planting is conducted by governmental entities or non-profits, or by private property developers complying with governmental regulations (which would not be eligible for carbon credits under our protocol), and because any carbon revenues will defray only a portion of the costs of tree planting, there is little danger of unjust enrichment to developers of city forest carbon projects.

Last, The WRI GHG Protocol recognizes explicitly that the principles underlying carbon protocols need to be adapted to different types of projects. The WRI Protocol further approves of balancing the stringency of requirements with the need to encourage participation in desirable carbon projects:

Setting the stringency of additionality rules involves a balancing act. Additionality criteria that are too lenient and grant recognition for "non-additional" GHG reductions will undermine the GHG program's effectiveness. On the other hand, making the criteria for additionality too stringent could unnecessarily limit the number of recognized GHG reductions, in some cases excluding project activities that are truly additional and highly desirable. In practice, no approach to additionality can completely avoid these kinds of errors. Generally, reducing one type of error will result in an increase of the other. Ultimately, there is no technically correct level of stringency for additionality rules. GHG programs may decide based on their policy objectives that it is better to avoid one type of error than the other.[4]

The policy considerations weigh heavily in favor of "highly desirable" planting projects to reverse tree loss for the public resource of city forests.

[4] WRI GHG Protocol, Chapter 3.1 at 19.

Attachments

Single Tree

Carbon Quantification Year 4 Credit Tool – Single Tree

Tree Sampling Data

Geocoded Photos

Canopy

iTree Canopy Report

Project Area Map and Imagery

Carbon Quantification Year 4 Credit Tool - Canopy

Riparian Quantification Approach

Attestation of No Double Counting and No Net Harm

Attestation of Additionality

Carbon Quantification Year 4 Credit Tool – Single Tree

Directions
1) In Table 1 record the number of sites planted for each tree species.
2) If species are not listed, add them to the bottom of Table 1.

Table 1. Planting List

Scientific Name	Common Name	Tree-Type Abbreviation	No. Sites Planted
Abies concolor	white fir	CEL	
Abies species	fir	CEL	
Acacia baileyana	Bailey acacia	BES	
Acer buergerianum	trident maple	BDS	
Acer campestre	hedge maple	BDM	
Acer ginnala	Amur maple	BDS	
Acer griseum	paperbark maple	BDS	
Acer macrophyllum	bigleaf maple	BDL	
Acer negundo	boxelder	BDL	
Acer nigrum	black maple	BDL	
Acer palmatum	Japanese maple	BDS	
Acer platanoides	Norway maple	BDL	
Acer rubrum	red maple	BDM	
Acer saccharinum	silver maple	BDL	
Acer saccharum	sugar maple	BDL	
Acer truncatum	purpleblow maple	BDS	
Acer x freemanii	Freeman maple	BDL	
Aesculus glabra	Ohio buckeye	BDL	
Aesculus hippocastanum	horsechestnut	BDL	
Aesculus octandra	yellow buckeye	BDL	
Aesculus pavia	red buckeye	BDS	
Ailanthus altissima	tree of heaven	BDM	
Albizia julibrissin	mimosa	BDS	
Amelanchier arborea	downy serviceberry	BDS	
Amelanchier species	serviceberry	BDS	
Araucaria araucana	monkeypuzzle tree	CEL	
Asimina triloba	pawpaw	BDS	
Aucuba species	acuba	BES	
Betula lenta	black birch	BDM	
Betula nigra	river birch	BDM	
Betula papyrifera	paper birch	BDL	
Betula pendula	European white birch	BDM	
Betula platyphylla	Asian white birch	BDM	
Betula utilis	Indian paper birch	BDM	
Broadleaf Deciduous Large	broadleaf deciduous large	BDL	
Broadleaf Deciduous Medium	broadleaf deciduous medium	BDM	
Broadleaf Deciduous Small	broadleaf deciduous small	BDS	
Broadleaf Evergreen Large	broadleaf evergreen large	BEL	
Broadleaf Evergreen Medium	broadleaf evergreen medium	BEM	
Broadleaf Evergreen Small	broadleaf evergreen small	BES	
Broussonetia papyrifera	paper mulberry	BDM	
Buddleja davidii	orange eye butterflybush	BDS	
Buxus species	boxwood	BES	
Camellia japonica	camellia	BES	
Carpinus betulus	European hornbeam	BDM	
Carpinus caroliniana	American hornbeam	BDM	
Carya cordiformis	bitternut hickory	BDL	
Carya glabra	pignut hickory	BDL	
Carya illinoinensis	pecan	BDL	4
Carya ovata	shagbark hickory	BDL	
Carya species	hickory	BDL	
Carya tomentosa	mockernut hickory	BDL	
Castanea dentata	American chestnut	BDL	
Castanea mollissima	Chinese chestnut	BDM	
Catalpa speciosa	northern catalpa	BDL	
Cedrus atlantica	Atlas cedar	CEL	
Cedrus deodara	deodar cedar	CEL	
Celtis laevigata	sugarberry	BDL	
Celtis occidentalis	northern hackberry	BDL	
Celtis species	hackberry	BDL	
Cercidiphyllum japonicum	katsura tree	BDM	
Cercis canadensis	eastern redbud	BDS	
Chamaecyparis lawsoniana	Port Orford cedar	CEL	
Chamaecyparis pisifera	Sawara false cypress	CES	
Chamaecyparis thyoides	Atlantic white cedar	CEM	
Chionanthus retusus	Chinese fringe tree	BDS	
Chionanthus virginicus	fringetree	BDS	
Cladrastis kentukea	yellowwood	BDM	
Clerodendrum trichotomum	harlequin glorybower	BDS	
Conifer Evergreen Large	conifer evergreen large	CEL	
Conifer Evergreen Medium	conifer evergreen medium	CEM	
Conifer Evergreen Small	conifer evergreen small	CES	
Cornus alternifolia	alternateleaf dogwood	BDS	
Cornus florida	flowering dogwood	BDS	
Cornus kousa	Kousa dogwood	BDS	
Cornus mas	cornelian cherry	BDS	
Cornus species	dogwood	BDS	
Cotinus coggygria	smoke tree	BDS	
Crataegus phaenopyrum	Washington hawthorn	BDS	
Crataegus species	hawthorn	BDS	
Crataegus viridis	green hawthorn	BDS	
Cryptomeria japonica	Japanese red cedar	CEL	
Cunninghamia lanceolata	blue Chinese fir	CEL	
Diospyros virginiana	common persimmon	BDM	
Elaeagnus umbellata	autumn olive	BES	
Eucalyptus species	gum	BEL	
Fagus grandifolia	American beech	BDL	
Fagus sylvatica	European beech	BDL	
Ficus carica	common fig	BDS	
Firmiana simplex	Chinese parasol tree	BDM	
Forsythia species	forsythia	BDS	
Fraxinus americana	white ash	BDL	
Fraxinus nigra	black ash	BDM	
Fraxinus pennsylvanica	green ash	BDL	
Fraxinus quadrangulata	blue ash	BDL	
Ginkgo biloba	ginkgo	BDL	
Gleditsia triacanthos	honeylocust	BDL	
Gymnocladus dioicus	Kentucky coffeetree	BDL	
Hakea species	hakea	BES	
Halesia carolina	snowdrop tree	BDM	
Hamamelis virginiana	witch hazel	BDS	
Hibiscus syriacus	rose-of-sharon	BDS	
Ilex aquifolium	English holly	BES	
Ilex cassine	dahoon	BES	
Ilex cornuta	Chinese holly	BES	
Ilex opaca	American holly	BES	
Ilex species	holly	BES	
Juglans nigra	black walnut	BDL	
Juglans regia	English walnut	BDL	
Juniperus species	juniper	CEM	
Juniperus virginiana	eastern red cedar	CEM	
Koelreuteria paniculata	goldenrain tree	BDM	
Lagerstroemia species	common crapemyrtle	BDS	
Larix decidua	European larch	BDL	
Ligustrum species	privet	BES	
Liquidambar styraciflua	sweetgum	BDL	
Liriodendron tulipifera	tulip tree	BDL	
Maclura pomifera	Osage orange	BDM	
Magnolia acuminata	cucumber tree	BDL	
Magnolia grandiflora	southern magnolia	BEM	
Magnolia species	magnolia	BDM	
Magnolia stellata	star magnolia	BDS	
Magnolia virginiana	sweetbay	BEM	
Magnolia x soulangiana	Chinese magnolia; saucer magnolia	BDS	
Mahonia bealei	leatherleaf mahonia	BES	
Malus species	apple	BDS	
Malus sylvestris	paradise apple	BDS	
Malus tschonoskii	crabapple	BDS	
Melia azedarach	Chinaberry	BDM	
Metasequoia glyptostroboides	dawn redwood	BDL	
Morus rubra	red mulberry	BDL	
Morus species	mulberry	BDM	
Myrica cerifera	southern bayberry	BES	
Nyssa sylvatica	black tupelo	BDL	
Ostrya virginiana	eastern hophornbeam	BDM	
Palm Evergreen Large	palm evergreen large	PEL	

Table 2a. Summary of Planting Sites

Tree-Type	Tree-Type Abbreviation	No. Sites Planted
Brdlf Decid Large (>50 ft)	**BDL**	21
Brdlf Decid Med (30-50 ft)	**BDM**	8
Brdlf Decid Small (<30 ft)	**BDS**	16
Brdlf Evgrn Large (>50 ft)	**BEL**	0
Brdlf Evgrn Med (30-50 ft)	**BEM**	1
Brdlf Evgrn Small (<30 ft)	**BES**	1
Conif Evgrn Large (>50 ft)	**CEL**	0
Conif Evgrn Med (30-50 ft)	**CEM**	0
Conif Evgrn Small (<30 ft)	**CES**	0
	Total Sites Planted	47

Table 2b. Summary of Planting Sites with Species Names and Replacement Notes

Scientific Name	Common Name	Abbreviation	Planted	Updates from Initial Crediting Planting List
Carya illinoinensis	pecan	BDL	4	
Cotinus obovatus	American Smoke Tree	BDS	1	Replaced original tree *Sophorus secundiflora* at site PAT-12
Sapindus saponaria	Western Soapberry	BDM	1	
Platanus mexicana	Mexican Sycamore	BDL	5	
Ungnadia speciosa	Mexican Buckeye	BDS	2	
Acacia farnesiana	Huisache	BDS	4	Includes replacement of original tree *Quercus polymorpha* at site PAT-2
Ulmus crassifolia	Cedar Elm	BDL	4	
Cercis canadensis var. texensis	Texas Redbud	BDS	7	
Chilopsis linearis	Desert Willow	BDM	5	
Quercus buckleyi	Texas Red Oak	BDL	3	
Quercus polymorpha	Monterrey Oak	BDL	3	Originally 4 were planted, but one died and was replaced by *Acacia farnesiana*
Quercus laceyi	Lacey Oak	BDL	2	
Quercus fusiformis	Plateau Live Oak	BEM	1	
Sophora secundiflora	Texas Mountain Laurel	BES	1	Originally 2 were planted, but one died and was replaced by *Cotinus obovatus*
Diospyros texana	Texas Persimmon	BDM	2	
Eysenhardtia texana	Texas Kidneywood	BDS	2	Includes replacement of original tree *Quercus macrocarpa* at site PAT-1
Leucaena retusa	Goldenball Leadtree	BDS	0	
				Quercus macrocarpa is no longer listed because it died and was replaced by *Eysenhardtia texana*
			47	

