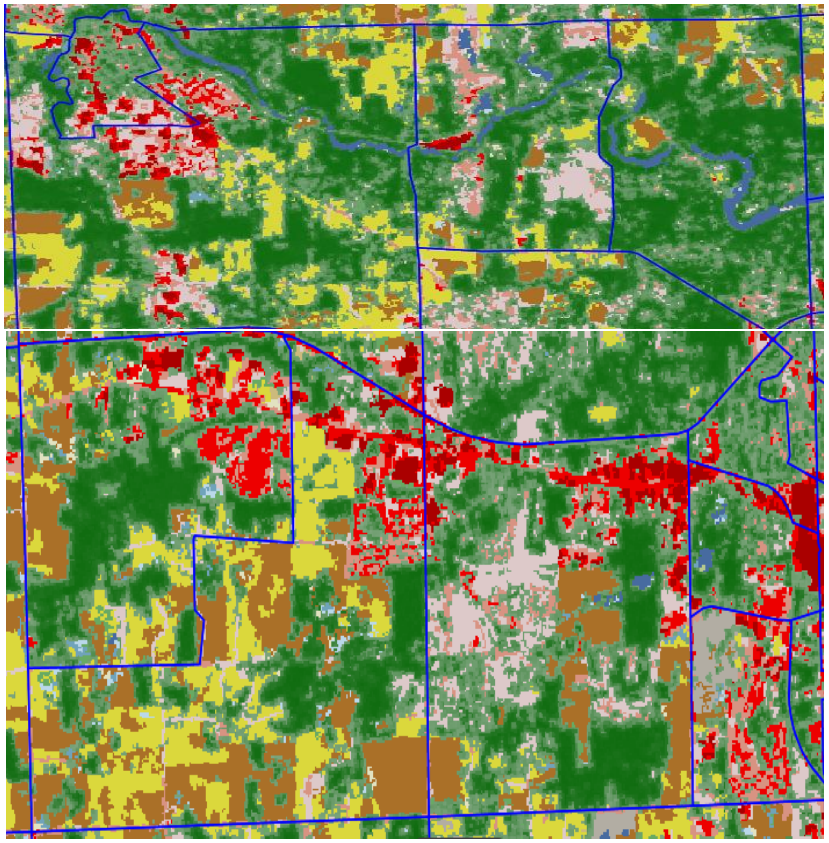
TREE FUND POLICY RATIONALE (as of October 8, 2024)

The Tree Policy Committee is charged with planning how best to spend the Tree Fund to plant native trees. To support the planning process, this document provides additional information on the rationale for the policy and guidelines for implementing it:

- An analysis of Scio's existing tree canopy, using both SEMCOG data and the I-Tree software, along with a map of Scio's existing parks and preserves,
- Details on benefits (ecosystem services) provided by trees;
- A matrix showing how tree benefits vary in different settings (reforestation vs. landscaping/streetscaping), to assist decisions about tree-planting priorities; this shows how reforestation was selected as the highest priority since it has the most and highest benefits overall;
- Tools and analysis supporting the selection of West Scio Preserve as an initial site for reforestation;
- A draft of guidelines for implementing reforestation at West Scio Preserve, to be used in developing an RFP for tree planting contractors;
- General guidelines for developing a list of preferred tree species for reforestation projects, with a draft tree species list; and
- General guidelines for developing a list of preferred tree species for planting in other Scio areas, with a draft tree species list.

TREE POLICY RATIONALE

Scio Township has the benefit of a substantial tree canopy due in part to its active land preservation practices and robust landscape ordinance. Scio Township's Land area totals 21,587 acres. Below are maps from i-Tree Landscape that illustrate Scio Townships Land Use and Tree Canopy:



Other	Meters squared of other
Tree	Meters squared of tree
Grass/Shrub	Meters squared of grass/shrub
Bare Earth	Meters squared of bare earth
Water	Meters squared of water
Building	Meters squared of building
Road	Meters squared of road
Other Paved	Meters squared of other paved
Agriculture	Meters squared of agriculture
Wetland	Meters squared of wetland

Map of Scio Township Park and Preserves

Scio Township Parks and Preserves are outlined in black.

