CITY FOREST CREDITS

Growing Futures. Growing Trees – Des Moines, IA
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 does an independent check of all documents and compliance with the Protocol, known as verification. An updated PDD will need to be submitted for future verification at Year 6 and After Year 25.

Project Operators should 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). Keep all instructions in the document.

Below is a list of documents that are needed to complete a successful Year 4 Project Design Document:

For the Single Tree Planting Design:

- Carbon Quantification Year 4 Credit tool
- Tree Sampling Data
- Geocoded photos
- Project geospatial data (KML file or shapefile)

For the Cluster Planting Design

- Project Area imaging from any telemetry, imaging, or remote sensing service
- i-Tree Canopy report
- i-Tree Canopy source data
- Project geospatial data (KML file or shapefile)
- Carbon Quantification Year 4 Credit tool

For the Area Reforestation Planting Design (previously Canopy Design):

- Either:
    - Project Area imaging from any telemetry, imaging, or remote sensing service
    - i-Tree Canopy report
    - i-Tree Canopy source data
- Or:
    - Tree plot sampling data
- Project geospatial data (KML file or shapefile)
- Carbon Quantification Year 4 Credit tool
- Summary of approach to quantifying the local CO_2 index

PROJECT OVERVIEW

Project Name: Growing Futures. Growing Trees – Des Moines, IA
Project Number: 5
Project Type: Planting Project (under the Planting Protocol – Version 6, August 11, 2018)
Project Start Date: December 4, 2019
Project Location: Des Moines, IA

Project Operator Name: Trees Forever
Project Operator Contact Information:
Megan Schneider
Director of Programs Des Moines Metro
515-776-0335
Mschneider@treesforever.org

PROJECT AND PLANTING DESIGN UPDATES

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

Tree planting projects for the Growing Futures project occurred throughout the City of Des Moines from April – December of 2019. Tree planting locations were a mix of street tree (right of way) and park plantings, with a major focus on street tree plantings. Tree planting totals for the 2019 season were: 734 trees, combination of overstory, understory. The Project Operator used the single tree planting design method.

Trees Forever is under contract with the City of Des Moines to plant the city's trees and works with the forestry department to target tree plantings. The main project goals were to increase tree equity across the city by targeting trees to under-resourced neighborhoods, working with volunteers to plant trees, and to complete major street corridor plantings. All trees planted are watered, pruned, and maintained by Trees Forever for two years following planting. Upon completion of the two year maintenance period, the City of Des Moines assumes tree maintenance responsibilities.

A total of 14 trees from the sample have been replaced over the four year period. Replacement trees were largely of the same size class as originally planted and did not require changes to the initial quantification tool and planting list. Trees Forever staff collected data on the 142 tree random sample and the project has a current mortality status of 10%.

CARBON QUANTIFICATION DOCUMENTATION (Section 12 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 method of 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) *Clustered - cluster quantification tool*
3) *Area Reforestation - 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. 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 by after Year 25 is generated.

2) Clustered
    a. Year 4: Project Operators provide 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). Imaging from Google Earth with leaf-on may be used. Project Operators will calculate the percent of canopy cover from the Google Earth imaging. 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.
        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 Clustered 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%.

3) Area Reforestation (formerly Canopy planting design)
    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%.

Overview

Tree planting projects for the Growing Futures project occurred throughout the City of Des Moines from April – December of 2019. Tree planting locations were a mix of street tree (right of way) and park plantings, with a major focus on street tree plantings. Tree planting totals for the 2019 season were: 734 trees, combination of overstory, understory. The Project Operator used the single tree quantification method.

Data Collection

Trees Forever staff collected data on the 142 tree random sample spanning the City of Des Moines provided by City Forest Credits. The status of each tree was documented, along with a geotagged photo. After sampling was completed, the project has a current mortality status of 10%. Significant mortality did not occur and no significant changes were made to the Project Area since initial planting.

Attachments: 1 Des Moines 2019 Midwest Single Tree Year 4 Credit Tool

Carbon Quantification

Total number of trees planted	734
Project area (acres), if applicable	NA
Total number of trees per acre, if applicable	NA
Credits attributed to the project (tCO2e)	1,842
Credits after mortality deduction (20%)	1,474
Contribution to Registry Reversal Pool Account (5%) (tCO2e)	73
Total credits to be issued to the Project Operator (tCO2e)	1,400
Total credits requested to be issued	560

GHG Assertion:
Project Operator asserts that the Project results in GHG emissions mitigation of 1,400tons CO_2e over the 26-year Project Duration. Project Operator asserts that the Project results in GHG emissions mitigation of 560 tons CO_2e at Year 4.

The initial single tree quantification tool used a 10% mortality deduction. For year 4 calculations, the anticipated mortality deduction was increased to 20% to provide consistency across projects and allow for future tree mortality. The credit total was adjusted to take into account this change.

The observed mortality rate for the sample was 10%. Per Registry guidance, if the observed mortality rate at Year 4 exceeds the 20% anticipated mortality deduction, the observed mortality is used to re-calculate carbon storage at Year 4; otherwise, the anticipated mortality deduction is used to be more conservative. Because the 10% observed mortality is less than the anticipated mortality deduction, the 20% anticipated mortality deduction was used in the carbon quantification tool.