Palm Evergreen Medium	palm evergreen medium	PEM	
Palm Evergreen Small	palm evergreen small	PES	
Paulownia tomentosa	royal paulownia	BDM	
Phellodendron amurense	Amur corktree	BDM	
Phoenix dactylifera	date palm	PEL	
Photinia species	chokeberry	BES	
Photinia x fraseri	Fraser photinia	BES	
Picea abies	Norway spruce	CEL	
Picea glauca	white spruce	CEL	
Picea pungens	blue spruce	CEL	
Picea species	spruce	CEL	
Pinus contorta var. bolanderi	Bolander beach pine	CES	
Pinus contorta var. latifolia	tall lodgepole pine	CEL	
Pinus echinata	shortleaf pine	CEL	
Pinus mugo	sweet mountain pine	CES	
Pinus nigra	Austrian pine	CEL	
Pinus palustris	longleaf pine	CEL	
Pinus resinosa	red pine	CEL	
Pinus species	pine	CEL	
Pinus strobus	eastern white pine	CEL	
Pinus sylvestris	Scotch pine	CEM	
Pinus taeda	loblolly pine	CEL	
Pinus virginiana	Virginia pine	CEM	
Pistacia chinensis	Chinese pistache	BDM	
Platanus acerifolia	London planetree	BDL	
Platanus occidentalis	American sycamore	BDL	
Populus alba	white poplar	BDL	
Populus balsamifera	balsam poplar	BDL	
Populus deltoides	eastern cottonwood	BDL	
Populus nigra	black poplar	BDL	
Prunus campanulata	Taiwan cherry	BDS	
Prunus caroliniana	Carolina laurelcherry	BEM	
Prunus cerasifera	cherry plum	BDS	
Prunus padus	European bird cherry	BDM	
Prunus persica	peach	BDS	
Prunus serotina	black cherry	BDL	
Prunus serrulata	Kwanzan cherry	BDS	
Prunus species	plum	BDS	
Prunus subhirtella	Higan cherry	BDS	
Prunus tomentosa	Manchu cherry	BDS	
Prunus yedoensis	Yoshino flowering cherry	BDS	
Pseudotsuga menziesii	Douglas fir	CEL	
Pyracantha koidzumii	Formosa firethorn	BES	
Pyracantha species	firethorn	BES	
Pyrus calleryana	Callery pear	BDS	
Pyrus communis	common pear	BDM	
Pyrus species	pear	BDM	
Quercus acutissima	sawtooth oak	BDM	
Quercus alba	white oak	BDL	
Quercus bicolor	swamp white oak	BDL	
Quercus coccinea	scarlet oak	BDL	
Quercus ellipsoidalis	northern pin oak	BDL	
Quercus falcata	southern red oak	BDL	
Quercus hemisphaerica	Darlington oak	BEL	
Quercus imbricaria	shingle oak	BDL	
Quercus lyrata	overcup oak	BDM	
Quercus macrocarpa	bur oak	BDL	0
Quercus marilandica	blackjack oak	BDM	
Quercus michauxii	swamp chestnut oak	BDL	
Quercus muehlenbergii	chinkapin oak	BDL	
Quercus nigra	water oak	BEL	
Quercus palustris	pin oak	BDL	
Quercus phellos	willow oak	BDL	
Quercus robur	English oak	BDL	
Quercus rubra	northern red oak	BDL	
Quercus shumardii	Shumard oak	BDL	
Quercus stellata	post oak	BDL	
Quercus velutina	black oak	BDL	
Quercus virginiana	live oak	BEL	
Rhamnus species	buckthorn	BDS	
Rhus species	sumac	BDS	
Robinia pseudoacacia	black locust	BDL	
Rosa banksiae	banksian rose; Lady Bank's rose	BDS	
Sabal palmetto	cabbage palmetto	PEM	
Salix gracilistyla	rosegold pussy willow	BDS	
Salix matsudana	corkscrew willow	BDS	
Salix nigra	black willow	BDM	
Salix species	willow	BDL	
Salix x pendulina Wenderoth	Wisconsin weeping willow	BDL	
Sapium sebiferum	tallowtree	BDM	
Sassafras albidum	sassafras	BDL	
Serenoa repens	saw palmetto	PES	
Shrub	unknown shrub	BDS OTHER	
Sophora japonica	Japanese pagoda tree	BDM	
Sorbus aucuparia	European mountain ash	BDM	
Styrax japonicus	Japanese snowbell	BDS	
Syringa reticulata	Japanese tree lilac	BDS	
Syringa species	lilac	BDS	
Taxodium distichum	bald cypress	BDL	
Thuja occidentalis	northern white cedar	CEL	
Thuja plicata	western red cedar	CEL	
Tilia americana	American basswood	BDL	
Tilia cordata	littleleaf linden	BDM	
Torreya taxifolia	Florida torreya	CES	
Tsuga canadensis	eastern hemlock	CEL	
Ulmus alata	winged elm	BDL	
Ulmus americana	American elm	BDL	
Ulmus parvifolia	Chinese elm	BDL	
Ulmus pumila	Siberian elm	BDL	
Ulmus rubra	slippery elm	BDL	
Ulmus species	elm	BDL	
Unknown	unknown tree	BDM OTHER	
Viburnum prunifolium	blackhaw	BDS	
Viburnum species	viburnum	BDS	
Vitex agnus-castus	chaste tree	BDS	
Washingtonia filifera	California palm	PES	
Washingtonia robusta	Mexican fan palm	PEM	
x Cupressocyparis leylandii	Leyland cypress	CEL	
Yucca species	yucca	PES	
Zelkova serrata	Japanese zelkova	BDL	
Sapindus saponaria	Western Soapberry	BDM	1
Platanus mexicana	Mexican Sycamore	BDL	5
Ungnadia speciosa	Mexican Buckeye	BDS	2
Acacia farnesiana	Huisache	BDS	4
Ulmus crassifolia	Cedar Elm	BDL	4
Cercis canadensis var. texensis	Texas Redbud	BDS	7
Chilopsis linearis	Desert Willow	BDM	5
Quercus buckleyi	Texas Red Oak	BDL	3
Quercus polymorpha	Monterrey Oak	BDL	3
Quercus laceyi	Lacey Oak	BDL	2
Quercus fusiformis	Plateau Live Oak	BEM	1
Sophora secundiflora	Texas Mountain Laurel	BES	1
Diospyros texana	Texas Persimmon	BDM	2
Eysenhardtia texana	Texas Kidneywood	BDS	2
Leucaena retusa	Goldenball Leadtree	BDS	0
Cotinus obovatus	American Smoke Tree	BDS	1

Directions

A mortality deductions (% loss) is applied to account for anticipated tree losses. Confirm that the anticipted mortality rate (% of planted sites without trees in 25 years) in cell D6 is constent with Initial Crediting. The tool calculates the Observed Mortality at Year 4 based on the sampling data. If the Observed Mortality exceeds the Anticipated Mortality, the Observed Mortality is used to calculate carbon storage; otherwise, the Anticipated Mortality is used. The tool calculates the amount of Forward Credits that could be issued at after Initial Crediting (10%), Year 4 (40%), Year 6 (30%), and after Year 25 (20%). A 5% buffer pool deduction is applied that will go into a program-wide pool to insure against catastrophic loss of trees.

Anticipated Mortality Deduction (%) at Initial Crediting:	20%
Observed Mortality (%) at Year 4:	17%

Because Observed Mortality is less than the Anticipated Mortality, the Anticipated Mortality is used to calculate carbon storage.

Table 3. Projected CO2 stored by live trees 25 years after planting, issued at four times over the Project Duration. These values account for anticipated tree losses and the 5% Reversal Pool Account deduction.

						10%	40%	30%	20%
	No. Sites Planted	**No. Live Trees**	**Mortality Deduction (%)**	**25-yr CO_2 stored (kg/tree)**	**Total 25-yr CO2 stored, includes Mortality and Reversal Pool Account Deduction (t)**	**Year 0 10% CO_2 (t)**	**Year 4 40% CO_2 (t)**	**Year 6 30% CO_2 (t)**	**After Year 25 20% CO_2 (t)**
BDL	21	17	0.20	3,625.26	57.9	5.79	23.14	17.36	11.57
BDM	8	6	0.20	2,817.57	17.1	1.71	6.85	5.14	3.43
BDS	16	13	0.20	2,118.55	25.8	2.58	10.30	7.73	5.15
BEL	0	0	0.20	0.00	0.0	0.00	0.00	0.00	0.00
BEM	1	1	0.20	1,317.96	1.0	0.10	0.40	0.30	0.20
BES	1	1	0.20	554.47	0.4	0.04	0.17	0.13	0.08
CEL	0	0	0.20	0.00	0.0	0.00	0.00	0.00	0.00
CEM	0	0	0.20	0.00	0.0	0.00	0.00	0.00	0.00
CES	0	0	0.20	0.00	0.0	0.00	0.00	0.00	0.00
	47	38	0.20	10,433.8	102.2	10.22	40.87	30.65	20.43

In Table 4 the tool infers the amount of CO_2 stored after 25 years based on the population of live trees. Values in column H account for anticipated tree losses and the 5% buffer pool deduction.

Table 4. Grand Total CO_2 Stored after 25 years (all live trees, includes tree losses and buffer pool deduction)

Tree-Type	No. Sites Planted	Mortality Deduction (%)	Total Live Trees After Mortality	25-yr CO2 stored (kg/tree)	CO2 Total - No Deductions (t)	Grand Total CO2 with Deductions (t)
Brdlf Decid Large (>50 ft)	21	0.20	17	3,625.26	76.1	57.9
Brdlf Decid Med (30-50 ft)	8	0.20	6	2,817.57	22.5	17.1
Brdlf Decid Small (<30 ft)	16	0.20	13	2,118.55	33.9	25.8
Brdlf Evgrn Large (>50 ft)	0	0.20	0	0.00	0.0	0.0
Brdlf Evgrn Med (30-50 ft)	1	0.20	1	1,317.96	1.3	1.0
Brdlf Evgrn Small (<30 ft)	1	0.20	1	554.47	0.6	0.4
Conif Evgrn Large (>50 ft)	0	0.20	0	0.00	0.0	0.0
Conif Evgrn Med (30-50 ft)	0	0.20	0	0.00	0.0	0.0
Conif Evgrn Small (<30 ft)	0	0.20	0	0.00	0.0	0.0
	47		38	10,433.8	134.4	102.17

Using the information you provide and background data, the tool provides estimates of co-benefits after 25 years.