Old-fields, outlined in yellow, have good potential for reforestation.

Existing trail systems are shown as dashed white lines.

TREE POLICY IMPLEMENTATION GUIDELINES

TREE BENEFITS & PRIORITIES MATRIX

Benefits (ecosystem services) provided by trees
The type and amount of ecosystem services that are provided by trees will depend on the individual species and the setting in which it is planted. Some key benefits are described below.

- **Carbon storage (sequestration).** Trees take up carbon as they grow—the bigger the tree, the more carbon stored. The carbon remains stored (sequestered) for the lifetime of the tree, or when harvested wood is used as timber. Wood chipped and used as mulch emits carbon during decomposition, while burning wood results in a rapid carbon release. Rather than burned or chipped for use as mulch. By storing carbon, trees can help compensate for human-generated carbon dioxide emissions and mitigate the associated increase in global average temperature.

- **Stormwater issues (flood reduction), water quality, and aquifer recharge.** Healthy mature trees take up large amounts of water (up to 11,000 gallons per year for a 100-foot-tall tree, according to the U.S. Forest Service), offering the potential to slow or reduce flooding during heavy rainfall events. Tree roots hold soil in place, controlling erosion, and fine roots filter sediment and absorb various toxic chemicals, resulting in improved water quality downstream. By slowing runoff, trees allow water to soak into the soil slowly, recharging groundwater aquifers.

- **Soil quality and erosion control.** Trees reduce erosion and control dust by serving as windbreaks to slow the airborne transport of soil; this can be important in agricultural settings and along dirt roads. Tree roots can hold soil in place during rainfall, while also absorbing water, to slow or prevent waterborne transport of soil (erosion). Trees in a woodland setting contribute to soil quality over the longer term by adding organic matter to the soil, through fallen leaves and branches, which decompose and release nutrients into the soil, while also forming a humus layer that benefits root growth of many plants other than trees.

- **Biodiversity and wildlife habitat.** Trees in natural woodlands and forests serve as important habitat for diverse plant species (trees as well as flowering shrubs and wildflowers important for pollinators, grasses and grass-like plants, ferns, and mosses) and numerous wildlife species. Even fish and aquatic species benefit from forests, with habitat recommendations for many species noting the importance of woody debris, overhanging branches, and fallen logs; streamside forests also offer shade and keep water temperatures cooler during the summer. Trees in parks and residential settings can also offer important wildlife benefits (depending on the species), although isolated individual trees provide fewer habitat benefits than groups of trees.

- **Weather amelioration (air temperature reduction; wind reduction; ultraviolet radiation reduction) and building energy conservation**. By offering windbreaks during the winter, trees can help reduce wind-blown snow, and can offer localized reductions in wind chill near homes, reducing energy use (documented by the U.S. Department of Energy). By offering shade during the summer, trees moderate localized weather, helping to combat the urban "heat island" effect, in which large expanses of pavement buildings absorb and retain heat, and increase urban temperatures by 2 to 6 degrees over surrounding vegetated areas.

- **Noise and visual buffering.** Trees can serve as sound breaks to muffle traffic noise on busy roadways. Trees can also serve to screen buildings and utilities from view, offering a more pleasant viewscape for the public.

- **Mental and physical health.** A growing body of research in ecopsychology and ecophysiology demonstrates that nature has powerful benefits to mental and physical health. Researchers at the University of Michigan have shown that a "Room with a View"—even a view of a

single tree—can speed recovery times for hospital patients. Researchers at the Harvard School of Public Health have found that spending time among trees can reduce the occurrence and severity of chronic health problems including cardiovascular disease and cancer, as well as contributing to reductions in depression and anxiety. Roadside trees may also calm drivers, potentially contributing to reduced accidents in some settings.

- **Aesthetic and spiritual benefits.** For many Scio citizens, trees offer aesthetic benefits, beautifying planted landscapes, while natural woodlands offer respite from the built environment. Trees may offer solace and spiritual renewal for many people. The COVID-19 pandemic reaffirmed the value of public parks and woodland for providing refuge and respite.