The updated Projected CO_2 stored and credit issuance over 26 years is outlined below:

Single Tree Plantings	Projection at Initial Crediting	Updated Projection at Year 4
Total credits issued at Initial Crediting (10% CO2 (t))	157	
Total credits to be issued at Year 4 (40% CO2 (t))	630	560
Total credits to be issued at Year 6 (30% CO2 (t))	472	420
Total credits to be issued at Year 26 (20% CO2 (t))	316	263
Total credits to be issued (tCO2e)	**1,575**	**1,400**

Attachment: 1 Des Moines 2019 Midwest Single Tree Year 4 Credit Tool

CO-BENEFITS QUANTIFICATION DOCUMENTATION (Section 12 and Appendix A)

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.

Ecosystem Services	***Resource Units***	***Value***
Rainfall Interception (m3/yr)	3,847.85	$27,547.03
Air Quality (t/yr)	0.1230	$569.97
Cooling – Electricity (kWh/yr)	122,691.15	$9,312.26
Heating – Natural Gas (kBtu/yr)	1,796,196.33	$17,485.49
Grand Total ($/yr)		**$54,914.74**

The total co-benefits are slightly lower than the initial co-benefits calculations due to increasing the mortality rate buffer from 10% to 20%.

Attachment: 1 Des Moines 2019 Midwest Single Tree Year 4 Credit Tool

ADDITIONALITY (Section 4)

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.

Attachment: 3 Des Moines 2019 Year 4_Attestation of Additionality

ATTESTATION OF NO DOUBLE COUNTING OF CREDITS AND NO NET HARM (Section 5)

Complete and attach the following attestation: Attestation of No Double Counting of Credits and Attestation of No Net Harm. Provide a map that includes both the Project Area and the closest registered urban forest afforestation or reforestation project based on the registered urban forest planting project database KML/Shapefile provided by CFC to demonstrate that the Project does not overlap with any existing urban forest carbon projects.

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. Project Operator has signed the Attestation of No Double Counting of Credits and No Net Harm on August 28. 2023.

Project Operator has mapped the Project Trees against the registered urban forest planting project database and determined that there is no overlap of Project Trees with any registered urban forest afforestation or reforestation carbon project. [Optional: enter text here with any additional details].

Attachment: 4 Des Moines 2019 Year 4_Attestation of No Double Counting

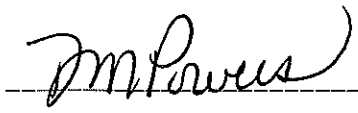
ADDITIONAL INFORMATION

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

There have been no changes to monitoring and reporting plans since the Initial Credit Planting Design Document was submitted.

SIGNATURE

Signed on September 12 in 2023, by Debra Powers, Interim CEO], for Trees Forever.



Signature

Deb Powers

Printed Name

563.275-9643

Phone

dpowers@treesforever.org

Email

ATTACHMENTS

For the Single Tree Planting Design:

1 - Carbon Quantification Year 4 Credit tool
2 - Tree Sampling Data
3 - Geocoded photos
4 - Project geospatial data (KML file or shapefile)

For the Cluster Planting Design

1 - Project Area imaging from any telemetry, imaging, or remote sensing service
2 - i-Tree Canopy report
3 - i-Tree Canopy source data
4 - Project geospatial data (KML file or shapefile)
5 - Carbon Quantification Year 4 Credit tool

For the Area Reforestation Planting Design (previously Canopy Design):

- Either:
  1 - Project Area imaging from any telemetry, imaging, or remote sensing service
  2 - i-Tree Canopy report
  3 - i-Tree Canopy source data
- Or:
  1 - Tree plot sampling data

2 - Project geospatial data (KML file or shapefile)
3 - Carbon Quantification Year 4 Credit tool
4 - Summary of approach to quantifying the local CO_2 index

Attachments

Single Tree

Carbon Quantification Year 4 Credit Tool – Single Tree

Tree Sampling Data

Geocoded Photos

Attestation of No Double Counting and No Net Harm

Attestation of Additionality

Carbon Quantification Year 4 Credit Tool – Single Tree

	A	B	C	D	E	F	G	H	I	J	K	L
1	This copy assigned to INSERT ORGANIZATION NAME. Proprietary and confidential CFC information. Do not forward to third parties without CFC permission.											
2												
3		**Directions**										
4		Using the information you provide and background data, the tool calculates the amount of Credits that could be issued after planting (10%), at Year 4 (30%), at Year 6 (30%), at Year 14 (10%), and at Year 26 (20%). A mortality deduction (% loss) is applied to account for anticipated tree losses (Cell D6). A 5% Reversal Pool Account deduction is applied that will go into a program-wide pool to insure against catastrophic loss of trees. This tool is used to determine credits issued after planting (Intial Crediting). A different tool is used for credit issuance in Years 4, 6, 14, and 26. The tool in those years requires calculation of a sample and collection of data on tree status in the sample sites.										
5												
6		Anticipated Mortality Deduction (%) at Initial Crediting		20%								
7		Observed Mortality (%) at Year 4		9.9%								
8		**Table 5. Projected CO_2 stored by live trees 25 years after planting, issued at five times over the Project Duration. These values account for anticipated tree losses and the 5% Reversal Pool Account deduction.**										
9												
10								10%	40%	30%	20%	
11			**No. Sites Planted**	**No. Live Trees**	**Mortality Deduction (%)**	**25-yr CO_2 stored (kg/tree)**	**Total 25-yr CO_2 stored, includes Mortality and Reversal Pool Account Deduction (t)**	**Year 1 10% CO_2 (t)**	**Year 4 40% CO_2 (t)**	**Year 6 30% CO_2 (t)**	**Year 26 20% CO_2 (t)**	
12		**BDL**	359	287	0.20	3,978.85	1085.6	108.56	434.24	325.68	217.12	
13		**BDM**	86	69	0.20	2,451.33	160.2	16.02	64.09	48.07	32.04	
14		**BDS**	289	231	0.20	700.27	153.8	15.38	61.52	46.14	30.76	
15		**BEL**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
16		**BEM**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
17		**BES**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
18		**CEL**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
19		**CEM**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
20		**CES**	0	0	0.00	0.00	0.0	0.00	0.00	0.00	0.00	
21			734	587	0.20	7,130.5	1399.6	139.96	559.85	419.88	279.92	
22												sumcheck
23						**Credits issued**	1400	157	560	420	263	1400

