



# i-Tree: Tools you can use?

Understanding the benefits of trees for people, places, and planning

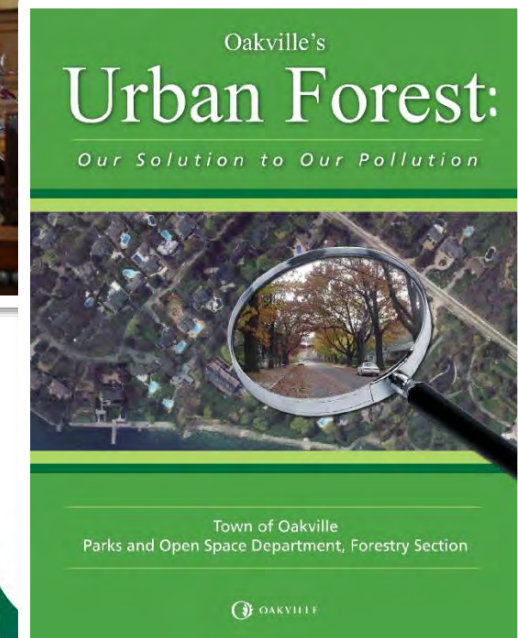
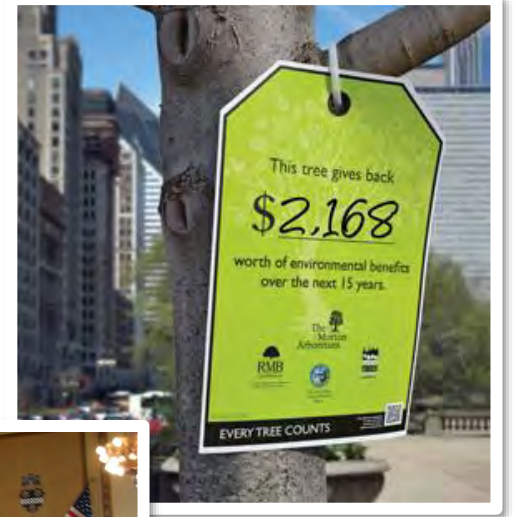
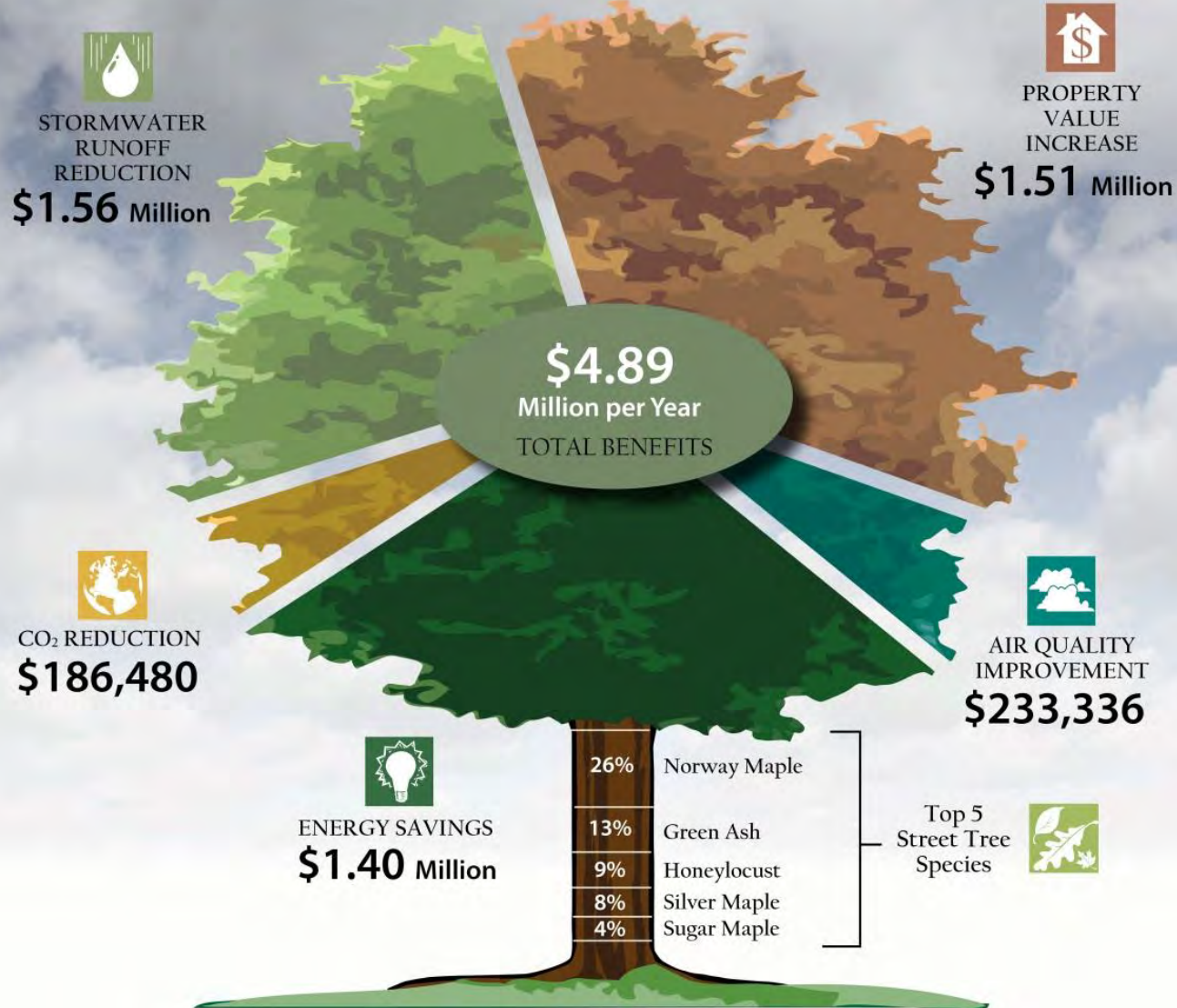
Scott Maco

The Davey Tree Expert Company



# i-Tree: Demonstrating that trees pay us back!

Annually Fox Valley Metro Area public street trees provide<sup>2</sup>...



# What is i-Tree?

- Public domain (free) software tools
- Based on peer-reviewed research
- Technical support
- Continuously improved

## Tools for Assessing and Managing Community Trees & Forests

i-Tree delivers current, peer-reviewed tree benefits estimation science from the USDA Forest Service to all types of users with free tools and support.