Table 5. Co-Benefits per year after 25 years (all live trees, includes tree losses)

Ecosystem Services	Resource Unit Totals	Total $
Rain Interception (m3/yr)	468.28	$1,224.69
Air Quality (t/yr)		
O3	0.0029	$42.43
NOx	0.0012	$17.84
PM10	0.0031	$16.77
Net VOCs	-0.0199	-$274.35
Air Quality Total	-0.0126	-$197.30
Energy (kWh/yr & kBtu/yr)		
Cooling - Elec.	3,728.97	$283.03
Heating - Nat. Gas	14,455.96	$150.20
Energy Total ($/yr)		$433.23
Grand Total ($/yr)		$1,460.62

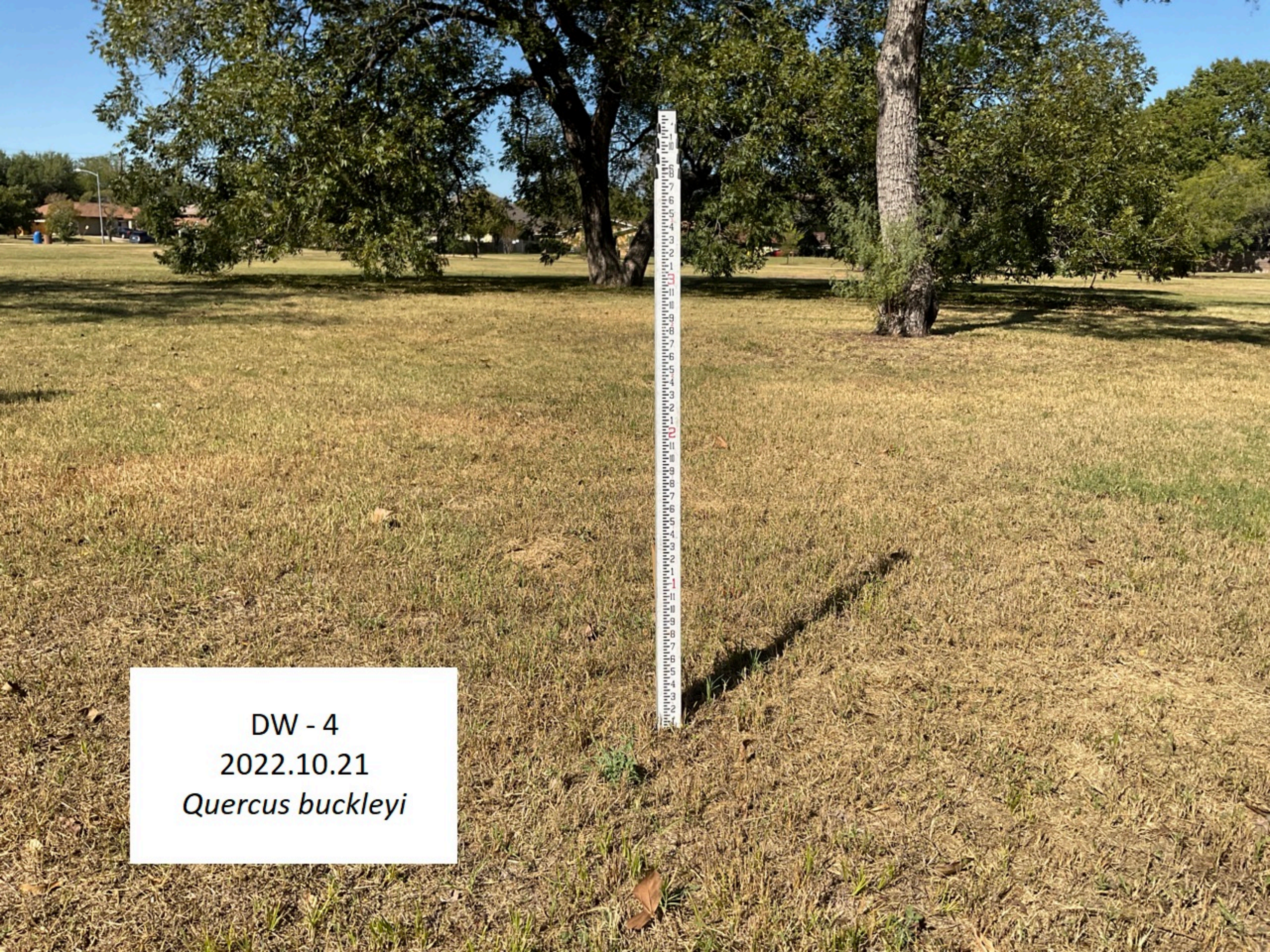
Tree Sampling Data

Data Collection Table

Data Collection Dates: 05/01/2019, 10/03/2022 Crew: Collin McMichael (2019), Emma Pett (2019), Marina Weikel (2022), Valerie Tamburri (2022)

Date Planted	Tree ID #	Species	Site ID #	Lat	Long	Image #1	Image #2	Live (Orig/Replace #1/Replace #2)	Standing Dead or Vacant Site	Date Removed	Date Replaced	Notes
3/31/2018	DW-1	*Quercus polymorpha*	DW-A	30°18'16.42"	97°39'23.16"	DW-1	DW-1_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-2	*Quercus polymorpha*	DW-B	30°18'14.69"	97°39'17.83"	DW-2	DW-2_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-3	*Quercus polymorpha*	DW-C	30°18'14.85"	97°39'19.20"	DW-3	DW-3_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-4	*Quercus buckleyi*	DW-D	30°18'13.04"	97°39'23.07"	DW-4	DEAD - NO PHOTO	Orig	Vacant	UNKNOWN	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-5	*Quercus buckleyi*	DW-E	30°18'16.24"	97°39'22.61"	DW-5	DW-5_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-6	*Quercus buckleyi*	DW-F	30°18'16.10"	97°39'24.67"	DW-6	DW-6_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-8	*Chilopsis linearis*	DW-G	30°18'13.08"	97°39'24.23"	DW-8	DW-8_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-9	*Chilopsis linearis*	DW-H	30°18'15.41"	97°39'20.40"	DW-9	DW-9_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-10	*Cercis canadensis var. texensis*	DW-I	30°18'13.08"	97°39'23.46"	DW-10	DW-10_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-11	*Cercis canadensis var. texensis*	DW-J	30°18'15.74"	97°39'21.73"	DW-11	DW-11_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-12	*Cercis canadensis var. texensis*	DW-K	30°18'15.99"	97°39'22.42"	DW-12	DEAD - NO PHOTO	Orig	Vacant	UNKNOWN	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-13	*Ulmus crassifolia*	DW-L	30°18'13.15"	97°39'24.56"	DW-13	DW-13_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-14	*Ulmus crassifolia*	DW-M	30°18'14.65"	97°39'24.51"	DW-14	DW-14_2022.10.03	Orig	Dead, Standing	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-15	*Ulmus crassifolia*	DW-N	30°18'16.20"	97°39'24.31"	DW-15	DW-15_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-16	*Ulmus crassifolia*	DW-O	30°18'15.94"	97°39'22.72"	DW-16	DW-16_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-17	*Acacia farnesiana*	DW-P	30°18'12.40"	97°39'23.93"	DW-17	DW-17_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-18	*Acacia farnesiana*	DW-Q	30°18'15.29"	97°39'20.33"	DW-18	DW-18_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-19	*Acacia farnesiana*	DW-R	30°18'16.20"	97°39'20.91"	DW-19	DW-19_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-21	*Quercus laceyi*	DW-T	30°18'12.78"	97°39'23.74"	DW-21	DW-21_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-22	*Quercus laceyi*	DW-U	30°18'16.18"	97°39'23.68"	DW-22	DW-22_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 7-10-19, #2 Photographed 10-03-22
3/31/2018	DW-24	*Ungnadia speciosa*	DW-W	30°18'13.11"	97°39'23.76"	DW-24	DW-24_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-25	*Ungnadia speciosa*	DW-X	30°18'14.42"	97°39'24.70"	DW-25	DEAD - NO PHOTO	Orig	Vacant	UNKNOWN	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-26	*Platanus mexicana*	DW-Y	30°18'13.04"	97°39'23.16"	DW-26	DW-26_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-27	*Platanus mexicana*	DW-Z	30°18'13.30"	97°39'24.75"	DW-27	DEAD - NO PHOTO	Orig	Vacant	UNKNOWN	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-28	*Platanus mexicana*	DW-AA	30°18'14.77"	97°39'24.59"	DW-28	DW-28_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-29	*Platanus mexicana*	DW-AB	30°18'16.52"	97°39'24.56"	DW-29	DW-29_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-30	*Platanus mexicana*	DW-AC	30°18'15.47"	97°39'20.39"	DW-30	DW-30_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-32	*Carya illinoinensis*	DW-AE	30°18'12.47"	97°39'23.98"	DW-32	DW-32_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-33	*Carya illinoinensis*	DW-AF	30°18'15.08"	97°39'24.57"	DW-33	DW-33_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-34	*Carya illinoinensis*	DW-AG	30°18'15.57"	97°39'20.85"	DW-34	DW-34_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-35	*Carya illinoinensis*	DW-AH	30°18'15.80"	97°39'22.72"	DW-35	DW-35_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/31/2018	DW-36	*Sapindus saponaria*	DW-AI	30°18'13.57"	97°39'24.81"	DW-36	DW-36_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-1-19, #2 Photographed 10-03-22
3/10/2018	PAT-1	*Quercus macrocarpa*	PAT-A	30°17'48.26"	97°42'39.07"	PAT-1	PAT-1_2022.10.03	Replace #1 (*Eysenha*	Alive	N/A	UNKNOWN	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-2	*Quercus polymorpha*	PAT-B	30°17'48.57"	97°42'38.41"	PAT-2	PAT-2_2022.10.03	Replace #1 (*Acacia fa*	Alive	N/A	UNKNOWN	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-3	*Quercus fusiformis*	PAT-C	30°17'48.74"	97°42'38.83"	PAT-3	PAT-3_2022.10.03	Orig	Dead, Standing	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-4	*Chilopsis linearis*	PAT-D	30°17'48.65"	97°42'39.16"	PAT-4	PAT-4_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-5	*Chilopsis linearis*	PAT-E	30°17'48.69"	97°42'39.18"	PAT-5	PAT-5_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-6	*Chilopsis linearis*	PAT-F	30°17'48.76"	97°42'38.77"	PAT-6	PAT-6_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-7	*Cercis canadensis var. texensis*	PAT-G	30°17'48.46"	97°42'38.72"	PAT-7	PAT-7_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-8	*Cercis canadensis var. texensis*	PAT-H	30°17'48.66"	97°42'38.55"	PAT-8	PAT-8_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-9	*Cercis canadensis var. texensis*	PAT-I	30°17'48.73"	97°42'38.66"	PAT-9	PAT-9_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-10	*Cercis canadensis var. texensis*	PAT-J	30°17'48.50"	97°42'38.61"	PAT-10	PAT-10_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-11	*Sophora secundiflora*	PAT-K	30°17'48.64"	97°42'39.24"	PAT-11	PAT-11_2022.10.03	Orig	Dead, Standing	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-12	*Sophora secundiflora*	PAT-L	30°17'48.46"	97°42'38.69"	PAT-12	DEAD - NO PHOTO	Replace #1 (*Cotinus c*	Vacant	UNKNOWN	UNKNOWN	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-13	*Diospyros texana*	PAT-M	30°17'48.48"	97°42'38.41"	PAT-13	PAT-13_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-14	*Diospyros texana*	PAT-N	30°17'48.59"	97°42'39.74"	PAT-14	PAT-14_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22
3/10/2018	PAT-15	*Eysenhardtia texana*	PAT-O	30°17'48.52"	97°42'39.13"	PAT-15	PAT-15_2022.10.03	Orig	Alive	N/A	N/A	#1 Photographed 5-2-19, #2 Photographed 10-03-22