	A	B	C	D	E	F	G	H	I	J
1	**This copy assigned to INSERT ORGANIZATION NAME. Proprietary and confidential CFC information. Do not forward to third parties without CFC permission.**									
2										
3		Using the information you provide and background data, the tool provides estimates of co-benefits per year after 25 years.								
4										
5		**Table 7. Co-Benefits <u>per year</u> after 25 years (all live trees, includes tree mortality)**								
6		**Ecosystem Services**	**Resource Units Totals**	**Total $**						
7		**Rainfall Interception (m3/yr)**	3,847.85	$27,547.03						
8		**Air Quality (t/yr)**								
9		**O3**	0.0521	$173.92						
10		**NOx**	0.0084	$28.18						
11		**PM10**	0.0274	$77.78						
12		**Net VOCs**	0.0351	$290.08						
13		**Air Quality Total**	0.1230	$569.97						
14		**Energy (kWh/yr & kBtu/yr)**								
15		**Cooling - Electricity**	122,691.15	$9,312.26						
16		**Heating - Natural Gas**	1,796,196.33	$17,485.49						
17		**Energy Total ($/yr)**		$26,797.75						
18		**Grand Total ($/yr)**		$54,914.74						
19										
20				$1,427,783.34						

	A	B	C	D	E	F	G	H
1	This copy assigned to INSERT ORGANIZATION NAME. Proprietary and confidential CFC information. Do not forward to third parties without CFC permission.							
2								
3		In Table 4 the tool infers the amount of CO_2 stored after 25 years from the sample to the population of live trees. Values in column H account for anticipated tree losses and the 5% Reversal Pool Account deduction.						
4								
5		**Table 6. Grand Total CO_2 Stored after 25 years (all live trees, includes anticipated tree loss and Reversal Pool Account deduction)**						
6		**Tree-Type**	**No. Sites Planted**	**Mortality Deduction (%)**	**Total Live Trees After Mortality**	**25-yr CO_2 stored (kg/tree)**	**CO_2 Total - No Deductions (t)**	**Grand Total CO_2 with Deductions (t)**
7		**Brdlf Decid Large (>50 ft)**	359	0.20	287	3,978.85	1,428.4	1,085.6
8		**Brdlf Decid Med (30-50 ft)**	86	0.20	69	2,451.33	210.8	160.2
9		**Brdlf Decid Small (<30 ft)**	289	0.20	231	700.27	202.4	153.8
10		**Brdlf Evgrn Large (>50 ft)**	0	0.20	0	0.00	0.0	0.0
11		**Brdlf Evgrn Med (30-50 ft)**	0	0.20	0	0.00	0.0	0.0
12		**Brdlf Evgrn Small (<30 ft)**	0	0.20	0	0.00	0.0	0.0
13		**Conif Evgrn Large (>50 ft)**	0	0.20	0	0.00	0.0	0.0
14		**Conif Evgrn Med (30-50 ft)**	0	0.20	0	0.00	0.0	0.0
15		**Conif Evgrn Small (<30 ft)**	0	0.20	0	0.00	0.0	0.0
16			734		587	7130	1,841.6	1,399.6