Tree benefits and priorities matrix, with supporting research

This matrix offers a qualitative comparison of how tree planting in different settings can provide different benefits, and different amounts of benefit, to assist decisions about tree-planting priorities.

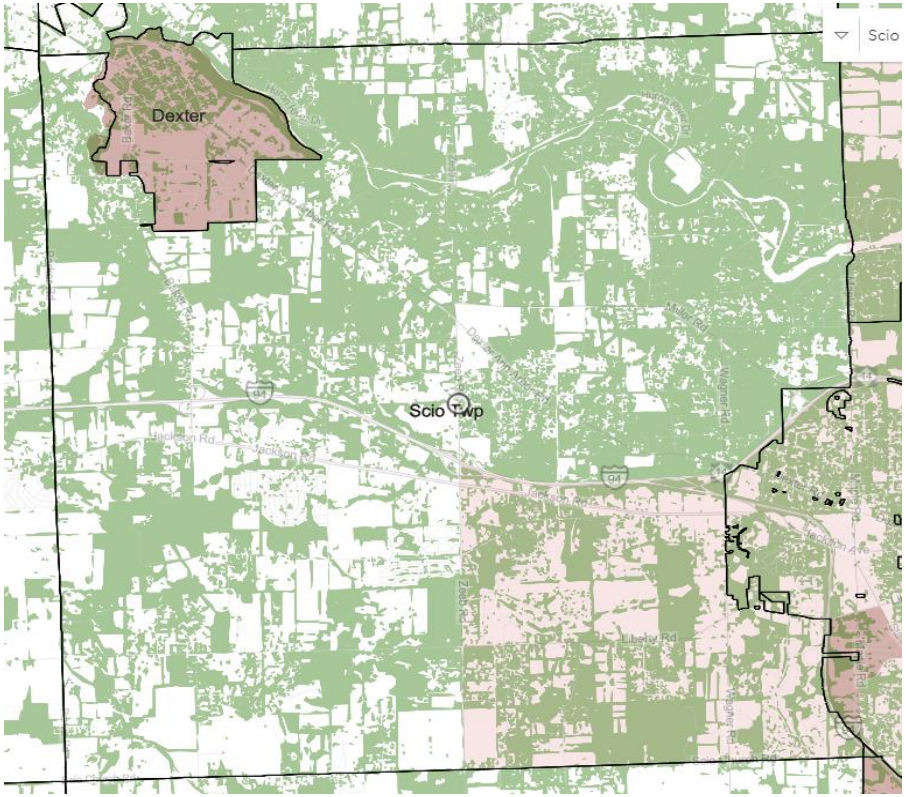
(https://docs.google.com/spreadsheets/d/1TNRVcpjlTStR3mIM3eujM1hOObyIFFYk/edit#gid=78144234) [Revise link as needed])