Geocoded Photos


DW - 4
2022.10.21
Quercus buckleyi

DW-8
2022.10.03
Chilopsis linearis

DW - 13
2022.10.03
Ulmus crassifolia


DW-16
2022.10.03
Ulmus crassifolia


DW-22
2022.10.03
Quercus laceyi

DW-33
2022.10.03
Carya illinoinensis

PAT - 2
2022.10.03
Acacia farnesiana

PAT - 7
2022.10.03
Cercis canadensis

PAT - 12
2022.10.21
Cotinus obovatus
(before replacement *Sophora secundiflora)*

PAT - 14
2022.10.03
Diospyros texana

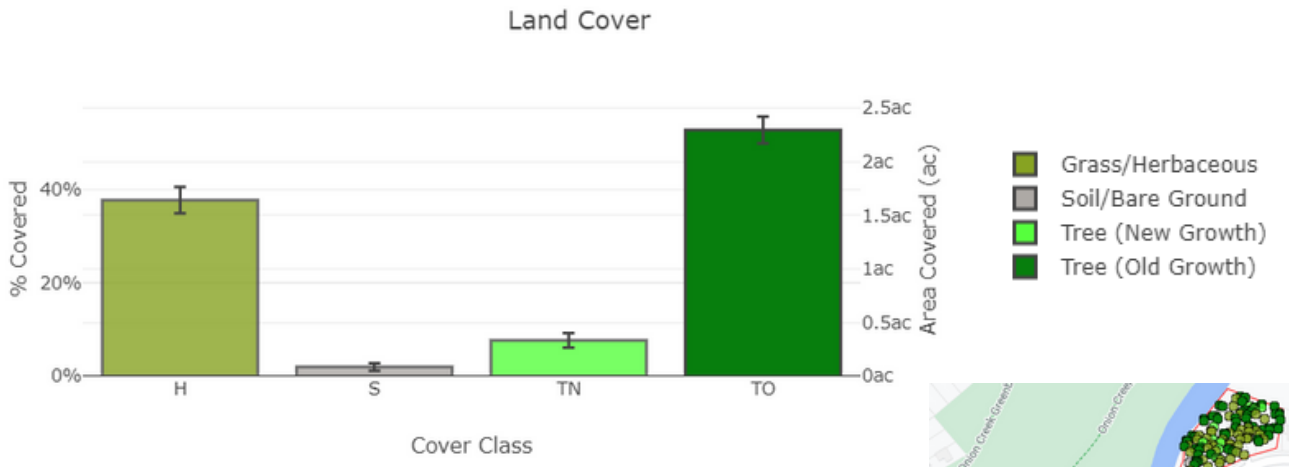
i-Tree Canopy Report

Initial Project Area i-Tree Report

REFORESTING AUSTIN'S PARKS AND RIPARIAN ZONES
Onion Creek Riparian Canopy Planting
4 Year Verification - October, 2022

Cover Assessment Report

Estimated using random sampling statistics on 10/17/2022



Abbr.	Cover Class	Points	% Cover ± SE	Area (ac) ± SE
H	Grass/Herbaceous	113	37.67 ± 2.80	1.64 ± 0.12
S	Soil/Bare Ground	6	2.00 ± 0.82	0.09 ± 0.04
TN	Tree (New Growth)	23	7.67 ± 1.54	0.33 ± 0.07
TO	Tree (Old Growth)	158	52.67 ± 2.88	2.29 ± 0.13
Total		**300**	**100.00**	**4.36**

	Tree (New Growth)	Tree (Old Growth)	Grass/ Herbaceous	Bare Earth	Tree Cover	Non-Tree Cover	Total Project Area
Percent (%)	7.7%	52.7%	37.7%	1.9%	60.4%	39.6%	100%
Area (sq miles)	0.00052	0.00358	0.00256	0.00014	0.0041	0.0027	0.0068
Area (m2)	1335	9267	6637	364	10,603	7,001	17,604
Area (acres)	0.33	2.29	1.64	0.09	2.62	1.73	4.35
Standard Error (%)	1.54%	2.88%	2.80%	0.82%	4.42%	3.62%	n/a
Standard Error (acres)	0.07	0.13	0.12	0.04	0.20	0.16	n/a

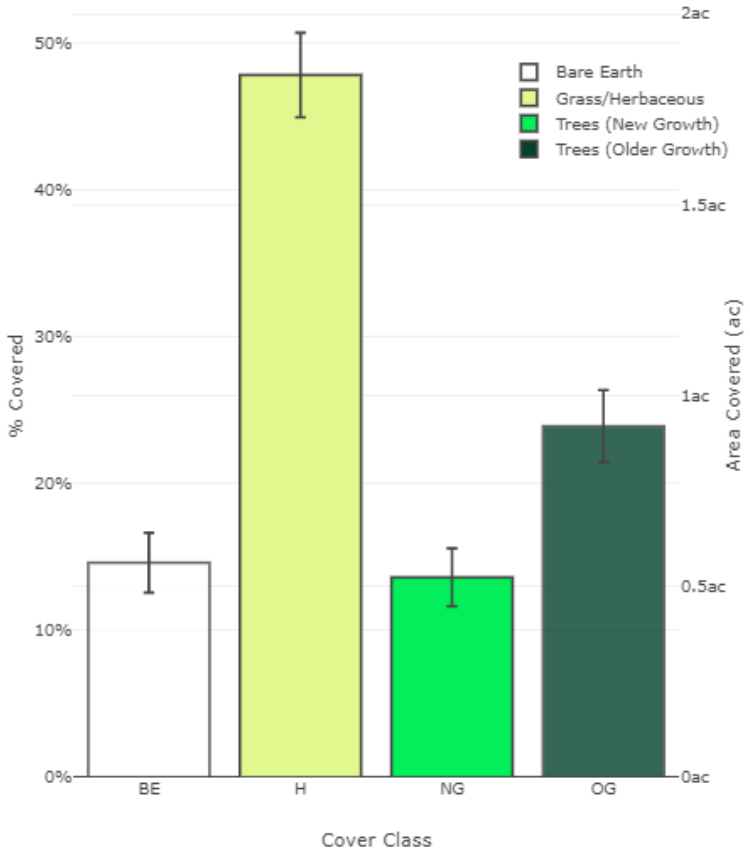
Map generated using iTree, Data: ©2022 Google Imagery ©2022, CAPCOG, MAXAR Technologies, U.S., Geological Survey, USDA/FPAC/GEO

Adjusted Project Area i-Tree Report and Data

REFORESTING AUSTIN'S PARKS AND RIPARIAN ZONES
Onion Creek Riparian Planting
4 Year Verification - December, 2022

Cover Assessment Report

Estimated using random sampling statistics on 12/13/2022



Abbr.	Cover Class	Points	% Cover ± SE	Area (ac) ± SE
BE	Bare Earth	44	14.62 ± 2.04	0.56 ± 0.08
H	Grass/Herbaceous	144	47.84 ± 2.88	1.84 ± 0.11
NG	Trees (New Growth)	41	13.62 ± 1.98	0.52 ± 0.08
OG	Trees (Older Growth)	72	23.92 ± 2.46	0.92 ± 0.09
Total		**301**	**100.00**	**3.85**

	Tree (New Growth)	Tree (Old Growth)	Grass/ Herbaceous	Bare Earth	Tree Cover	Non-Tree Cover	Total Project Area
Percent (%)	13.62%	23.92%	47.84%	14.62%	37.54%	62.46%	100.00%
Area (sq miles)	0.0008	0.0014	0.0029	0.0009	0.0023	0.0038	0.0060
Area (m^2)	2122	3727	7454	2278	5849	9732	15581
Area (acres)	0.524	0.921	1.842	0.563	1.445	2.405	3.850
Standard Error (%)	1.98%	2.46%	2.88%	2.04%	4.44%	4.92%	n/a
Standard Error (acres)	0.08	0.09	0.11	0.08	0.17	0.19	n/a

ID	Cover Clas	Latitude	Longitude
1	Grass/Herl	30.17003	-97.7424
2	Trees (Old	30.16809	-97.7443
3	Grass/Herl	30.16788	-97.7445
4	Trees (Nev	30.16773	-97.7446
5	Grass/Herl	30.17052	-97.7419
6	Trees (Nev	30.16916	-97.7433
7	Bare Earth	30.17041	-97.7419
8	Grass/Herl	30.16963	-97.7427
9	Grass/Herl	30.16933	-97.743
10	Trees (Nev	30.17011	-97.7422
11	Trees (Old	30.17055	-97.7424
12	Grass/Herl	30.17081	-97.7417
13	Grass/Herl	30.17076	-97.7421
14	Grass/Herl	30.16953	-97.7427
15	Grass/Herl	30.1686	-97.7435
16	Trees (Nev	30.1705	-97.7415
17	Grass/Herl	30.16791	-97.7444
18	Trees (Old	30.16962	-97.7428
19	Grass/Herl	30.16766	-97.7446
20	Grass/Herl	30.17081	-97.7417
21	Grass/Herl	30.17035	-97.7421
22	Trees (Old	30.16964	-97.7426
23	Trees (Old	30.1676	-97.7446
24	Grass/Herl	30.16799	-97.7442
25	Trees (Nev	30.17023	-97.7425
26	Grass/Herl	30.17058	-97.7417
27	Grass/Herl	30.17026	-97.7422
28	Grass/Herl	30.16895	-97.7433
29	Grass/Herl	30.1702	-97.7421
30	Trees (Nev	30.16892	-97.7431
31	Bare Earth	30.16931	-97.7432
32	Grass/Herl	30.16803	-97.7442
33	Trees (Nev	30.16877	-97.7436
34	Grass/Herl	30.17029	-97.7423
35	Bare Earth	30.16778	-97.7446
36	Trees (Old	30.1708	-97.7416
37	Trees (Old	30.17082	-97.742
38	Trees (Old	30.17071	-97.7422
39	Trees (Nev	30.17075	-97.7418
40	Trees (Old	30.17017	-97.7426
41	Trees (Old	30.1695	-97.7429
42	Grass/Herl	30.17077	-97.742
43	Grass/Herl	30.16862	-97.7437
44	Grass/Herl	30.16941	-97.7429
45	Trees (Old	30.16784	-97.7446
46	Grass/Herl	30.17069	-97.7418