Tree Sampling Data

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
Acer ginnala	Amur maple	BDS	
Acer negundo	boxelder	BDM	
Acer nigrum	black maple	BDL	
Acer palmatum	Japanese maple	BDS	
Acer platanoides	Norway maple	BDL	
Acer rubrum	red maple	BDL	
Acer saccharinum	silver maple	BDL	
Acer saccharum	sugar maple	BDL	6
Acer species	maple	BDL	
Aesculus glabra	Ohio buckeye	BDL	
Albizia julibrissin	mimosa	BDS	
Alnus species	alder	BDM	
Amelanchier canadensis	serviceberry, shadblow	BDS	
Amelanchier laevis	serviceberry, Allegheny	BDM	
Amelanchier spp.	serviceberry, spp.	BDS	
Betula nigra	river birch	BDM	9
Betula papyrifera	paper birch	BDL	
Betula species	birch	BDM	
Broadleaf Deciduous Large	broadleaf deciduous large	BDL	31
Broadleaf Deciduous Medium	broadleaf deciduous medium	BDM	
Broadleaf Deciduous Small	broadleaf deciduous small	BDS	45
Broadleaf Evergreen Large	broadleaf evergreen large	BEL	
Broadleaf Evergreen Medium	broadleaf evergreen medium	BEM	
Broadleaf Evergreen Small	broadleaf evergreen small	BES	
Carya species	hickory	BDL	
Castanea dentata	American chestnut	BDL	
Catalpa species	catalpa	BDL	
Catalpa speciosa	northern catalpa	BDL	
Celtis occidentalis	northern hackberry	BDL	15
Cercidiphyllum japonicum	katsuratree	BDM	
Cercis canadensis	eastern redbud	BDS	60
Cladrastis kentukea	yellowwood	BDM	
Conifer Evergreen Large	conifer evergreen large	CEL	
Conifer Evergreen Medium	conifer evergreen medium	CEM	
Conifer Evergreen Small	conifer evergreen small	CES	
Cornus florida	flowering dogwood	BDS	
Cornus species	dogwood	BDS	
Crataegus crusgalli	hawthorn, cockspur	BDS	
Crataegus spp.	hawthorn, spp.	BDS	
Crataegus viridis	hawthorn, green	BDM	
Fraxinus americana	white ash	BDL	
Fraxinus nigra	black ash	BDM	
Fraxinus pennsylvanica	green ash	BDL	
Fraxinus species	ash	BDM	
Ginkgo biloba	ginkgo	BDM	4
Gleditsia triacanthos	honeylocust	BDM	24
Gleditsia triacanthos inermis	honeylocust, thornless	BDL	44
Gymnocladus dioicus	Kentucky coffeetree	BDL	
Hibiscus syriacus	rose-of-sharon	BDS	
Ilex opaca	American holly	BES	
Ilex species	holly	BES	
Juglans nigra	black walnut	BDL	
Juniperus species	juniper	CEM	
Juniperus virginiana	eastern red cedar	CEM	
Liquidambar styraciflua	sweetgum	BDL	
Liriodendron tulipifera	tulip tree	BDL	28
Magnolia grandiflora	southern magnolia	BEM	
Magnolia virginiana	sweetbay	BEM	
Malus species	apple	BDS	150
Malus spp.	crabapple, flowering	BDS	
Morus alba	white mulberry	BDM	
Morus species	mulberry	BDM	
Nyssa sylvatica	blackgum	BDM	
Ostrya virginiana	eastern hophornbeam	BDM	18
Parrotia persica	persian ironwood	BDS	
Phellodendron amurense	Amur corktree	BDM	
Picea abies	Norway spruce	CEL	
Picea mariana	black spruce	CEM	
Picea pungens	blue spruce	CEM	
Picea species	spruce	CEL	
Pinus contorta	Bolander beach pine	CES	
Pinus nigra	Austrian pine	CEM	
Pinus ponderosa	ponderosa pine	CEL	
Pinus resinosa	red pine	CEL	
Pinus strobus	eastern white pine	CEL	
Pinus sylvestris	Scotch pine	CEM	
Pinus virginiana	Virginia pine	CEM	
Platanus occidentalis	American sycamore	BDL	85
Platanus x acerifolia	planetree, London	BDL	
Populus deltoides	eastern cottonwood	BDL	
Populus nigra	black poplar	BDL	
Populus species	cottonwood	BDL	
Populus tremuloides	quaking aspen	BDL	2

Table 2. Summary of Planting Sites

Tree-Type	Tree-Type Abbreviation	No. Sites Planted
Brdlf Decid Large (>50 ft)	**BDL**	359
Brdlf Decid Med (30-50 ft)	**BDM**	86
Brdlf Decid Small (<30 ft)	**BDS**	289
Brdlf Evgrn Large (>50 ft)	**BEL**	0
Brdlf Evgrn Med (30-50 ft)	**BEM**	0
Brdlf Evgrn Small (<30 ft)	**BES**	0
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	734

Prunus cerasifera	cherry plum	BDS	
Prunus serotina	black cherry	BDL	
Prunus serrulata	Kwanzan cherry	BDS	
Prunus species	plum	BDS	
Prunus virginiana	common chokecherry	BDS	
Pyrus calleryana	Callery pear	BDM	
Pyrus species	pear	BDM	
Quercus alba	white oak	BDL	21
Quercus bicolor	swamp white oak	BDL	27
Quercus coccinea	scarlet oak	BDL	
Quercus ellipsoidalis	northern pin oak	BDL	
Quercus macrocarpa	bur oak	BDL	22
Quercus nigra	water oak	BEL	
Quercus palustris	pin oak	BDL	3
Quercus rubra	northern red oak	BDL	29
Quercus species	oak	BDL	
Rhamnus species	buckthorn	BDS	
Rhus species	sumac	BDS	
Robinia pseudoacacia	black locust	BDL	
Salix discolor	pussy willow	BDS	
Salix species	willow	BDL	
Sorbus species	mountain ash	BDS	
Syringa reticulata	Japanese tree lilac	BDS	12
Syringa species	lilac	BDS	22
Thuja occidentalis	northern white cedar	CEL	
Tilia americana	American basswood	BDL	
Tilia cordata	littleleaf linden	BDM	31
Tilia species	basswood	BDL	
Tsuga canadensis	eastern hemlock	CEL	
Ulmus americana	American elm	BDL	
Ulmus parvifolia	Chinese elm	BDL	
Ulmus pumila	Siberian elm	BDM	
Ulmus species	elm	BDL	46
Ulmus thomasi	elm, rock	BDL	
Ulmus x	elm, hybrid	BDL	

Table 3. Sample Size Calculator

Description		Value
1)	Margin of Error (15% required)	15%
2)	Confidence level (95% required)	95%
3)	Total number of project sites	734
4)	Mean stored CO_2 per tree (kg)	1003
5)	Standard deviation of stored CO_2 (kg)	729
6)	Expected proportion of tree survival (75% required)	75%
	Calculated sample size	142
		142

Use the Sample Size Calculator that we provide to determine the number of sites to sample. We use the term "site" instead of "tree" because some planted trees may no longer be present in the sites where they were planted.