TREE PLANTING SITE TYPE BENEFITS	Preserve Reforestation	Parks & Recreational Pathways	Residential Neighborhoods	Landscaping & Street Trees	Notes	Supporting Research
Carbon storage (sequestration)	HIGH	LOW-MED	MEDIUM	LOW	Large trees in healthy forest will have the fastest growth rate and largest total carbon uptake. Landscape trees are typically selected for smaller forms and are likely to grow slowly in stressful street environments, so they take up less carbon. Trees planted along recreational pathways may offer additional ADA accessibility benefits.	https://ourtrees.itreetools.org, an application developed by the U.S. Forest Service, National Arbor Day Foundation, and others, offers various online tools to calculate carbon storage and other benefits of tree canopy for a given location. Stephenson, N.L, Das, A.J.; Condit, R.; Russo, S.E.; Baker, P.J.; Beckman, N.G.; Coomes, D.A.; Lines, E.R.; Morris, W.K.; Ruger, N.; Alvarez, E.; Blundo, C.; Bunyavejchewin, S.; Chuyong, G.; Davies, S.J.; Duque, A.; Ewango, C.N.; Flores, O.; Franklin, J.F.; Grau, H.R.; Hao, Z.; Harmon, M.E.; Hubbell, S.P.; Kenfack, D.; Lin, Y.; Makana, J.R.; Malizia,A.; Malizia, L.R.; Pabst, R.J.; Pongpattananurak, N.; Su, S.H.; Sun, I.F.; Tan, S.; Thomas, D.; van Mantgem, P.J.; Wang, X.; Wiser, S.K.; and Zavala, M.A. 2014. Rate of tree carbon accumulation increases continuously with tree size. Nature Research Letter. 507: 90–93. https://www.nature.com/articles/nature12914. DOI: http://dx.doi.org/10.1038/nature12914. Although urban trees might sometimes have faster growth rates than forest trees, climate change is reducing this advantage, and urban trees are more likely to die at a younger age (Pretzsch, H., Biber, P., Uhl, E. et al. Climate change accelerates growth of urban trees in metropolises worldwide. Sci Rep 7, 15403 (2017). . https://doi.org/10.1038/s41598-017-14831-w) And urban trees are typically selected for smaller size to take up less space, (McPherson, E. Gregory; van Doorn, Natalie S.; Peper, Paula J. 2016. Urban tree database and allometric equations. Gen. Tech. Rep. PSW-GTR-253. Albany, CA: U.S. Department of Agriculture, Forest Service, Pacific Southwest Research Station. 86 p; https://www.fs.usda.gov/rds/archive/Catalog/RDS-2016-0005) which reduces total carbon sequestration.
Stormwater impacts; water quality	HIGH	MED-HIGH	MED-HIGH	MED-LOW	Although even small trees typically used for landscaping and street trees can help water quality, larger trees with bigger canopies have bigger benefits (although even shrubs and small trees can be helpful). Similarly, although individual or widely spaced typically used in landscaping and along streets, denser and more abundant groupings of trees provide greater water quality benefits (such as reducing and slowing runoff after rains). While trees in urban areas can have large benefits in reducing localized flooding, trees in natural settings may also benefit water supply and groundwater recharge for a larger area.	https://www.fs.usda.gov/ecosystemservices/FS_Efforts/forests2faucets.shtml; https://extension.psu.edu/the-role-of-trees-and-forests-in-healthy-watersheds; https://www.epa.gov/soakuptherain/soak-rain-trees-help-reduce-runoff, https://wriorg.s3.amazonaws.com/s3fs-public/Protecting_Drinking_Water_at_the_Source.pdf.
Soil quality, erosion control	HIGH	MED-HIGH	MED-HIGH	LOW-MED	Denser and more abundant groupings of trees provide greater benefits than individual or widely spaced trees (typically found in landscaping and street trees) unless intermingled with shrubs and deep-rooted prairie plants. Identify and prioritize areas with runoff and erosion issues for maximum benefits.	https://www.sciencedirect.com/science/article/abs/pii/S1618866713000460
Biodiversity, wildlife habitat	HIGH	MED	MED	LOW-MED	A 2017 review found that most of the 267 bird species found in Washtenaw County depend on forests for at least part of their life cycles (whether during nesting or migrating), as do many of the 46 mammal species, 213 butterfly and moth species, and nearly all of the 43 species of frogs, toads, salamanders, turtles, and snakes found in the county (https://www.michigandnr.com/Publications/pdfs/ForestsLandWater/LandscapeStewardshipPlans/HA_TSN_Final.pdf). Although trees in residential settings and parklands can provide important wildlife habitat, benefits of denser and more diverse groupings of trees in natural settings are greater than individual or widely spaced trees (typically found in landscaping/streetscaping), which are less likely to provide adequate resources throughout the growing season. In the worst case, street plantings can serve as "ecological traps," luring wildlife (including birds and butterflies) into the path of traffic as they try to reach roadside resources. Furthermore, bigger and older trees, as well as dead trees, provide habitat for diverse species of birds and other organisms; these characteristics are more likely to be allowed to develop in natural woodlands rather than in residential or landscape areas.	