47	Grass/Herl	30.16822	-97.7441
48	Grass/Herl	30.16961	-97.7428
49	Grass/Herl	30.17046	-97.7421
50	Grass/Herl	30.16857	-97.7435
51	Bare Earth	30.16789	-97.7446
52	Bare Earth	30.17039	-97.7424
53	Bare Earth	30.16909	-97.7431
54	Bare Earth	30.16977	-97.7425
55	Bare Earth	30.17008	-97.7423
56	Grass/Herl	30.17039	-97.7417
57	Grass/Herl	30.16991	-97.7424
58	Trees (Nev	30.17056	-97.7415
59	Trees (Old	30.16859	-97.7434
60	Bare Earth	30.16782	-97.7446
61	Grass/Herl	30.16984	-97.7426
62	Trees (Nev	30.16832	-97.744
63	Grass/Herl	30.16798	-97.7442
64	Trees (Nev	30.17074	-97.7417
65	Trees (Old	30.16963	-97.7427
66	Trees (Nev	30.1691	-97.7433
67	Grass/Herl	30.16803	-97.7442
68	Bare Earth	30.17005	-97.7424
69	Bare Earth	30.17061	-97.7423
70	Trees (Nev	30.1684	-97.7439
71	Grass/Herl	30.16782	-97.7445
72	Grass/Herl	30.17062	-97.7421
73	Grass/Herl	30.1694	-97.7429
74	Grass/Herl	30.16789	-97.7443
75	Bare Earth	30.16853	-97.7435
76	Grass/Herl	30.16873	-97.7434
77	Grass/Herl	30.17046	-97.7419
78	Bare Earth	30.1703	-97.7421
79	Trees (Nev	30.17038	-97.7421
80	Trees (Nev	30.16825	-97.7441
81	Grass/Herl	30.17028	-97.742
82	Grass/Herl	30.16805	-97.7442
83	Trees (Old	30.16992	-97.7427
84	Grass/Herl	30.16827	-97.7439
85	Grass/Herl	30.17064	-97.7421
86	Trees (Old	30.16941	-97.7428
87	Trees (Old	30.16929	-97.7432
88	Trees (Old	30.16934	-97.7432
89	Trees (Nev	30.17067	-97.7419
90	Trees (Old	30.17087	-97.742
91	Grass/Herl	30.16971	-97.7426
92	Trees (Old	30.17052	-97.7424
93	Trees (Old	30.17004	-97.7423

94	Trees (Old	30.17053	-97.7424
95	Grass/Herl	30.16812	-97.744
96	Bare Earth	30.17034	-97.7418
97	Grass/Herl	30.17018	-97.7425
98	Grass/Herl	30.17064	-97.742
99	Grass/Herl	30.17055	-97.7419
100	Trees (Old	30.16929	-97.7431
101	Grass/Herl	30.16869	-97.7434
102	Trees (Old	30.16802	-97.7441
103	Trees (Old	30.17073	-97.7422
104	Grass/Herl	30.16773	-97.7444
105	Grass/Herl	30.16984	-97.7425
106	Grass/Herl	30.17059	-97.7418
107	Grass/Herl	30.16942	-97.7428
108	Grass/Herl	30.16873	-97.7434
109	Grass/Herl	30.16835	-97.7437
110	Bare Earth	30.17034	-97.7417
111	Grass/Herl	30.17042	-97.7419
112	Trees (Old	30.16858	-97.7438
113	Grass/Herl	30.1677	-97.7446
114	Trees (Old	30.17067	-97.7422
115	Trees (Old	30.17007	-97.7422
116	Trees (Nev	30.16992	-97.7426
117	Grass/Herl	30.16829	-97.7439
118	Grass/Herl	30.17035	-97.742
119	Grass/Herl	30.17024	-97.7422
120	Grass/Herl	30.16962	-97.7427
121	Trees (Old	30.16904	-97.7434
122	Grass/Herl	30.16861	-97.7437
123	Grass/Herl	30.16878	-97.7434
124	Grass/Herl	30.16844	-97.7439
125	Grass/Herl	30.16873	-97.7434
126	Grass/Herl	30.17042	-97.7423
127	Grass/Herl	30.17045	-97.7415
128	Grass/Herl	30.17039	-97.7417
129	Grass/Herl	30.17052	-97.7417
130	Trees (Old	30.16955	-97.7429
131	Trees (Nev	30.17071	-97.7418
132	Grass/Herl	30.17048	-97.7422
133	Trees (Old	30.17072	-97.7422
134	Grass/Herl	30.16793	-97.7444
135	Trees (Nev	30.16801	-97.7443
136	Grass/Herl	30.16864	-97.7436
137	Trees (Old	30.16894	-97.7433
138	Grass/Herl	30.16885	-97.7433
139	Grass/Herl	30.16837	-97.7439
140	Grass/Herl	30.17058	-97.7418

141	Trees (Nev	30.17068	-97.7419
142	Grass/Herl	30.17073	-97.7417
143	Bare Earth	30.17043	-97.7417
144	Trees (Nev	30.1693	-97.7431
145	Trees (Old	30.16985	-97.7427
146	Grass/Herl	30.16928	-97.743
147	Trees (Old	30.16808	-97.7441
148	Trees (Old	30.16939	-97.743
149	Grass/Herl	30.17056	-97.7419
150	Trees (Nev	30.17073	-97.7417
151	Grass/Herl	30.16856	-97.7434
152	Grass/Herl	30.16814	-97.744
153	Grass/Herl	30.17073	-97.742
154	Grass/Herl	30.1691	-97.7432
155	Trees (Nev	30.16864	-97.7437
156	Bare Earth	30.1706	-97.7419
157	Grass/Herl	30.16783	-97.7445
158	Grass/Herl	30.17036	-97.7423
159	Grass/Herl	30.17071	-97.7416
160	Grass/Herl	30.17044	-97.7415
161	Grass/Herl	30.16984	-97.7426
162	Grass/Herl	30.16834	-97.7437
163	Grass/Herl	30.16837	-97.7436
164	Grass/Herl	30.17015	-97.7423
165	Trees (Old	30.16941	-97.743
166	Trees (Old	30.17073	-97.7415
167	Trees (Old	30.17017	-97.7425
168	Trees (Old	30.16821	-97.7442
169	Grass/Herl	30.17048	-97.7422
170	Bare Earth	30.1704	-97.7418
171	Trees (Old	30.16864	-97.7437
172	Grass/Herl	30.17062	-97.7423
173	Grass/Herl	30.16953	-97.7428
174	Grass/Herl	30.16992	-97.7425
175	Trees (Old	30.16942	-97.743
176	Bare Earth	30.17054	-97.7417
177	Bare Earth	30.17043	-97.7417
178	Trees (Old	30.1692	-97.7433
179	Grass/Herl	30.17049	-97.7419
180	Trees (Old	30.16923	-97.7429
181	Grass/Herl	30.16945	-97.7429
182	Trees (Old	30.17006	-97.7424
183	Bare Earth	30.16982	-97.7426
184	Trees (Old	30.16933	-97.7431
185	Bare Earth	30.16936	-97.7429
186	Trees (Old	30.16759	-97.7447
187	Grass/Herl	30.17052	-97.7418

188	Grass/Herl	30.1704	-97.7419
189	Grass/Herl	30.16856	-97.7437
190	Bare Earth	30.17073	-97.742
191	Grass/Herl	30.16955	-97.7428
192	Grass/Herl	30.17056	-97.7417
193	Grass/Herl	30.16921	-97.743
194	Grass/Herl	30.17082	-97.7418
195	Trees (Nev	30.1706	-97.742
196	Grass/Herl	30.16845	-97.7438
197	Grass/Herl	30.1705	-97.7422
198	Grass/Herl	30.17064	-97.7422
199	Trees (Nev	30.17058	-97.7416
200	Grass/Herl	30.16983	-97.7426
201	Trees (Old	30.16928	-97.7432
202	Grass/Herl	30.17051	-97.7417
203	Grass/Herl	30.16852	-97.7435
204	Grass/Herl	30.16802	-97.7442
205	Grass/Herl	30.16757	-97.7445
206	Bare Earth	30.17077	-97.742
207	Bare Earth	30.17074	-97.7417
208	Bare Earth	30.17004	-97.7425
209	Grass/Herl	30.17024	-97.7422
210	Trees (Old	30.16822	-97.7442
211	Trees (Old	30.17027	-97.7423
212	Grass/Herl	30.17057	-97.7422
213	Trees (Nev	30.16889	-97.7432
214	Trees (Nev	30.16937	-97.743
215	Trees (Nev	30.17073	-97.7419
216	Bare Earth	30.16884	-97.7434
217	Grass/Herl	30.17043	-97.7419
218	Trees (Nev	30.17074	-97.7415
219	Trees (Nev	30.17053	-97.7417
220	Bare Earth	30.17039	-97.7424
221	Trees (Old	30.16884	-97.7432
222	Trees (Nev	30.16827	-97.744
223	Trees (Old	30.16789	-97.7443
224	Bare Earth	30.17027	-97.7419
225	Trees (Nev	30.16899	-97.7434
226	Trees (Old	30.16841	-97.7436
227	Trees (Old	30.17059	-97.742
228	Trees (Nev	30.16975	-97.7426
229	Bare Earth	30.16924	-97.7431
230	Trees (Old	30.1706	-97.7415
231	Trees (Old	30.16948	-97.743
232	Trees (Nev	30.17032	-97.742
233	Grass/Herl	30.16977	-97.7426
234	Bare Earth	30.16903	-97.7432