Directions

1) Margin of error, the default value of 15% is used.

2) Confidence level, the default value of 95% is used.

3) The total number of original sites is automatically filled in from the Planting List tab.

4) Mean stored CO_2 for all tree types 25 years after planting is automatically filled in from Table 4 below.

5) Standard deviation of the average CO_2 stored for all tree types 25 years after planting is automatically filled in from the Table 4.

6) Expected proportion of tree survival – for sampling purposes we conservatively estimate that 75% of the planted trees are expected to survive. This value is used as the default in the Sample Size Calculator.

Table 4. Stored CO_2 (kg) by tree type for years after planting in the Midwest climate zone.

Age	BDL	BDM	BDS	BEL	BEM	BES	CEL	CEM	CES	Avg.	Std. Dev.
5	91	53	65	104	44	13	13	25	47		
10	536	423	150	355	149	60	78	105	166		
15	1,357	1,015	248	843	348	149	299	249	313		
20	2,520	1,704	398	1,641	673	286	876	458	470		
25	**3,979**	**2,451**	**700**	**2,800**	**1,159**	**475**	**2,145**	**724**	**632**	**1,003**	**729**
30	5,678	3,307	1,376	4,341	1,847	720	2,145	1,039	795		
35	7,562	4,397	2,916	6,249	2,779	1,025	2,145	1,390	958		
40	9,573	5,938	6,338	8,468	4,006	1,392	2,145	1,765	1,119		