**The trees around you:**  
remove hazardous pollutants from the air you breathe,  
absorb carbon dioxide from the air to store as wood,  
and control storm water by intercepting and absorbing rainfall.

**Trees provide more than just beauty and shade.**

**They work hard for all of us, every day!**

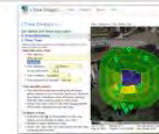
[Click here to learn more.](#)

### Tools for assessing individual trees



#### MyTree

Are you new to i-Tree? Start with our EASIEST tool! MyTree helps you quickly assess **individual trees** with a minimum of fuss.  
*web browser or Android | Apple devices; Learn [How to use it!](#)*



#### i-Tree Design

A full-featured web tool with expanded building interactions and forecasting for estimating the benefits of **individual trees**.  
*via your web browser; Learn [How to use it!](#)*



#### i-Tree Eco

Eco is our flagship tool that accommodates tree inventory IMPORT or field data evaluation to derive **individual tree** benefit estimates.  
*requires installation on a Windows PC; Learn [How to use it!](#)*

### Tree canopy area assessment tools



#### OurTrees

Beta release: Quick **tree canopy** and related information for your community within the continental US!  
*web browser or Android | Apple devices*



#### i-Tree Landscape

US **tree canopy** and Census maps/data at your fingertips! Identify priority planting & protection areas for climate & social issues.  
*via your web browser; Learn [How to use it!](#)*



i-Tree is a  
Cooperative  
Initiative





# i-Tree's Key Premise

i-Tree Tools



We can influence through our actions: **planning, preservation, planting, maintenance and advocacy.**