235	Bare Earth	30.17086	-97.7419
236	Grass/Herl	30.17039	-97.7419
237	Trees (Nev	30.17061	-97.7423
238	Bare Earth	30.16913	-97.7432
239	Grass/Herl	30.1706	-97.742
240	Trees (Old	30.17081	-97.7419
241	Grass/Herl	30.17063	-97.7421
242	Grass/Herl	30.17033	-97.7418
243	Bare Earth	30.16835	-97.7439
244	Trees (Old	30.16896	-97.7434
245	Trees (Old	30.16861	-97.7434
246	Trees (Nev	30.17036	-97.7423
247	Bare Earth	30.16783	-97.7443
248	Grass/Herl	30.1681	-97.7441
249	Bare Earth	30.1681	-97.744
250	Trees (Old	30.16828	-97.7437
251	Grass/Herl	30.16835	-97.7438
252	Grass/Herl	30.17046	-97.7418
253	Grass/Herl	30.16857	-97.7436
254	Grass/Herl	30.16972	-97.7425
255	Bare Earth	30.16898	-97.7432
256	Grass/Herl	30.17085	-97.742
257	Trees (Nev	30.1693	-97.7431
258	Trees (Old	30.1709	-97.742
259	Grass/Herl	30.16873	-97.7435
260	Grass/Herl	30.17042	-97.7419
261	Grass/Herl	30.16984	-97.7425
262	Trees (Old	30.17016	-97.7424
263	Trees (Old	30.1696	-97.7427
264	Trees (Old	30.17057	-97.7416
265	Grass/Herl	30.17056	-97.7421
266	Grass/Herl	30.16826	-97.7439
267	Bare Earth	30.17063	-97.7416
268	Bare Earth	30.17008	-97.7424
269	Bare Earth	30.17065	-97.7417
270	Grass/Herl	30.16935	-97.7428
271	Grass/Herl	30.16905	-97.7432
272	Trees (Nev	30.16809	-97.7442
273	Bare Earth	30.16795	-97.7444
274	Grass/Herl	30.16932	-97.7429
275	Grass/Herl	30.16927	-97.743
276	Trees (Old	30.16888	-97.7435
277	Trees (Old	30.16893	-97.7434
278	Grass/Herl	30.17042	-97.742
279	Trees (Nev	30.16875	-97.7434
280	Trees (Old	30.17058	-97.7421
281	Grass/Herl	30.17057	-97.7417

282	Bare Earth	30.16866	-97.7434
283	Trees (Old	30.16935	-97.7429
284	Trees (Old	30.16846	-97.7436
285	Grass/Herl	30.17036	-97.7421
286	Grass/Herl	30.17069	-97.7418
287	Trees (Old	30.17029	-97.7422
288	Trees (Old	30.17087	-97.7421
289	Trees (Nev	30.16792	-97.7445
290	Grass/Herl	30.16881	-97.7434
291	Grass/Herl	30.1704	-97.7424
292	Trees (Old	30.17011	-97.7425
293	Grass/Herl	30.16827	-97.7439
294	Grass/Herl	30.17017	-97.7423
295	Grass/Herl	30.17061	-97.7422
296	Bare Earth	30.17034	-97.7418
297	Trees (Old	30.17006	-97.7422
298	Trees (Old	30.17083	-97.7419
299	Trees (Nev	30.16852	-97.7438
300	Grass/Herl	30.16798	-97.7442

Project Area Map and Imagery

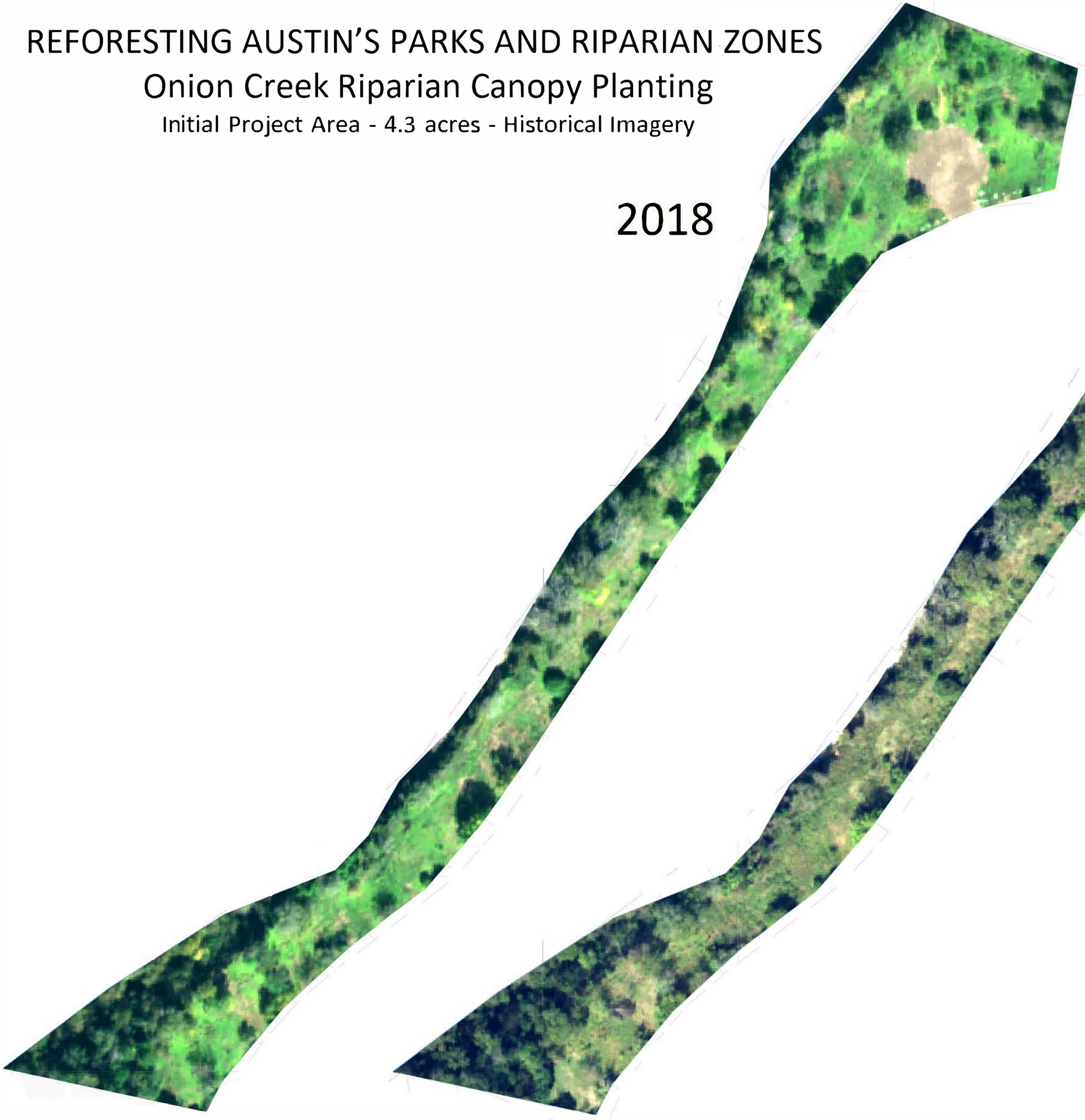
Initial Project Area Map and Imagery

REFORESTING AUSTIN'S PARKS AND RIPARIAN ZONES

Onion Creek Riparian Canopy Planting

Initial Project Area - 4.3 acres - Historical Imagery

2018



2020

REFORESTING AUSTIN'S PARKS AND RIPARIAN ZONES

Onion Creek Riparian Canopy Planting

Initial Project Area - 4.3 acres - October 2022

2022

Map generated using iTree, Data: ©2022 Google Imagery ©2022, CAPCOG, MAXAR Technologies, U.S., Geological Survey, USDA/FPAC/GEO

Adjusted Project Area Map and Imagery

REFORESTING AUSTIN'S PARKS AND RIPARIAN ZONES

Onion Creek Riparian Canopy Planting

Adjusted Project Area - 3.85 acres

Adjusted Project Area (3.85 acres)

Excluded Area (0.45 acres)

Original Project Area Boundary (4.3 acres)

N


Trees (Old Growth)
Trees (New Growth)
Grass/Herbaceous
Bare Earth
N

Carbon Quantification Year 4 Credit Tool - Canopy

Directions
1) In Table 1 record the number of sites planted for each tree species.
2) If species are not listed, add them to the bottom of Table 1.

Table 1. Planting List

ScientificName	CommonName	Tree-Type Abbreviation	No. Sites Planted
Abies concolor	white fir	CEL	0
Abies species	fir	CEL	0
Acacia baileyana	Bailey acacia	BES	0
Acer buergerIanum	trident maple	BDS	0
Acer campestre	hedge maple	BDM	0
Acer ginnala	Amur maple	BDS	0
Acer griseum	paperbark maple	BDS	0
Acer macrophyllum	bigleaf maple	BDL	0
Acer negundo	boxelder	BDL	0
Acer nigrum	black maple	BDL	0
Acer palmatum	Japanese maple	BDS	0
Acer platanoides	Norway maple	BDL	0
Acer rubrum	red maple	BDM	0
Acer saccharinum	silver maple	BDL	0
Acer saccharum	sugar maple	BDL	0
Acer truncatum	purpleblow maple	BDS	0
Acer x freemanii	Freeman maple	BDL	0
Aesculus glabra	Ohio buckeye	BDL	0
Aesculus hippocastanum	horsechestnut	BDL	0
Aesculus octandra	yellow buckeye	BDL	0
Aesculus pavia	red buckeye	BDS	0
Ailanthus altissima	tree of heaven	BDM	0
Albizia julibrissin	mimosa	BDS	0
Amelanchier arborea	downy serviceberry	BDS	0
Amelanchier species	serviceberry	BDS	0
Araucaria araucana	monkeypuzzle tree	CEL	0
Asimina triloba	pawpaw	BDS	0
Aucuba species	acuba	BES	0
Betula lenta	black birch	BDM	0
Betula nigra	river birch	BDM	0
Betula papyrifera	paper birch	BDL	0
Betula pendula	European white birch	BDM	0
Betula platyphylla	Asian white birch	BDM	0
Betula utilis	Indian paper birch	BDM	0
Broadleaf Deciduous Large	broadleaf deciduous large	BDL	0
Broadleaf Deciduous Medium	broadleaf deciduous medium	BDM	0
Broadleaf Deciduous Small	broadleaf deciduous small	BDS	0
Broadleaf Evergreen Large	broadleaf evergreen large	BEL	0
Broadleaf Evergreen Medium	broadleaf evergreen medium	BEM	0
Broadleaf Evergreen Small	broadleaf evergreen small	BES	0
Broussonetia papyrifera	paper mulberry	BDM	0
Buddleja davidii	orange eye butterflybush	BDS	0
Buxus species	boxwood	BES	0
Camellia japonica	camellia	BES	0
Carpinus betulus	European hornbeam	BDM	0
Carpinus caroliniana	American hornbeam	BDM	0
Carya cordiformis	bitternut hickory	BDL	0
Carya glabra	pignut hickory	BDL	0
Carya illinoinensis	pecan	BDL	0
Carya ovata	shagbark hickory	BDL	0
Carya species	hickory	BDL	0
Carya tomentosa	mockernut hickory	BDL	0
Castanea dentata	American chestnut	BDL	0
Castanea mollissima	Chinese chestnut	BDM	0
Catalpa speciosa	northern catalpa	BDL	0
Cedrus atlantica	Atlas cedar	CEL	0
Cedrus deodara	deodar cedar	CEL	0
Celtis laevigata	sugarberry	BDM	0
Celtis occidentalis	northern hackberry	BDL	0
Celtis species	hackberry	BDL	0
Cercidiphyllum japonicum	katsura tree	BDM	0
Cercis canadensis	eastern redbud	BDS	0
Chamaecyparis lawsoniana	Port Orford cedar	CEL	0
Chamaecyparis pisifera	Sawara false cypress	CES	0
Chamaecyparis thyoides	Atlantic white cedar	CEM	0
Chionanthus retusus	Chinese fringe tree	BDS	0
Chionanthus virginicus	fringetree	BDS	0
Cladrastis kentukea	yellowwood	BDM	0
Clerodendrum trichotomum	harlequin glorybower	BDS	0
Conifer Evergreen Large	conifer evergreen large	CEL OTHER	0
Conifer Evergreen Medium	conifer evergreen medium	CEM OTHER	0
Conifer Evergreen Small	conifer evergreen small	CES OTHER	0
Cornus alternifolia	alternateleaf dogwood	BDS	0
Cornus florida	flowering dogwood	BDS	0
Cornus kousa	Kousa dogwood	BDS	0
Cornus mas	cornelian cherry	BDS	0
Cornus species	dogwood	BDS	0
Cotinus coggygria	smoke tree	BDS	0
Crataegus phaenopyrum	Washington hawthorn	BDS	0
Crataegus species	hawthorn	BDS	0
Crataegus viridis	green hawthorn	BDS	0
Cryptomeria japonica	Japanese red cedar	CEL	0
Cunninghamia lanceolata	blue Chinese fir	CEL	0
Diospyros virginiana	common persimmon	BDM	0
Elaeagnus umbellata	autumn olive	BES	0
Eucalyptus species	gum	BEL	0
Fagus grandifolia	American beech	BDL	0