Example Data Collection Table

Data Collection Dates: Crew: Megan Schneider

Date Planted	Tree ID #	Species	Site ID #	Lat	Long	Image #1	Image #2	Status	Replacement Tracker	Date Removed	Date Replaced	Notes
	580	*planetree, London (Platanus x acerifolia)*	5830	41.54093816	-93.63706331			Alive				
	67	*Kentucky coffeetree (Gymnocladus dioicus)*	8827	41.58857569	-93.66550732			Alive				
	339	*Kentucky coffeetree (Gymnocladus dioicus)*	10881	41.58459143	-93.67055492			Alive				
	361	*oak, white (Quercus alba)*	10886	41.5846042	-93.67254298			Alive				
	469	*crabapple, flowering (Malus spp.)*	22411	41.6162879	-93.61476254			Alive				
	477	*serviceberry, spp. (Amelanchier spp.)*	22412	41.61628356	-93.61444446			Alive				
	595	*honeylocust, thornless (Gleditsia triacanthos inermis)*	23737	41.61950051	-93.60824069			Alive				
	132	*planetree, London (Platanus x acerifolia)*	24716	41.59541165	-93.68065242			Alive				
	142	*planetree, London (Platanus x acerifolia)*	25010	41.5984457	-93.66798706			Alive				
	664	*crabapple, flowering (Malus spp.)*	25707	41.622281	-93.68748031			Alive				
	669	*lilac, common (Syringa vulgaris)*	25710	41.62228024	-93.68897094			Alive				
	651	*baldcypress, common (Taxodium distichum)*	25774	41.62217739	-93.68144226			Alive				
	243	*hawthorn, green (Crataegus viridis)*	34122	41.60274497	-93.63897089			Alive				
	248	*hophornbeam, American (Ostrya virginiana)*	34123	41.6032419	-93.63897481			Alive				
	259	*elm, American (Ulmus americana)*	37756	41.60438717	-93.65101681			Vacant				vacant - Photo Jul 14 2023, 3 39 16 PM
	53	*honeylocust (Gleditsia triacanthos)*	38129	41.60475981	-93.64521378			Alive				
	138	*linden, littleleaf (Tilia cordata)*	38136	41.60571592	-93.6452201			Alive				
	56	*honeylocust (Gleditsia triacanthos)*	38253	41.60520253	-93.64537219			Alive				
	620	*planetree, London (Platanus x acerifolia)*	49598	41.58272929	-93.62203398			Alive				
	150	*planetree, London (Platanus x acerifolia)*	50667	41.58959808	-93.6095892			Alive				
	320	*planetree, London (Platanus x acerifolia)*	52092	41.58457032	-93.66807573			Alive				
	318	*planetree, London (Platanus x acerifolia)*	52093	41.58456832	-93.66820984			Alive	Replaced #1			
	321	*elm, hybrid (Ulmus x)*	52106	41.58441862	-93.66762268			Alive				
	322	*elm, hybrid (Ulmus x)*	52107	41.58441824	-93.66744138			Alive				
	295	*hawthorn, spp. (Crataegus spp.)*	52110	41.58439918	-93.66473503			Alive				
	269	*oak, white (Quercus alba)*	52119	41.58438413	-93.66262548			Alive				
	701	*planetree, London (Platanus x acerifolia)*	132553	41.58340171	-93.63607172			Alive				
	307	*Kentucky coffeetree (Gymnocladus dioicus)*	134055	41.58456811	-93.66594815			Alive				
	342	*elm, American (Ulmus americana)*	134060	41.58459419	-93.6708928			Alive				
	274	*oak, white (Quercus alba)*	134063	41.58437683	-93.66126065			Alive				
	220	*birch, river (Betula nigra)*	134447	41.58874475	-93.61363783			Alive				
	570	*crabapple, flowering (Malus spp.)*	140832	41.51840001	-93.62573773			Alive				
	578	*crabapple, flowering (Malus spp.)*	140834	41.51775936	-93.625727			Alive				
	573	*crabapple, flowering (Malus spp.)*	140836	41.51734966	-93.62573236			Alive				
	568	*crabapple, flowering (Malus spp.)*	140840	41.51673311	-93.625727			Alive				
	621	*crabapple, flowering (Malus spp.)*	140844	41.51619688	-93.62572834			Alive				
	697	*redbud, eastern (Cercis canadensis)*	140913	41.62204639	-93.69530534			Alive				
	124	*redbud, eastern (Cercis canadensis)*	140915	41.62205241	-93.69469112			Alive				
	694	*tuliptree (Liriodendron tulipifera)*	140931	41.62203969	-93.69567931			Vacant				vacant - Photo Jul 14 2023, 1 54 47 PM
	693	*tuliptree (Liriodendron tulipifera)*	140932	41.6220417	-93.69553447			Vacant				vacant - Photo Jul 14 2023, 1 55 47 PM
	684	*crabapple, flowering (Malus spp.)*	140953	41.62228394	-93.69230286			Alive				
	687	*blackgum (Nyssa sylvatica)*	140957	41.62230099	-93.69331137			Vacant				vacant - Photo Jul 14 2023, 2 39 17 PM
	691	*blackgum (Nyssa sylvatica)*	140963	41.62230199	-93.69476111			Alive				
	149	*tuliptree (Liriodendron tulipifera)*	141059	41.58740092	-93.61334732			Dead Standing				dead standing - Photo Aug 10 2023, 3 18 46 PM
	338	*elm, hybrid (Ulmus x)*	141085	41.58458863	-93.66989643			Alive				
	299	*redbud, eastern (Cercis canadensis)*	141125	41.58440601	-93.66584218			Alive				
	352	*Kentucky coffeetree (Gymnocladus dioicus)*	141135	41.5845906	-93.67140218			Alive				
	267	*planetree, London (Platanus x acerifolia)*	141153	41.58437419	-93.66078099			Alive				
	301	*redbud, eastern (Cercis canadensis)*	141155	41.58441311	-93.66608505			Alive				
	312	*elm, hybrid (Ulmus x)*	141156	41.58441802	-93.66692794			Alive				
	351	*elm, American (Ulmus americana)*	141164	41.58443104	-93.67019101			Alive				
	369	*oak, northern red (Quercus rubra)*	141302	41.56984977	-93.59526619			Alive	Replaced #1			Sycamore
	374	*planetree, London (Platanus x acerifolia)*	141307	41.56980964	-93.59415039			Alive				
	402	*crabapple, flowering (Malus spp.)*	141459	41.57049191	-93.58810201			Vacant				vacant - Photo Aug 10 2023, 2 11 36 PM
	409	*crabapple, flowering (Malus spp.)*	141468	41.57026793	-93.5888451			Alive	Replaced #1			Elm
	411	*crabapple, flowering (Malus spp.)*	141470	41.57024385	-93.58903286			Alive	Replaced #1			Elm
	441	*lilac, common (Syringa vulgaris)*	141503	41.57004643	-93.5919778			Alive				
	392	*crabapple, flowering (Malus spp.)*	141519	41.57006047	-93.59299168			Vacant				vacant - Photo Aug 10 2023, 2 06 21 PM
	379	*crabapple, flowering (Malus spp.)*	141522	41.57008054	-93.59323039			Alive	Replaced #1			Redbud
	381	*lilac, common (Syringa vulgaris)*	141524	41.57004041	-93.59338864			Alive	Replaced #1			Redbud
	382	*lilac, common (Syringa vulgaris)*	141525	41.57004241	-93.59342888			Alive	Replaced #1			Redbud
	376	*lilac, common (Syringa vulgaris)*	141531	41.57004843	-93.5962291			Vacant				vacant - Photo Aug 10 2023, 1 50 23 PM
	378	*lilac, common (Syringa vulgaris)*	141533	41.57005445	-93.5959582			Vacant				vacant - Photo Aug 10 2023, 1 50 26 PM
	665	*crabapple, flowering (Malus spp.)*	141539	41.62228228	-93.68739604			Alive				
	653	*hackberry, common (Celtis occidentalis)*	141545	41.62206975	-93.68567541			Alive				
	635	*planetree, London (Platanus x acerifolia)*	141575	41.60267886	-93.63785833			Alive				
	636	*planetree, London (Platanus x acerifolia)*	141576	41.60278717	-93.63785296			Alive				
	637	*planetree, London (Platanus x acerifolia)*	141577	41.60284934	-93.63781273			Alive				
	641	*planetree, London (Platanus x acerifolia)*	141581	41.60301982	-93.63738089			Alive				