# The 2023 i-Tree Suite of Tools

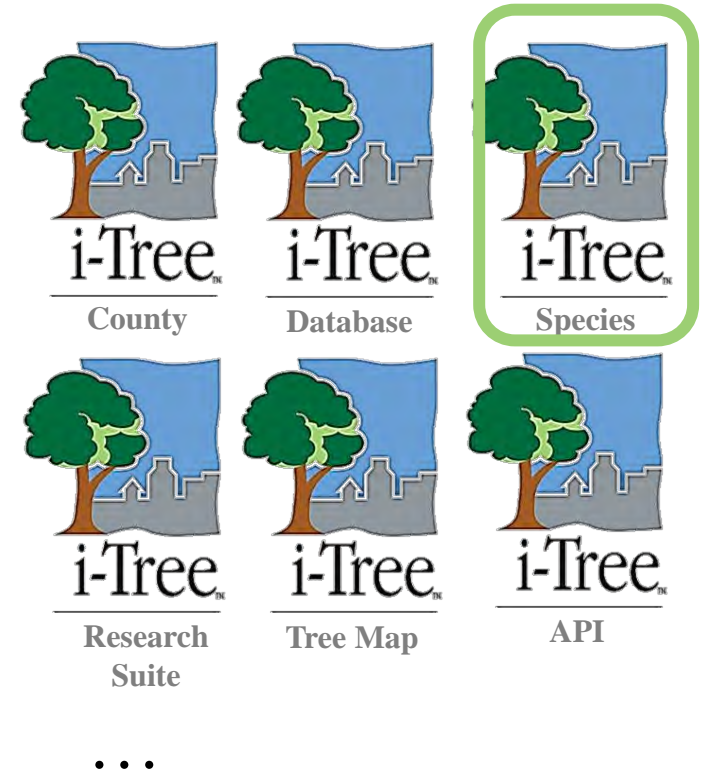
## Core individual tree tools



## Core canopy tools



## Utilities

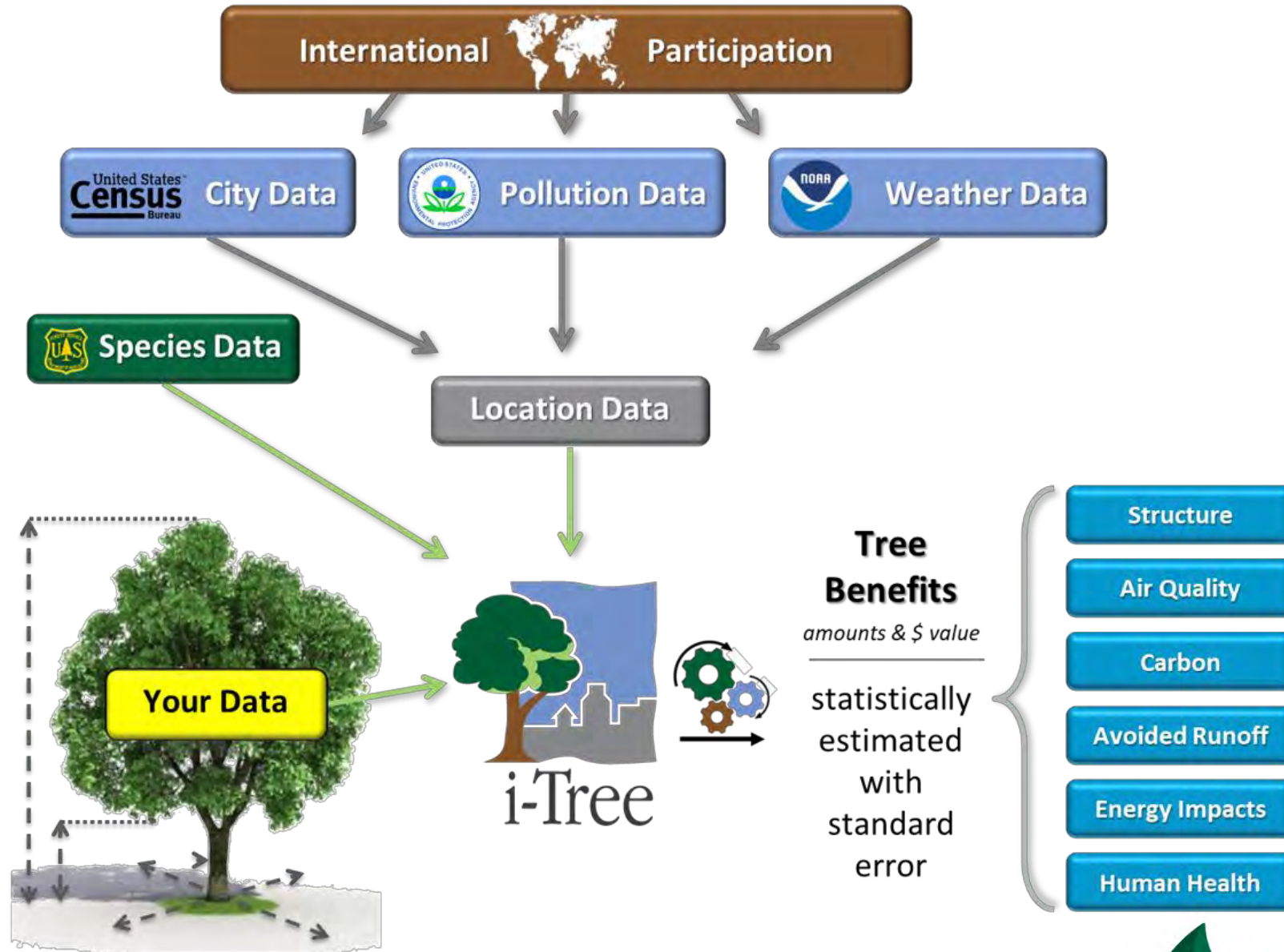


i-Tree is a  
Cooperative  
Initiative among  
these partners



State University of New York  
College of Environmental Science and Forestry

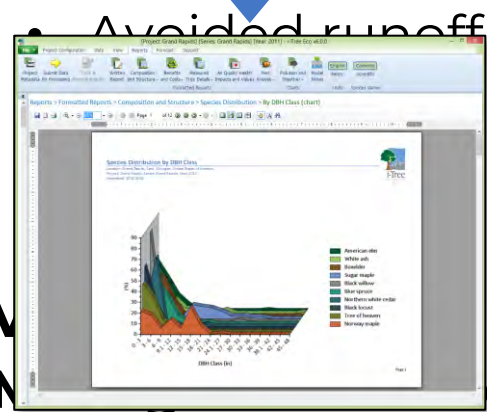
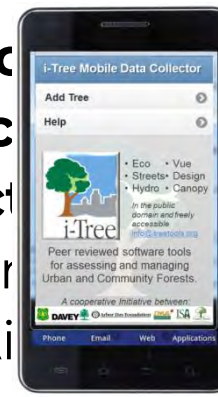
# i-Tree Model Schematic





• **i-Tree Eco Uses:**

- **Structure**
- **Function**
  - Energy
  - Air Quality
  - Carbon



- **Value**
- **Non-trees**
- **Pest risk**



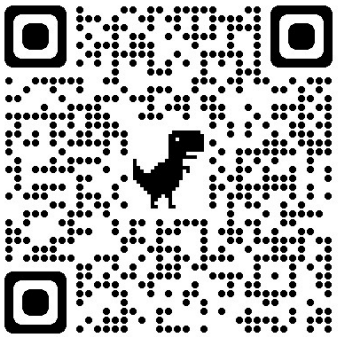
- **Cost**
- **Forests**
- **Cost-benefit ratio**





# i-Tree MyTree

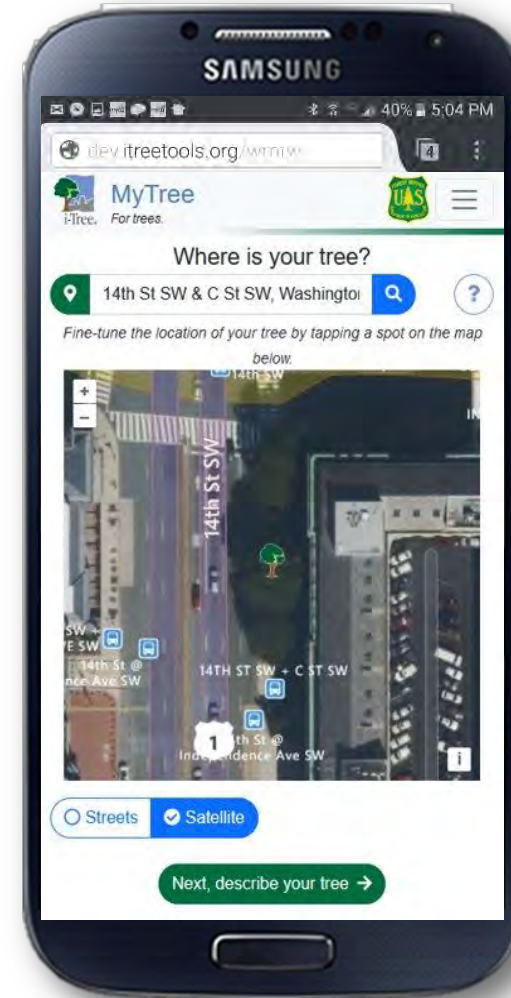
- 🌳 Accessible online/in pocket
- 🌳 Easy to use
- 🌳 Single or multiple trees
- 🌳 Estimates total benefits for the year and CO<sub>2</sub> stored to date




[mytree.itreetools.org](http://mytree.itreetools.org)

...or access from

[www.itreetools.org](http://www.itreetools.org)




# View Results




## MyTree

v1.5



Back

### MyTree Benefits



Tree 1: Oak, Coastal live oak; California live (Quercus agrifolia)

Serving size: 10" dbh, Excellent condition

**Total benefits for this year** **\$36.61**

---

**Carbon Dioxide (CO<sub>2</sub>) Sequestered** **\$4.38**

Annual CO<sub>2</sub> equivalent of carbon<sup>1</sup> 188.40 lbs

---

**Storm Water runoff avoided** **\$2.71**

Runoff avoided 303.09 gal.

Rainfall intercepted 734.44 gal.

---

**Air Pollution removed each year** **< \$0.10**

Carbon monoxide 0.33 oz

Ozone 10.19 oz

Nitrogen dioxide 1.96 oz


Sulfur dioxide 0.26 oz

Particulate matter < 2.5 microns 0.49 oz

---


**Energy Usage each year<sup>2</sup>** **\$26.52**

Electricity savings (A/C) 158.77 kWh



## MyTree

v1.5



<b>Energy Usage each year<sup>2</sup></b>	<b>\$26.52</b>
Electricity savings (A/C)	158.77 kWh
Fuel savings (Natural Gas, Oil)	0.17 MMBtu
<b>Avoided Energy Emissions</b>	<b>\$2.98</b>
Carbon dioxide	116.89 lbs
Carbon monoxide	1.60 oz
Nitrogen dioxide	0.13 oz
Sulfur dioxide	0.47 oz
Particulate matter < 2.5 microns	0.83 oz
<b>Carbon Dioxide (CO<sub>2</sub>) Stored to date<sup>3</sup></b>	<b>\$29.09</b>
Lifetime CO <sub>2</sub> equivalent of carbon <sup>3</sup>	1250.96 lbs

Benefits are estimated based on USDA Forest Service research and are meant for guidance only [www.itreetools.org](http://www.itreetools.org)

<sup>1</sup> Large trees: sequestration is overtaken by CO<sub>2</sub> loss with decay/maintenance.