Table 2. Summary of Planting Sites

Tree-Type	Tree-Type Abbreviation	No. Sites Planted
Brdlf Decid Large (>50 ft)	**BDL**	230
Brdlf Decid Med (30-50 ft)	**BDM**	220
Brdlf Decid Small (<30 ft)	**BDS**	675
Brdlf Evgrn Large (>50 ft)	**BEL**	0
Brdlf Evgrn Med (30-50 ft)	**BEM**	5
Brdlf Evgrn Small (<30 ft)	**BES**	120
Conif Evgrn Large (>50 ft)	**CEL**	0
Conif Evgrn Med (30-50 ft)	**CEM**	0
Conif Evgrn Small (<30 ft)	**CES**	0
	Total Sites Planted	1250

Fagus sylvatica	European beech	BDL	0
Ficus carica	common fig	BDS	0
Firmiana simplex	Chinese parasol tree	BDM	0
Forsythia species	forsythia	BDS	0
Fraxinus americana	white ash	BDL	0
Fraxinus nigra	black ash	BDM	0
Fraxinus pennsylvanica	green ash	BDL	0
Fraxinus quadrangulata	blue ash	BDL	0
Ginkgo biloba	ginkgo	BDL	0
Gleditsia triacanthos	honeylocust	BDL	100
Gymnocladus dioicus	Kentucky coffeetree	BDL	0
Hakea species	hakea	BES	0
Halesia carolina	snowdrop tree	BDM	0
Hamamelis virginiana	witch hazel	BDS	0
Hibiscus syriacus	rose-of-sharon	BDS	0
Ilex aquifolium	English holly	BES	0
Ilex cassine	dahoon	BES	0
Ilex cornuta	Chinese holly	BES	0
Ilex opaca	American holly	BES	0
Ilex species	holly	BES	0
Juglans nigra	black walnut	BDL	0
Juglans regia	English walnut	BDL	0
Juniperus species	juniper	CEM	0
Juniperus virginiana	eastern red cedar	CEM	0
Koelreuteria paniculata	goldenrain tree	BDM	0
Lagerstroemia species	common crapemyrtle	BDS	0
Larix decidua	European larch	BDL	0
Ligustrum species	privet	BES	0
Liquidambar styraciflua	sweetgum	BDL	0
Liriodendron tulipifera	tulip tree	BDL	0
Maclura pomifera	Osage orange	BDM	0
Magnolia acuminata	cucumber tree	BDL	0
Magnolia grandiflora	southern magnolia	BEM	0
Magnolia species	magnolia	BDM	0
Magnolia stellata	star magnolia	BDS	0
Magnolia virginiana	sweetbay	BEM	0
Magnolia x soulangiana	Chinese magnolia; saucer magnolia	BDS	0
Mahonia bealei	leatherleaf mahonia	BES	0
Malus species	apple	BDS	0
Malus sylvestris	paradise apple	BDS	0
Malus tschonoskii	crabapple	BDS	0
Melia azedarach	Chinaberry	BDM	0
Metasequoia glyptostroboides	dawn redwood	BDL	0
Morus rubra	red mulberry	BDL	0
Morus species	mulberry	BDM	0
Myrica cerifera	southern bayberry	BES	0
Nyssa sylvatica	black tupelo	BDL	0
Ostrya virginiana	eastern hophornbeam	BDM	0
Palm Evergreen Large	palm evergreen large	PEL OTHER	0
Palm Evergreen Medium	palm evergreen medium	PEM OTHER	0
Palm Evergreen Small	palm evergreen small	PES OTHER	0
Paulownia tomentosa	royal paulownia	BDM	0
Phellodendron amurense	Amur corktree	BDM	0
Phoenix dactylifera	date palm	PEL	0
Photinia species	chokeberry	BES	0
Photinia x fraseri	Fraser photinia	BES	0
Picea abies	Norway spruce	CEL	0
Picea glauca	white spruce	CEL	0
Picea pungens	blue spruce	CEL	0
Picea species	spruce	CEL	0
Pinus contorta var. bolanderi	Bolander beach pine	CES	0
Pinus contorta var. latifolia	tall lodgepole pine	CEL	0
Pinus echinata	shortleaf pine	CEL	0
Pinus mugo	sweet mountain pine	CES	0
Pinus nigra	Austrian pine	CEL	0
Pinus palustris	longleaf pine	CEL	0
Pinus resinosa	red pine	CEL	0
Pinus species	pine	CEL	0
Pinus strobus	eastern white pine	CEL	0
Pinus sylvestris	Scotch pine	CEM	0
Pinus taeda	loblolly pine	CEL	0
Pinus virginiana	Virginia pine	CEM	0
Pistacia chinensis	Chinese pistache	BDM	0
Platanus acerifolia	London planetree	BDL	0
Platanus occidentalis	American sycamore	BDL	10
Populus alba	white poplar	BDL	0
Populus balsamifera	balsam poplar	BDL	0
Populus deltoides	eastern cottonwood	BDL	0
Populus nigra	black poplar	BDL	0
Prunus campanulata	Taiwan cherry	BDS	0
Prunus caroliniana	Carolina laurelcherry	BEM	0
Prunus cerasifera	cherry plum	BDS	0
Prunus padus	European bird cherry	BDM	0
Prunus persica	peach	BDS	0
Prunus serotina	black cherry	BDL	0
Prunus serrulata	Kwanzan cherry	BDS	0
Prunus species	plum	BDS	0
Prunus subhirtella	Higan cherry	BDS	0
Prunus tomentosa	Manchu cherry	BDS	0
Prunus yedoensis	Yoshino flowering cherry	BDS	0
Pseudotsuga menziesii	Douglas fir	CEL	0
Pyracantha koidzumii	Formosa firethorn	BES	0
Pyracantha species	firethorn	BES	0
Pyrus calleryana	Callery pear	BDS	0
Pyrus communis	common pear	BDM	0
Pyrus species	pear	BDM	0

Quercus acutissima	sawtooth oak	BDM	0
Quercus alba	white oak	BDL	0
Quercus bicolor	swamp white oak	BDL	0
Quercus coccinea	scarlet oak	BDL	0
Quercus ellipsoidalis	northern pin oak	BDL	0
Quercus falcata	southern red oak	BDL	0
Quercus hemisphaerica	Darlington oak	BEL	0
Quercus imbricaria	shingle oak	BDL	0
Quercus lyrata	overcup oak	BDM	0
Quercus macrocarpa	bur oak	BDL	0
Quercus marilandica	blackjack oak	BDM	0
Quercus michauxii	swamp chestnut oak	BDL	0
Quercus muehlenbergii	chinkapin oak	BDL	0
Quercus nigra	water oak	BEL	0
Quercus palustris	pin oak	BDL	0
Quercus phellos	willow oak	BDL	0
Quercus robur	English oak	BDL	0
Quercus rubra	northern red oak	BDL	0
Quercus shumardii	Shumard oak	BDL	0
Quercus stellata	post oak	BDL	0
Quercus velutina	black oak	BDL	0
Quercus virginiana	live oak	BEL	0
Rhamnus species	buckthorn	BDS	0
Rhus species	sumac	BDS	0
Robinia pseudoacacia	black locust	BDL	0
Rosa banksiae	banksian rose; Lady Bank's rose	BDS	0
Sabal palmetto	cabbage palmetto	PEM	0
Salix gracilistyla	rosegold pussy willow	BDS	0
Salix matsudana	corkscrew willow	BDS	0
Salix nigra	black willow	BDM	0
Salix species	willow	BDL	0
Salix x pendulina Wenderoth	Wisconsin weeping willow	BDL	0
Sapium sebiferum	tallowtree	BDM	0
Sassafras albidum	sassafras	BDL	0
Serenoa repens	saw palmetto	PES	0
Shrub	unknown shrub	BDS OTHER	0
Sophora japonica	Japanese pagoda tree	BDM	0
Sorbus aucuparia	European mountain ash	BDM	0
Styrax japonicus	Japanese snowbell	BDS	0
Syringa reticulata	Japanese tree lilac	BDS	0
Syringa species	lilac	BDS	0
Taxodium distichum	bald cypress	BDL	50
Thuja occidentalis	northern white cedar	CEL	0
Thuja plicata	western red cedar	CEL	0
Tilia americana	American basswood	BDL	0
Tilia cordata	littleleaf linden	BDM	0
Torreya taxifolia	Florida torreya	CES	0
Tsuga canadensis	eastern hemlock	CEL	0
Ulmus alata	winged elm	BDL	0
Ulmus americana	American elm	BDL	20
Ulmus parvifolia	Chinese elm	BDL	0
Ulmus pumila	Siberian elm	BDL	0
Ulmus rubra	slippery elm	BDL	0
Ulmus species	elm	BDL	0
Unknown	unknown tree	BDM OTHER	0
Viburnum prunifolium	blackhaw	BDS	0
Viburnum species	viburnum	BDS	0
Vitex agnus-castus	chaste tree	BDS	0
Washingtonia filifera	California palm	PES	0
Washingtonia robusta	Mexican fan palm	PEM	0
x Cupressocyparis leylandii	Leyland cypress	CEL	0
Yucca species	yucca	PES	0
Zelkova serrata	Japanese zelkova	BDL	0
Callicarpa americana	American Beautyberry	BDS	10
Ehretia anacua	Anacua	BDM	60
Condalia hookeri	Brazilwood	BDS	50
Frangula caroliniana	Carolina buckthorn	BDS	100
Acacia gregii	Catclaw acacia	BDS	10
Ulmus crassifolia	Cedar elm	BDL	50
Acacia berlanderi	Guajillo	BDS	100
Prosopis glandulosa	Honey mesquite	BDS	50
Acacia farnesiana	Huisache	BDS	100
Eysenhardtia texana	Kidneywood	BDS	85
Quercus fusiformis	Plateau live oak	BEM	5
Parkinsonia aculeata	Retama	BDM	100
Cornus dromundii	Roughleaf Dogwood	BDS	70
Sophra secundiflora	Texas Mountainlaurel	BES	120
Diospyros texana	Texas Persimmon	BDS	50
Sapindus saponaria var. drummondi	Western soapberry	BDM	60
Aloysia gratissima	Whitebrush	BDS	50