	236	*hophornbeam, American (Ostrya virginiana)*	141597	41.60400464	-93.637515			Alive				
	237	*blackgum (Nyssa sylvatica)*	141598	41.6037078	-93.63785564			Alive				
	238	*blackgum (Nyssa sylvatica)*	141599	41.60394246	-93.6377725			Alive				
	239	*blackgum (Nyssa sylvatica)*	141600	41.60394246	-93.63754451			Alive				
	240	*blackgum (Nyssa sylvatica)*	141601	41.60395048	-93.63747477			Alive				
	474	*oak, bur (Quercus macrocarpa)*	141602	41.616392	-93.61418259			Alive	Replaced #1			Crabapple
	475	*oak, bur (Quercus macrocarpa)*	141603	41.61639638	-93.61434155			Alive				
	473	*oak, northern red (Quercus rubra)*	141605	41.61639638	-93.61452931			Vacant				vacant - Photo Aug 10 2023, 12 17 27 PM
	470	*oak, northern red (Quercus rubra)*	141609	41.61641243	-93.61475461			Alive				
	468	*linden, American (Tilia americana)*	141611	41.61641042	-93.61499333			Alive	Replaced #1			Honeylocust
	478	*crabapple, flowering (Malus spp.)*	141612	41.61629	-93.61450873			Alive				
	461	*honeylocust, thornless (Gleditsia triacanthos inermis)*	141629	41.61644841	-93.61585981			Alive				
	446	*oak, northern red (Quercus rubra)*	141632	41.61640641	-93.61605816			Dead Standing				dead standing - Photo Aug 10 2023, 12 21 41 PM
	447	*crabapple, flowering (Malus spp.)*	141633	41.61644652	-93.61591601			Vacant				vacant - Photo Aug 10 2023, 12 20 21 PM
	711	*lilac, Japanese tree (Syringa reticulata)*	141639	41.61535123	-93.61524194			Alive				
	731	*serviceberry, shadblow (Amelanchier canadensis)*	141649	41.61537028	-93.61378148			Alive				
	730	*oak, northern red (Quercus rubra)*	141664	41.61546453	-93.61376538			Alive				
	714	*oak, bur (Quercus macrocarpa)*	141672	41.61546252	-93.61513331			Alive				
	708	*maple, sugar (Acer saccharum)*	141673	41.61545851	-93.61566975			Alive	Replaced #1			Honeylocust
	585	*oak, bur (Quercus macrocarpa)*	141679	41.61950502	-93.61167192			Alive				
	593	*maple, sugar (Acer saccharum)*	141686	41.61950702	-93.60855251			Alive				
	40	*blackgum (Nyssa sylvatica)*	141725	41.58266571	-93.63646827			Alive				
	47	*blackgum (Nyssa sylvatica)*	141732	41.58273493	-93.63638781			Dead Standing				dead standing - Photo Aug 10 2023, 2 53 44 PM
	51	*elm, American (Ulmus americana)*	141736	41.58274697	-93.63626845			Alive				
	63	*linden, littleleaf (Tilia cordata)*	141740	41.60554239	-93.64536784			Alive				
	12	*crabapple, flowering (Malus spp.)*	141745	41.60774147	-93.6274936			Alive				
	26	*crabapple, flowering (Malus spp.)*	141752	41.6070977	-93.62825669			Alive				
	24	*crabapple, flowering (Malus spp.)*	141753	41.60703552	-93.62825669			Alive				
	19	*crabapple, flowering (Malus spp.)*	141758	41.60634662	-93.62825401			Alive				
	260	*oak, northern red (Quercus rubra)*	141906	41.60406702	-93.67344977			Alive				
	601	*persian ironwood (Parrotia persica)*	141907	41.61679003	-93.60854731			Alive				
	335	*Kentucky coffeetree (Gymnocladus dioicus)*	142133	41.58458659	-93.66942818			Alive				
	328	*planetree, London (Platanus x acerifolia)*	142138	41.58458278	-93.66863022			Alive				
	7	*birch, river (Betula nigra)*	142144	41.59030664	-93.62285157			Alive	Replaced #1			Elm
	10	*birch, river (Betula nigra)*	142147	41.58988038	-93.6228473			Alive	Replaced #1			Honeylocust
	556	*Kentucky coffeetree (Gymnocladus dioicus)*	142180	41.59657432	-93.67900207			Alive				
	553	*hornbeam, American (Carpinus caroliniana)*	142184	41.59657934	-93.67806866			Alive				
	550	*blackgum (Nyssa sylvatica)*	142187	41.59657232	-93.6759068			Alive				
	548	*hophornbeam, American (Ostrya virginiana)*	142189	41.59657281	-93.67467766			Alive				
	224	*zz Vacant (zz Vacant)*	142294	41.61582436	-93.56804842			Alive				
	109	*sycamore, American (Platanus occidentalis)*	142322	41.59439492	-93.67575123			Alive				
	110	*oak, swamp white (Quercus bicolor)*	142323	41.59434277	-93.67568954			Alive				
	97	*crabapple, flowering (Malus spp.)*	142324	41.59423445	-93.67567613			Alive				
	98	*crabapple, flowering (Malus spp.)*	142325	41.59424849	-93.6755608			Alive				
	99	*hackberry, common (Celtis occidentalis)*	142326	41.59414619	-93.67575123			Alive				
	104	*elm, American (Ulmus americana)*	142331	41.59416223	-93.67553934			Alive				
	89	*crabapple, flowering (Malus spp.)*	142334	41.59419232	-93.6749117			Alive				
	90	*crabapple, flowering (Malus spp.)*	142335	41.59419834	-93.67475882			Alive				
	91	*crabapple, flowering (Malus spp.)*	142336	41.59430466	-93.67465958			Alive				
	93	*crabapple, flowering (Malus spp.)*	142338	41.59429061	-93.67486342			Alive				
	539	*elm, American (Ulmus americana)*	142345	41.59656329	-93.67133833			Alive				
	540	*linden, American (Tilia americana)*	142346	41.59655025	-93.67165081			Alive				
	255	*honeylocust, thornless (Gleditsia triacanthos inermis)*	142358	41.60472661	-93.65101993			Vacant				vacant - Photo Jul 14 2023, 3 39 16 PM (1)
	197	*planetree, London (Platanus x acerifolia)*	142365	41.58708291	-93.61127629			Alive				
	626	*crabapple, flowering (Malus spp.)*	142373	41.51571076	-93.62572535			Alive				
	184	*crabapple, flowering (Malus spp.)*	142377	41.51561034	-93.62555369			Alive				
	133	*Kentucky coffeetree (Gymnocladus dioicus)*	142393	41.59453869	-93.56771359			Alive				
	528	*oak, northern red (Quercus rubra)*	142397	41.62233442	-93.57385143			Alive				
	523	*oak, northern red (Quercus rubra)*	142402	41.62233642	-93.57457429			Alive				
	179	*Kentucky coffeetree (Gymnocladus dioicus)*	142413	41.62233341	-93.57047587			Alive				
	180	*tuliptree (Liriodendron tulipifera)*	142414	41.62233241	-93.57039943			Alive				
	159	*planetree, London (Platanus x acerifolia)*	142417	41.62055591	-93.57346385			Alive				both adjacent photos are of alive trees
	161	*redbud, eastern (Cercis canadensis)*	142423	41.62109929	-93.57358589			Alive				
	165	*serviceberry, spp. (Amelanchier spp.)*	142427	41.62028321	-93.57357785			Alive				
	166	*serviceberry, spp. (Amelanchier spp.)*	142428	41.62009673	-93.57357651			Alive				
	488	*honeylocust, thornless (Gleditsia triacanthos inermis)*	142441	41.62234845	-93.57839778			Alive	Replaced #1			Honeylocust
	491	*elm, American (Ulmus americana)*	142444	41.62234745	-93.57720285			Alive				
	493	*elm, American (Ulmus americana)*	142445	41.62234945	-93.57744157			Alive				
	494	*elm, American (Ulmus americana)*	142446	41.62235146	-93.5777688			Alive				
	504	*oak, swamp white (Quercus bicolor)*	142453	41.62238956	-93.57909247			Alive				
	517	*oak, northern red (Quercus rubra)*	142466	41.62238454	-93.57750862			Alive				
	355	*sycamore, American (Platanus occidentalis)*	142471	41.58459413	-93.6716783			Alive	Replaced #1			