<sup>2</sup> Positive energy values indicate savings or reduced emissions. Negative energy values indicate increased usage or emissions.

<sup>3</sup> Not an annual amount or value.

[www.itreetools.org](http://www.itreetools.org)  
**i-Tree MyTree v1.5**  
*powered by the i-Tree Eco engine*



# i-Tree Design

[design.itreetools.org](http://design.itreetools.org)

...or access from

[www.itreetools.org](http://www.itreetools.org)

The screenshot shows the i-Tree Design v7.0 website. At the top, there is a navigation bar with the i-Tree logo, the text "i-Tree Design v7.0", and links for "Home", "Menu", "i-Tree", and "Feedback". The main heading is "i-Tree Design v7.0\*". Below this, a paragraph explains that the tool allows users to estimate the benefits of individual trees based on location, species, size, and condition. It lists benefits such as greenhouse gas mitigation, air quality improvements, and stormwater interception. A second paragraph details how tree benefits are estimated for current, forecast, and total future periods. A third paragraph states the tool's purpose as a starting point for understanding tree value and provides a link for more information. On the right side, there is a logo for "i-Tree Design" and a notice about potential performance issues. Below the notice are two buttons: "Go!" and "Load Previously Saved Project". A note below the buttons states "Use of this tool indicates you accept our EULA." At the bottom of the page, there are several logos: U.S. Environmental Protection Agency, Davey, Arbor Day Foundation, SMA (Society of Municipal Arborists), ISA (International Society of Arboriculture), and Casey Trees.

i-Tree Design v7.0 Home Menu i-Tree Feedback

## i-Tree Design v7.0\*

i-Tree Design allows anyone to make a simple estimation of the benefits provided by individual trees. With inputs of location, species, tree size, and condition, users will receive an understanding of tree benefits related to greenhouse gas mitigation, air quality improvements, and stormwater interception. With the additional step of drawing a building footprint – and virtually “planting” or placing a tree – tree effects on building energy use can be evaluated.

Tree benefits are estimated for (a) the current year, (b) a user-specified forecast year sometime in the future, (c) the projected total benefits across that future timespan, and (d) the total benefits provided to date (based on estimated tree age). Multiple trees and buildings can be added to compare benefits or to provide a full accounting of a property’s trees.

This tool is intended as a simple and accessible starting point for understanding the value of individual trees or a small population of trees to a community. For more detailed information on urban and community forest assessments, please explore more of the [i-Tree](#) website. To learn more about the i-Tree Design model, click [here](#).



While we work to improve I-Tree Design this year, you may experience performance and limited functionality for some locations. Please be patient with load times and we apologize for any inconvenience.

Laptop users (mouse)  Tablet users (finger taps)

**Enter a street address below to get started:**

-or-

Use of this tool indicates you accept our [EULA](#).



**U.S.** Environmental Protection Agency

**DAVEY**

**Arbor Day Foundation**

**SMA** SOCIETY OF MUNICIPAL ARBORISTS

**ISA** INTERNATIONAL SOCIETY OF ARBORICULTURE

**Casey Trees** WASHINGTON DC

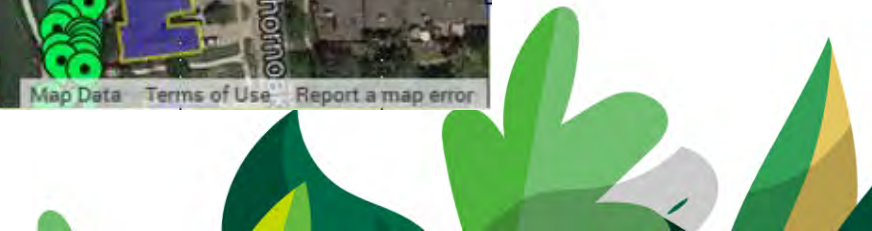
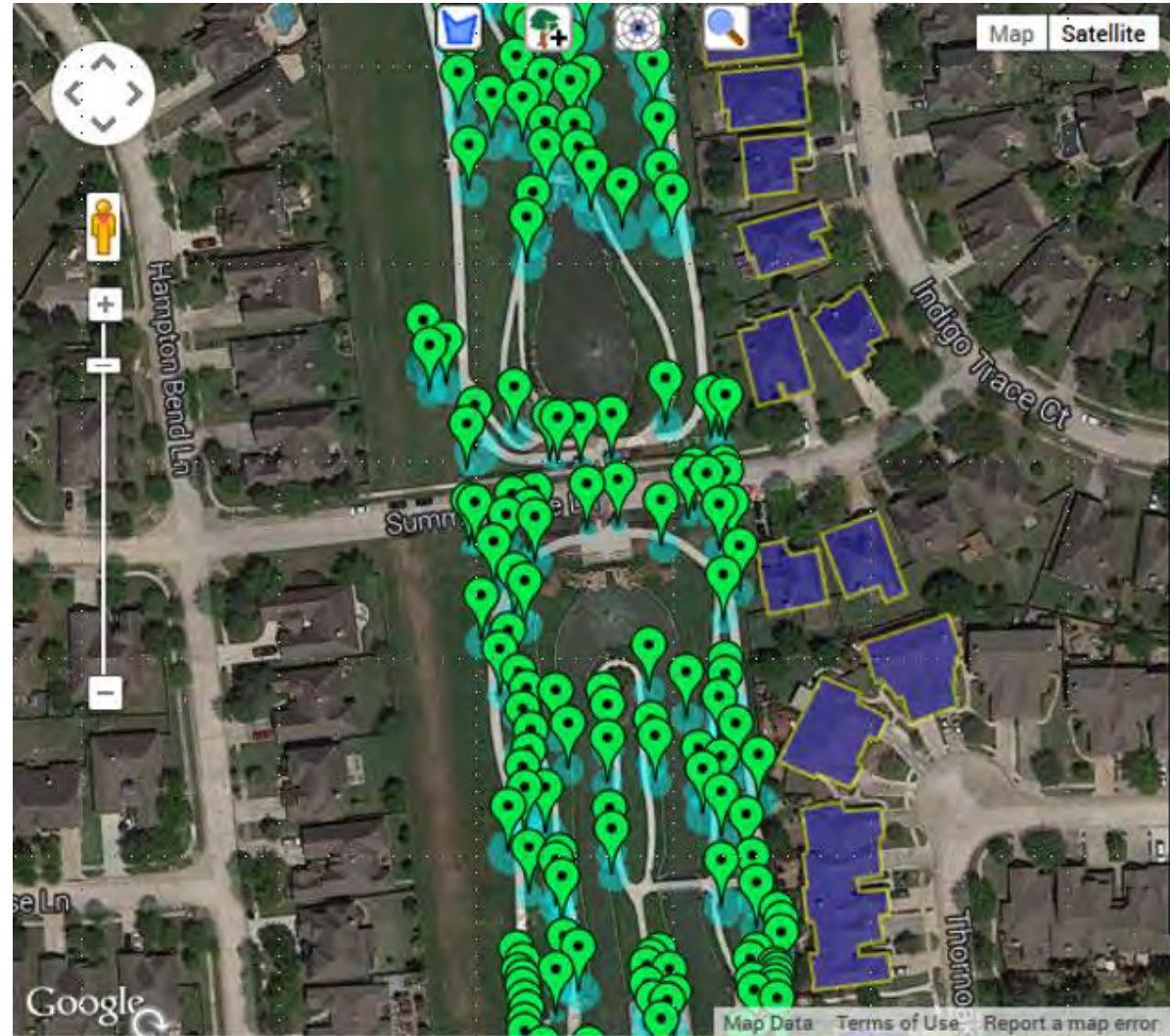
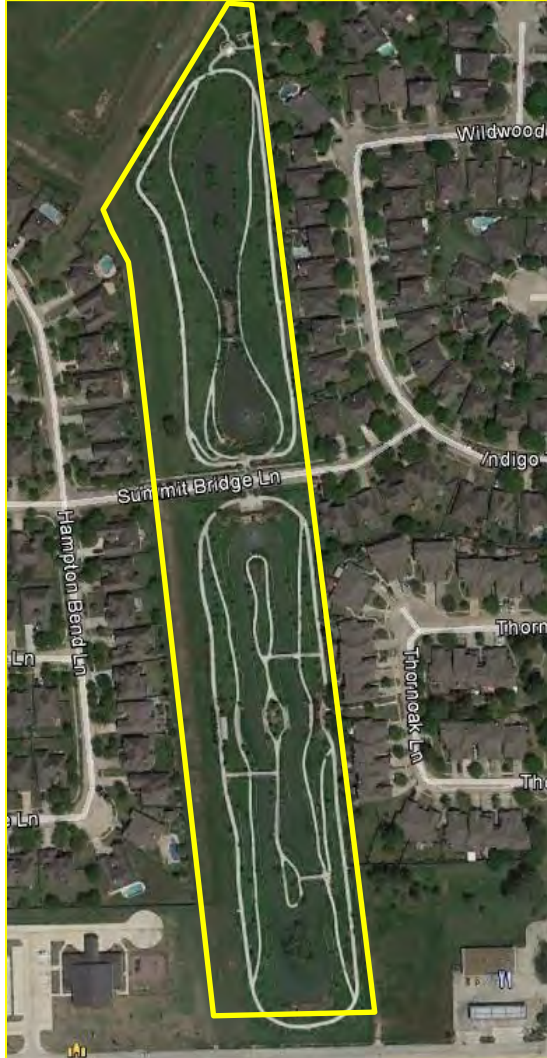
# Mandolin Gardens Redevelopment