Light yellow background denotes an input cell ->

Directions
1) Use i-Tree Canopy, or another tool, to estimate the amount of tree cover area (acres) (Cell C18) that the planted tree sites will provide at 25-years after planting.
2) Use i-Tree Canopy, or another tool, to estimate the amount of non-tree cover area (acres) (Cell D18) in the project area.
3) In Cell E18 the total area of the project is calculated (acres). By clicking on the gear icon next to the upper right portion of the image and selecting "Report By Area" you can prompt i-Tree Canopy to provide an estimate of the area.
4) Total Project Area, cell E15 should equal 100%.

Table 6. Tree Cover

	Tree Cover	Non-Tree Cover	Total Project Area
Percent (%)	100%	0%	100%
Area (sq miles)	0.006	0.000	0.01
Area (m2)	15,580	0	15,580
Area (acres)	3.85	0.00	3.85

Table 7. GHG Emissions

	Acres	CO2 index (tCO2e/acre)	GHG Emissions (tCO2e)	5% Buffer Pool Deduction	Grand Total CO2 w/ Deductions (t)
Total GHG Reduc	3.85	106.7	411	21	390

Using the information on species and acreage of project area, the tool provides estimates of co-benefits after 25 years and at full canopy in Resource Units and $ per year. These are first-order approximations based on values from i-Tree Streets.

Table 8. Co-Benefits per year after 25 years

Ecosystem Services	Resource Units Totals	Total $
Rain Interception (m3/yr)	387.49	$1,013.51
Air Quality (t/yr)		
O3	0.0481	$142.87
NOx	0.0119	$35.47
PM10	0.0260	$29.32
Net VOCs	0.0005	$1.41
Air Quality Total	0.0865	$209.08
Energy (kWh/yr & kBtu/yr)		
Cooling - Elec.	19,712.35	$1,496.17
Heating - Nat. Gas	10,339.88	$107.44
Energy Total ($/yr)		$1,603.60
Grand Total ($/yr)		$2,826.19

Riparian Quantification Approach

Approach for Establishing Carbon Dioxide Stored by Tree Canopy in Riparian Tree Planting Projects in Austin, TX

June 25, 2018

There are two different methods for quantifying carbon dioxide (CO_2) storage in urban forest carbon projects – the Single Tree Approach (where planted trees are few or are scattered among many existing trees) and the Tree Canopy Approach (where planted trees are relatively contiguous). Instead of using the traditional the Tree Canopy Approach for riparian tree planting projects in Austin, we use a forest ecosystem approach. The traditional approach, which is based on the biometrics of open-growing urban trees, cannot adequately describe biomass distribution among closely-spaced trees and the dynamic changes in CO_2 stored in dead wood and understory vegetation as a riparian forest stand matures.

In our modified approach the amount of CO_2 stored after 25-years by planted project trees is based on the anticipated amount of tree canopy area (TC). The forecasted amount of CO_2 stored at 25-years is the product of the amount of tree canopy (TC) and the CO_2 Index (CI, t CO_2 per acre). This amount is the value from which the Registry issues forward credits in the amounts of 10%, 40% and 30% at Years 1, 3 and 5 after planting, respectively. A 5% buffer pool deduction is applied, with these funds going into a program-wide pool to insure against catastrophic loss of trees. At the end of the project, in year 25, the Operator will receive credits for all CO_2 stored, minus forward credits already issued.

To provide an accurate and complete accounting of carbon pools in these riparian projects we used the US Forest Service General Technical Report (GTR) NE-343, with its allometrics for the elm/ash/cottonwood forest ecosystem in the South Central region (Smith et al., 2006). The table we used (B50) provides carbon stored per hectare for each of six pools as a function of stand age. We used values for 25-year old stands for afforestation projects, because the sites contain little carbon in down dead wood and forest floor material at the time of planting. Data used to derive the 51 forest ecosystem tables came from U.S. Forest Inventory and Assessment plots. More information on methods used to prepare the tables can be found in Smith et al. (2006).

Following guidance in GTR NE-343 we adjusted the GTR NE-343 values for live wood, dead standing and dead down wood using local plot data provided by the team. According to the plot data the mean amount of C stored in all tree biomass was 24 t/ha. This value does not include biomass of invasive woody species. Lacking a measured breakdown of this total for trees among the live, standing dead, and down dead biomass components, the 24 t/ha was proportionately distributed as per the GTR (i.e., live: 87%, 20.9 t/ha; standing dead: 7%, 1.7 t/ha; down dead: 6%, 1.4 t/ha). The remaining three carbon pools (understory, forest floor and soil) remained the same as in GTR Table B50 because their values are independent of tree biomass. The customized values are shown below in Table 1. Carbon in the tree pool totals 24 t/ha and accounts for 33% of the total 71.9 t/ha after 25 years for this forest ecosystem. Soil organic carbon is the single largest pool (56%).

After conversions, **the CO_2 Index (CI) is 106.7 t CO_2 per acre of tree canopy (TC) and the forecasted amount of CO_2 stored after 25-years is the CI x TC.** This is the value from which the Registry will issue forward credits (Table 1).

Table 1. Estimated amounts of carbon stored in each pool at 25-years after planting for riparian forest projects in Austin, TX. These values are based on local plot data for these types of forests and values from GTR NE-343 for the elm/ash/cottonwood forest ecosystem in the South Central region.

elm/ash/cottonwood	t/C/ha	t/CO2/ha	t/CO2/ac	% total
live tree	20.9	76.8	31.08	29%
std dead tree	1.7	6.1	2.48	2%
understory	3.3	12.1	4.90	5%
down dead wood	1.4	5.1	2.07	2%
forest floor	4.4	16.1	6.53	6%
soil	40.2	147.4	59.68	56%
total	71.9	263.6	106.73	100%

Quantification at end of Year 25

- Project provides images of the Project Area from any telemetry, imaging, remote sensing, i-Tree Canopy, or UAV service, such as Google Earth and estimate the area in tree canopy cover (acres).
    - Projects can use i-Tree Canopy and point sampling to calculate canopy cover. Using i-Tree Canopy, continue adding points until the standard error of the estimate for both the tree and non-tree cover is less than 5%. I-Tree Canopy will supply you with the standard errors.
    - If tree canopy cover is determined using another approach, such as image classification, a short description of the approach should be provided, as well as the QA/QC measures that were used. A tree cover classification accuracy assessment should be conducted, as with randomly placed points, and the percentage tree cover classification accuracy reported.
- Project calculates total CO_2 storage at end of Year 25 as follows:
    - Multiply the CI (106.73 t CO_2/ac TC) times the acres of TC (tree canopy) in the Project Area.

References

Smith, James E.; Heath, Linda S.; Skog, Kenneth E.; Birdsey, Richard A. 2006. Methods for calculating forest ecosystem and harvested carbon with standard estimates for forest types of the United States. Gen. Tech. Rep. NE-343. Newtown Square, PA: U.S. Department of Agriculture, Forest Service, Northeastern Research Station. 216 p.

Attestation of No Double Counting and No Net Harm

Reforesting Austin's Parks and Riparian Zones
Attestation of No Double Counting of Credits & No Net Harm

I am the Reforestation Manager of TreeFolks, Inc. and make this attestation regarding no double counting of credits and no net harm from this tree planting project, Reforesting Austin's Parks and Riparian Zones.

1. Project Description

The Project that is the subject of this attestation is described more fully in both our Application and our Project Design Document (PDD), both of which are incorporated into this attestation.

2. No Double Counting by Applying for Credits from another Registry

TreeFolks has not and will not seek credits for CO_2 for the project trees or for this project from any other organization or registry issuing credits for CO_2 storage.

3. No Double Counting by Seeking Credits for the Same Trees or Same CO_2 Storage

TreeFolks has not and will not apply for a project including the same trees as this project nor will it seek credits for CO_2 storage for the project trees or for this project in any other project or more than once.

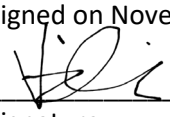
4. No Net Harm

The trees planted in this project will produce many benefits, as described in our Application and PDD. Like almost all urban trees, the project trees are planted not for harvest but for the benefits they deliver to people, communities, and the environment as living trees in a metropolitan area.

The project trees will produce many benefits and will not cause net harm. Specifically, they will not:

- Displace native or indigenous populations
- Deprive any communities of food sources
- Degrade a landscape or cause environmental damage

Signed on November 3rd in 2022, by Valerie Tamburri, Reforestation Manager, for TreeFolks



Signature

Valerie Tamburri

Printed Name

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Email

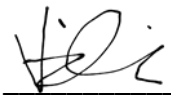
Attestation of Additionality

Reforesting Austin's Parks and Riparian Zones
Attestation of Additionality

I am the Reforestation Manager of TreeFolks, Inc. and make this attestation regarding additionality from this tree planting project, Reforesting Austin's Parks and Riparian Zones

- Project Description
  - The Project that is the subject of this attestation is described more fully in both our Application and our Project Design Document (PDD), both of which are incorporated into this attestation.
- Legal Requirements Test (Protocol Section 2.2)
  - Project trees are not required by law or ordinance to be planted.
- The Project did not plant trees on sites that were converted out of a forest use or that were cleared of healthy trees and then planted with project trees
- Project-Specific Baseline or Performance Standard Baseline
  - Project trees are additional based on a project specific baseline. See PDD; or
  - Project trees are additional based on the Performance Standard baseline; see attached baseline to the PDD.
- Project Implementation Agreement for Project Duration
  - TreeFolks has signed a Project Implementation Agreement with City Forest Credits for 25 years.
- The 25-year Project Duration commitment is additional to and longer than any commitment TreeFolks makes to non-carbon project tree plantings.

Signed on November 3rd in 2022, by Valerie Tamburri, Reforestation Manager, for TreeFolks



Signature

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