		195	*crabapple, flowering (Malus spp.)*	142532	41.51611433	-93.62555772			Alive				

Geocoded Photos


UNITED METHODIST CHURCH
SIMPSON


MAXIM
MATERIALS


MATERIALS
641-204-
•Driveway Rock


Mason Av
SPEED LIMIT
35
910

This concludes the sample of tree photos taken. Additional project photos are available upon request.

Attestation of No Double Counting and No Net Harm

CITY FOREST
CREDITS

Growing Futures. Growing Trees – Des Moines, IA
Attestation of No Double Counting of Credits & No Net Harm

I am the Interim CEO of Trees Forever and make this attestation regarding no double counting of credits and no net harm from this tree planting project, Growing Futures. Growing Trees – Des Moines, IA

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

Trees Forever 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

Trees Forever 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. Trees Forever has checked the location of the Project Area against the Registry-provided geospatial database, which contains geospatial data on the project areas of all registered urban forest carbon afforestation and reforestation projects to date. Project Operator has determined that there is no overlap of Project Area or Project Trees with any registered urban forest carbon afforestation and reforestation project.

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 August 28th in 2023, by Debra Powers, Interim CEO, for Trees Forever.

Debra M. Powers
Signature

563-275-9643
Phone

dpowers@treesforever.org
Email

Attestation of Additionality

CITY FOREST
CREDITS

Growing Futures. Growing Trees—Des Moines, IA
Attestation of Additionality

I am the Interim CEO of Trees Forever and make this attestation regarding additionality from this tree planting project, Growing Futures. Growing Trees—Des Moines, IA.

- 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 1.8)
  - 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 (Protocol Section 1.9)
- 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
  - Trees Forever has signed a Project Implementation Agreement with City Forest Credits for 26-years.
- The 26-year Project Duration commitment is additional to and longer than any commitment Trees Forever makes to non-carbon project tree plantings.

Signed on August 28th in 2023, by Debra Powers, Interim CEO, for Trees Forever.

Debra M. Powers
Signature

Debra M. Powers
Printed Name

563-275-9643
Phone

dpowers@treesforever.org
Email