Using i-Tree to assess 341 trees planted on redeveloped retention ponds.

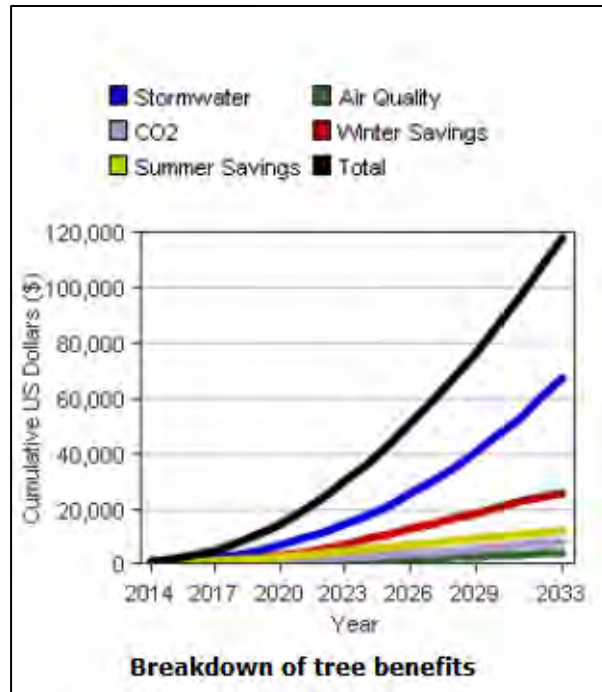


# Tree Benefits for Redevelopment Project

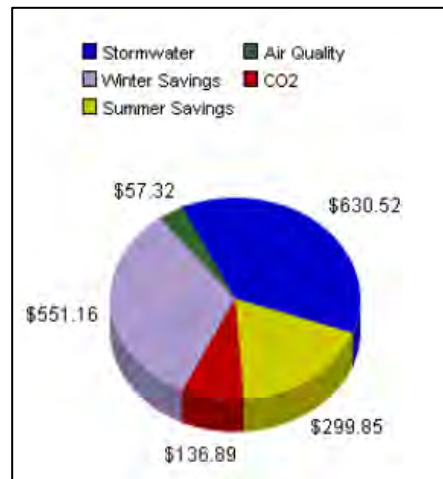


# 341 trees planted at Mandolin Gardens...

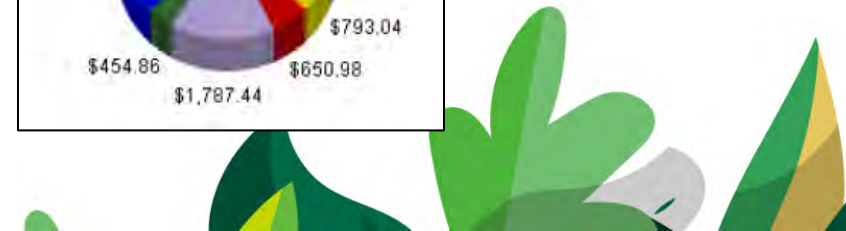
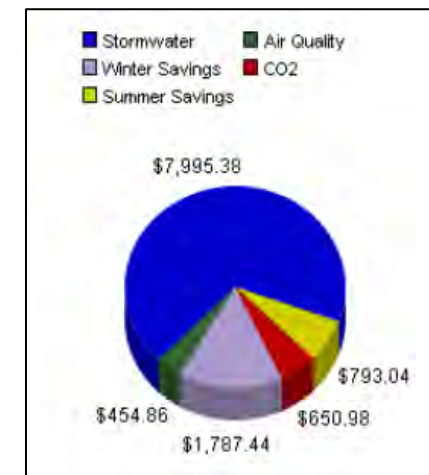
will provide **\$118,200** worth of benefits over the next 20 years ...and growing



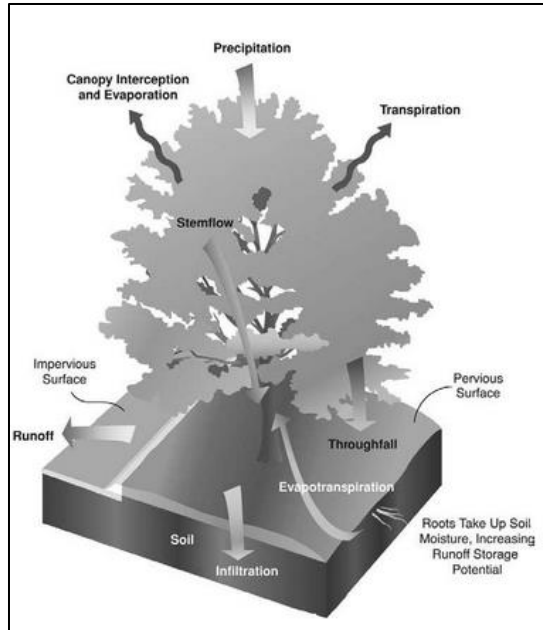
Benefits in Year 1 =  
**\$1,676**



Benefits in Year 20 =  
**\$11,682**



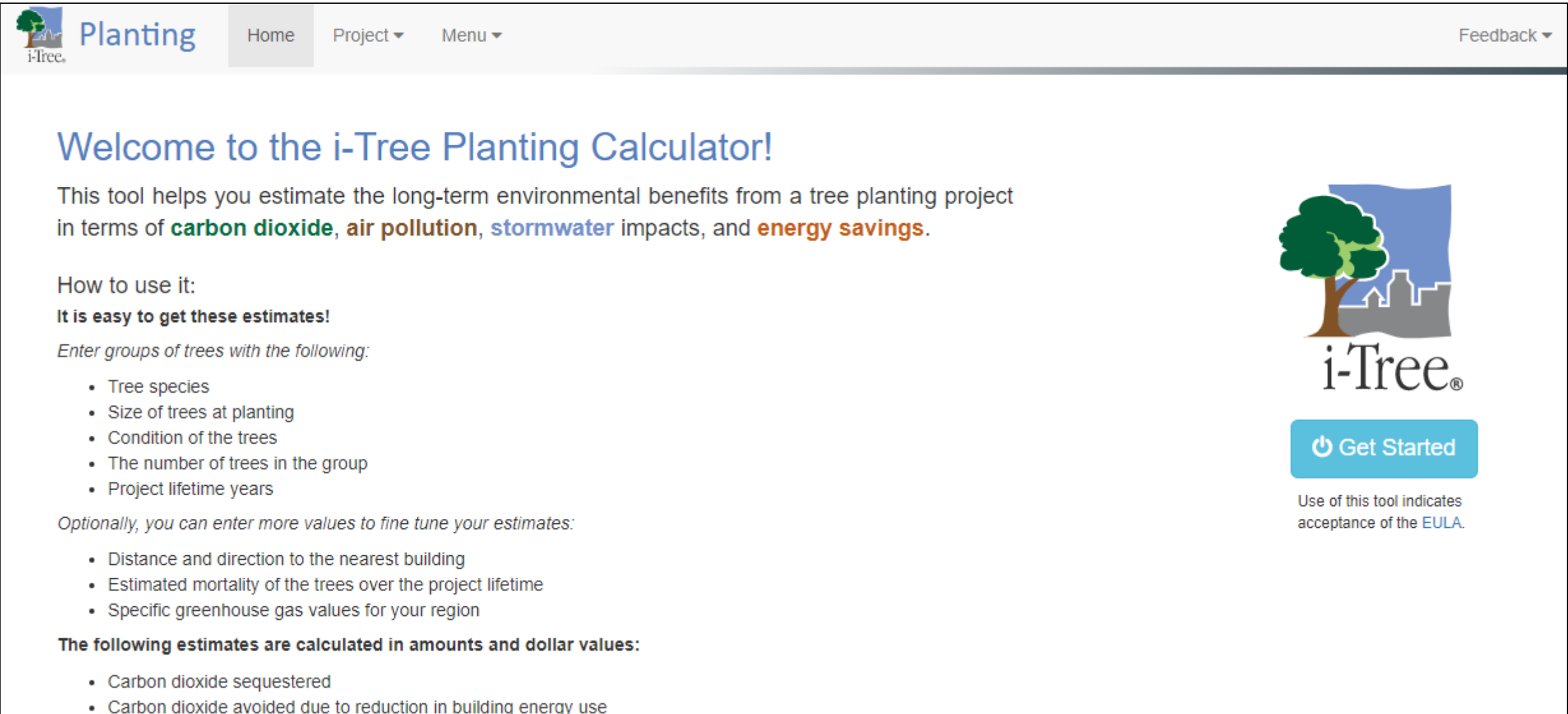
# 341 trees planted at Mandolin Gardens...



will avoid **11.1 million gallons of stormwater runoff** worth **\$67,000** over the next 20 years



# Let's take a closer look at i-Tree Planting



The screenshot shows the i-Tree Planting Calculator website. At the top left is the i-Tree logo, followed by the word "Planting" in blue. To the right are navigation links: "Home", "Project" with a dropdown arrow, and "Menu" with a dropdown arrow. At the top right is a "Feedback" link with a dropdown arrow. The main content area features a large blue heading "Welcome to the i-Tree Planting Calculator!". Below this is a paragraph explaining the tool's purpose: "This tool helps you estimate the long-term environmental benefits from a tree planting project in terms of carbon dioxide, air pollution, stormwater impacts, and energy savings." The words "carbon dioxide", "air pollution", "stormwater", and "energy savings" are highlighted in green, orange, blue, and orange respectively. Underneath, it says "How to use it:" followed by "It is easy to get these estimates!". A sub-heading reads "Enter groups of trees with the following:" followed by a bulleted list: "Tree species", "Size of trees at planting", "Condition of the trees", "The number of trees in the group", and "Project lifetime years". Another sub-heading says "Optionally, you can enter more values to fine tune your estimates:" followed by a bulleted list: "Distance and direction to the nearest building", "Estimated mortality of the trees over the project lifetime", and "Specific greenhouse gas values for your region". A final sub-heading states "The following estimates are calculated in amounts and dollar values:" followed by a bulleted list: "Carbon dioxide sequestered" and "Carbon dioxide avoided due to reduction in building energy use". On the right side of the page, there is a large i-Tree logo featuring a tree and a city skyline, with the text "i-Tree®" below it. Underneath the logo is a blue button with a power icon and the text "Get Started". Below the button, a small text block reads "Use of this tool indicates acceptance of the EULA."

Planting

Home Project Menu

Feedback

## Welcome to the i-Tree Planting Calculator!

This tool helps you estimate the long-term environmental benefits from a tree planting project in terms of **carbon dioxide**, **air pollution**, **stormwater** impacts, and **energy savings**.

How to use it:  
**It is easy to get these estimates!**

Enter groups of trees with the following:


- Tree species
- Size of trees at planting
- Condition of the trees
- The number of trees in the group
- Project lifetime years

Optionally, you can enter more values to fine tune your estimates:

- Distance and direction to the nearest building
- Estimated mortality of the trees over the project lifetime
- Specific greenhouse gas values for your region

The following estimates are calculated in amounts and dollar values:

- Carbon dioxide sequestered
- Carbon dioxide avoided due to reduction in building energy use



**Get Started**

Use of this tool indicates acceptance of the [EULA](#).

<https://planting.itreetools.org>



# Let's put this in i-Tree Planting

## 2021 Philly Street Trees

	A	B
1	Species	Number of Trees
2	Acer campestre	10
3	Acer ginnala	14
4	Acer griseum	3
5	Acer nigrum	7
6	Acer Rubrum	37
7	Acer Saccharum	34
8	Acer truncatum	1
9	Acer x freemanii	2
10	Aesculus spp	3
11	Amelanchier spp	42
12	Betula nigra	11
13	Carpinus spp	41
14	Catalpa speciosa	1
15	Celtis occidentalis	24
16	Cercidiphyllum japonicum	7
17	Cercis Canadensis	59
18	Cladrastis kentukea	34
19	Cornus mas	21
20	Crataegus spp	14
21	Diospyros virginiana	1
22	Ginkgo biloba	17
23	Gleditsia triacanthos	27
24	Gymnocladus dioicus	13
25	Halesia spp	5
26	ignored	1
27	Liquidambar styraciflua	4
28	Liriodendron tulipifera	
29	Maclura pomifera	1
30	Magnolia acuminata	1
31	Malus spp.	64

Location
Parameters
Trees
Report

### Tree Planting Configurations

ATTENTION: Please, limit projects to batches of 100 or less tree groups.

Enter the tree groups for the project.

**Units**  
 English (feet & inches)    Metric (meters & cm)

**Nomenclature**  
 Common Name    Scientific Name

Tree Group Information				Building Information				Tree Details		
	Group Number	Species	DBH in inches	Distance to Nearest in feet	Tree is _____ of Building	Vintage	Climate Controls	Condition	Exposure to Sunlight	Number of Trees
+	1	Acer campestre	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	10
×	2	Acer tataricum ssp. ginnala	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	14
×	3	Acer nigrum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	7
×	4	Acer rubrum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	37
×	5	Acer saccharum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	34
×	6	Acer griseum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	3
×	7	Acer truncatum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	1
×	8	Acer x freemanii	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	2
×	9	Aesculus hippocastanum	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	3
×	11	Amelanchier (genus)	1.5	40-59	North (0°)	Built after 1980	Heat & Cool	Good	Full Sun	42

# i-Tree Planting Results

## Project Report - i-Tree Planting Calculator

Location: Philadelphia, Pennsylvania 19133  
 Electricity Emissions Factor: 517.24 kilograms CO2 equivalent/MWh  
 Fuel Emissions Factor: 84.69 kilograms CO2 equivalent/MMBtu  
 Lifetime: 20 years  
 Tree Mortality: 37%

All amounts in the tables are for the full lifetime of the project.

Units  
 English (pounds & tons)

Copy Export CO<sub>2</sub>

### Location

Group Identifier	Tree Group Characteristics
1	• (10.0) Hedge maple(Acer campestre) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.
11	• (42.0) Serviceberry spp(Amelanchier) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.
12	• (41.0) River birch(Betula nigra) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.
13	• (41.0) American hornbeam(Carpinus caroliniana) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling.
14	• (1.0) Norway spruce(Picea canadensis) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling.

## Project Report - i-Tree Planting Calculator

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Copy Export CO<sub>2</sub>

### Location

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12	• (41.0) River birch(Betula nigra) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.
13	• (41.0) American hornbeam(Carpinus caroliniana) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling.
14	• (1.0) Norway spruce(Picea canadensis) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling.

## Project Report - i-Tree Planting Calculator

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All amounts in the tables are for the full lifetime of the project.

Units  
 English (pounds & tons; kWh & MMBtu; gallons)  Metric (kilograms & metric tons; kWh & MMBtu; cubic meters)

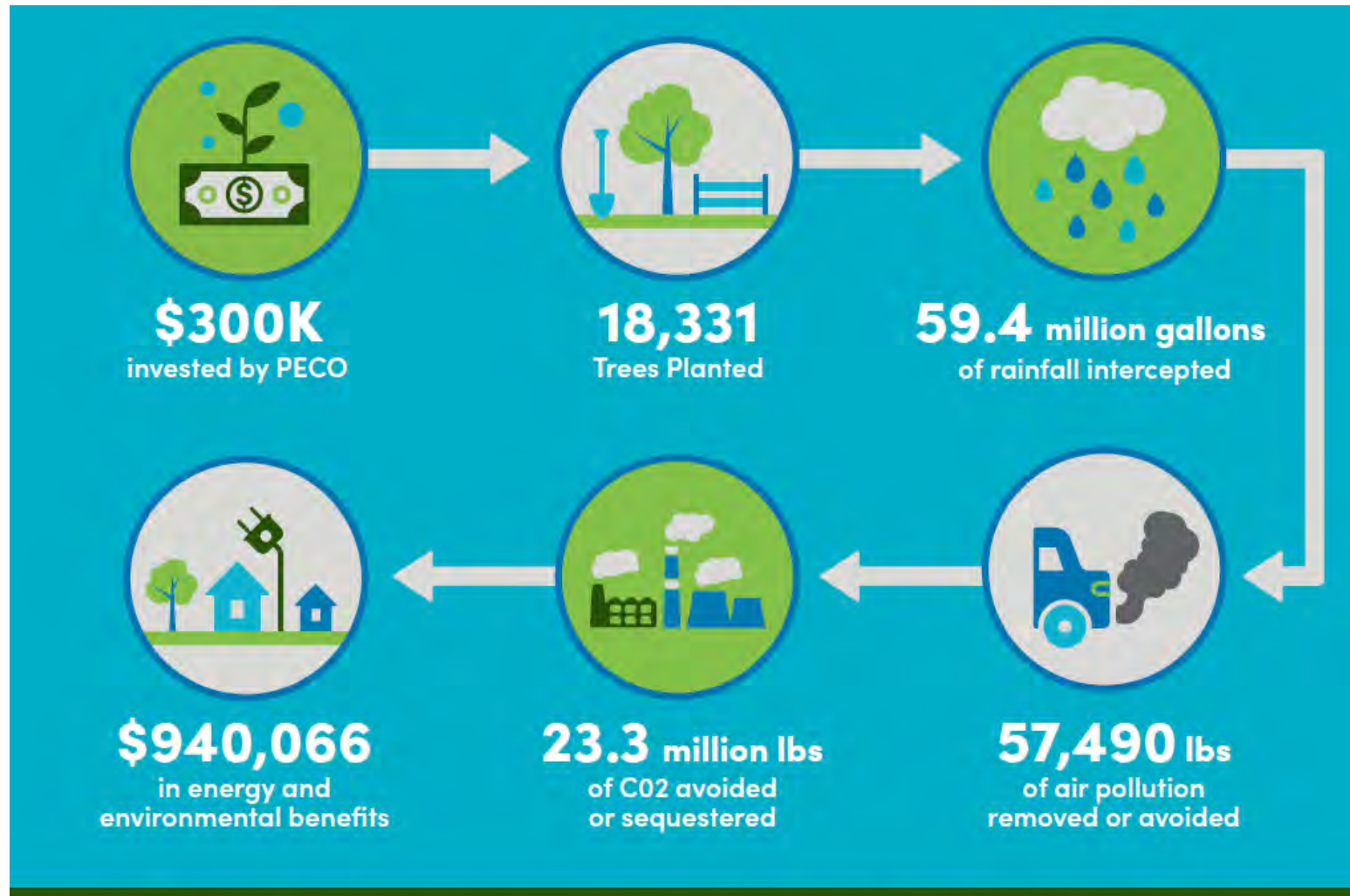
Copy Export CO<sub>2</sub> Energy Eco Air Pollution

Search:

Location		Ecological Benefits			
Group Identifier	Tree Group Characteristics	Tree Biomass (short ton)	Rainfall Interception (gallons)	Avoided Runoff (gallons)	Avoided Runoff (\$)
1	• (10.0) Hedge maple(Acer campestre) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.	1.1	31,780.4	13,545.9	\$121.05
11	• (42.0) Serviceberry spp(Amelanchier) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.	8.8	146,810.8	62,575.9	\$559.18
12	• (41.0) River birch(Betula nigra) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling. • Trees are in good condition and planted in full sun.	12.3	188,651.8	80,410.0	\$718.54
13	• (41.0) American hornbeam(Carpinus caroliniana) at 1.5 inches DBH. • Planted 40-59 feet and north (0°) of buildings that were built post-1980 with heating and cooling.	4.0	125,854.3	53,643.5	\$479.36



# Reporting results...



## 2019-2021 Tree Planting

Projected 20 year cumulative values

Source: US Forest Service Northern Research Station & iTree



# i-Tree Species

- Helps you select the most appropriate tree species based on their potential benefits for your geographic area.
- New features
  - Hardiness zones
  - Pest / Host
  - Invasive designation
  - Ranked list of species based on desired benefits

**species.itreetools.org**

The screenshot shows the i-Tree Species Selector web application. The browser address bar displays the URL <https://species.itreetools.org/selector/>. The page title is "i-Tree Species". The navigation menu includes "Home", "Project", "Menu", and "i-Tree". The main content area is titled "Report" and shows the "Report Type" set to "Top 10%". A "Save Report" button is visible. Below this, the "Top 10% of Species for Selected Functions" report is displayed for the location "Indianapolis city (balance), Marion, Indiana, United States of America". The report includes constraints for Minimum Height (None) and Maximum Height (50). It also shows Air Pollutant Removal (0-10 Importance) with an Overall score of 0, and Other Functions (0-10 Importance) including Low VOC (8), Carbon Storage (4), Wind Reduction (0), Air Temperature Reduction (5), UV Radiation Reduction (4), Building Energy Reduction (0), Streamflow Reduction (0), and Low Allergenicity (0). The report was generated on 11/11/2016. A legend indicates S = Sensitive, I = Intermediate, and SI = Indeterminate. The main table lists species with columns for Scientific Name, Common Name, Hardiness Zone, Invasive status, Sensitivity (Ozone, Nitrogen Dioxide, Sulfur Dioxide), and Pest Risk.

Species	Scientific Name	Common Name	Hardiness Zone	Invasive	Sensitivity			Pest Risk
					Ozone (O3)	Nitrogen Dioxide (NO2)	Sulfur Dioxide (SO2)	
	SEQUOIA SEMPERVIRENS	COAST REDWOOD	7-10					
	LIRIODENDRON TULIPIFERA	TULIP TREE	5-9		S			
	ULMUS AMERICANA	AMERICAN ELM	3-9			I/S	Asian Longhorned Beetle, Dutch Elm Disease, Winter Moth	
	ULMUS GLABRA	WYCH ELM	4-7				Asian Longhorned Beetle, Dutch Elm Disease	
	MAGNOLIA GRANDIFLORA	SOUTHERN MAGNOLIA	7-10					
	TILIA AMERICANA	AMERICAN BASSWOOD	4-9		I	I	Gypsy Moth, Winter Moth	
	TSUGA HETEROPHYLLA	WESTERN HEMLOCK	6-7			I	Southern Pine Beetle, Western Spruce Budworm	
	TSUGA MERTENSIANA	MOUNTAIN HEMLOCK	5-7				Fir Engraver, Southern Pine Beetle, Western Spruce Budworm	

# There are lots of resources to help

[www.itreetools.org](http://www.itreetools.org)

Videos

Documentation

Online tools

Support

Examples

Downloads

Newsletters

Webinars

[info@itreetools.org](mailto:info@itreetools.org)

[Scott.maco@davey.com](mailto:Scott.maco@davey.com)