https://forestry.org/wp-content/uploads/2022/09/WFMarAprMay2017_Urban-Forests-and-Their-Benefits-to-Wildlife.pdf https://www.sciencedirect.com/science/article/abs/pii/S016920462100267X https://www.ecolandscaping.org/02/designing-ecological-landscapes/trees/the-birds-and-the-trees-managing-the-urban-forest-for-wildlife https://royalsocietypublishing.org/doi/10.1098/rspb.2015.2647 https://academic.oup.com/bioscience/advance-article/doi/10.1093/biosci/biad111/7526105?login=false https://www.researchgate.net/publication/308050296_Habitat_trees_Key_elements_for_forest_biodiversity, https://www.isa-arbor.com/quizbank/resources/4575/Arborist_and_Wildlife_2018_02.pdf https://extension.psu.edu/landscaping-for-wildlife-trees-shrubs-and-vines.
Weather amelioration (air temperature reduction; wind reduction; ultraviolet radiation	HIGH	HIGH	HIGH	MED-HIGH	Trees can ameliorate weather on both a whole-township level and for individual buildings. Small landscape plantings can cut winter-time energy use when planted closely enough to offer insulating air pockets around buildings; otherwise, taller and denser tree plantings will offer greater shade and summertime temperature reductions. Shrubs can play an important role but planting them would not be funded with the Tree Fund.	https://www.energy.gov/energysaver/energy-efficient-landscaping https://www.fs.usda.gov/research/news/highlights/urban-trees-save-billions-dollars-through-reduced-energy-costs
Air pollution removal; noise/visual buffering	MED-HIGH	HIGH	MED-HIGH	MED-HIGH	Benefits are highest where tree buffer strips are densely planted and wider (for example, a 100-foot wide buffer strip with dense tree plantings can reduce noise 5-8 decibels), and visual screening is also most effective when plantings dense enough. Benefits will also be greater where the greatest numbers of people are nearby to experience them.	https://www.fs.usda.gov/nac/buffers/guidelines/6_aesthetics/4.html https://www.fs.usda.gov/nac/buffers/guidelines/6_aesthetics/3.html https://www.fs.usda.gov/nac/buffers/guidelines/6_aesthetics/7.html https://depts.washington.edu/hhwb/Thm_SafeStreets.html
Mental/physical health	MED-HIGH	HIGH	HIGH	MED	Even individual trees can have significant benefits, so total benefits will be largest where the greatest numbers of people are near to experience them in the immediate vicinity, although benefits to individuals might be largest in more natural settings. From an environmental justice perspective, tree planting in neighborhoods that lack trees and resources to plant them, or that are distant from or lack access to woodlands in parks and preserves, can be a high benefit. Street trees might offer calming effects to drivers in some settings, potentially reducing accidents.	https://nph.onlinelibrary.wiley.com/doi/full/10.1002/ppp3.39. https://yaleclimateconnections.org/2023/02/the-little-known-physical-and-mental-health-benefits-of-urban-trees/
Aesthetic/spiritual benefits	MED-HIGH	HIGH	HIGH	LOW-MED	Even individual trees can have significant benefits, so total benefits will be largest where the greatest numbers of people are able to spend time nearby to experience them--often in the immediate vicinity--although benefits to individuals might be largest in more natural settings.	https://www.americanforests.org/article/american-forests-launches-nationwide-tree-equity-scores/, https://yaleclimateconnections.org/2023/02/the-little-known-physical-and-mental-health-benefits-of-urban-trees/.
Environmental justice and accessibility considerations					Poorer neighborhoods often have fewer trees, which can make them more vulnerable to urban "heat island" impacts, with summer temperatures reaching several degrees higher than in neighborhoods with more trees. Scio Township, however, has few areas typified by low-density trees. Trees planted along recreational pathways may offer additional ADA accessibility benefits.	The U.S. Forest Service and National Park Service have both embraced the goal of making forests (and other natural areas) more accessible to diverse populations (https://www.fs.usda.gov/managing-land/national-forests-grasslands/accessibility; https://www.nps.gov/aboutus/upload/All_In_Accessibility_in_the_NPS_2015-2020_FINAL.pdf) https://link.springer.com/article/10.1007/s00267-023-01934-6, https://yaleclimateconnections.org/2023/02/the-little-known-physical-and-mental-health-benefits-of-urban-trees/, https://www.americanforests.org/article/american-forests-launches-nationwide-tree-equity-scores/

TOOLS

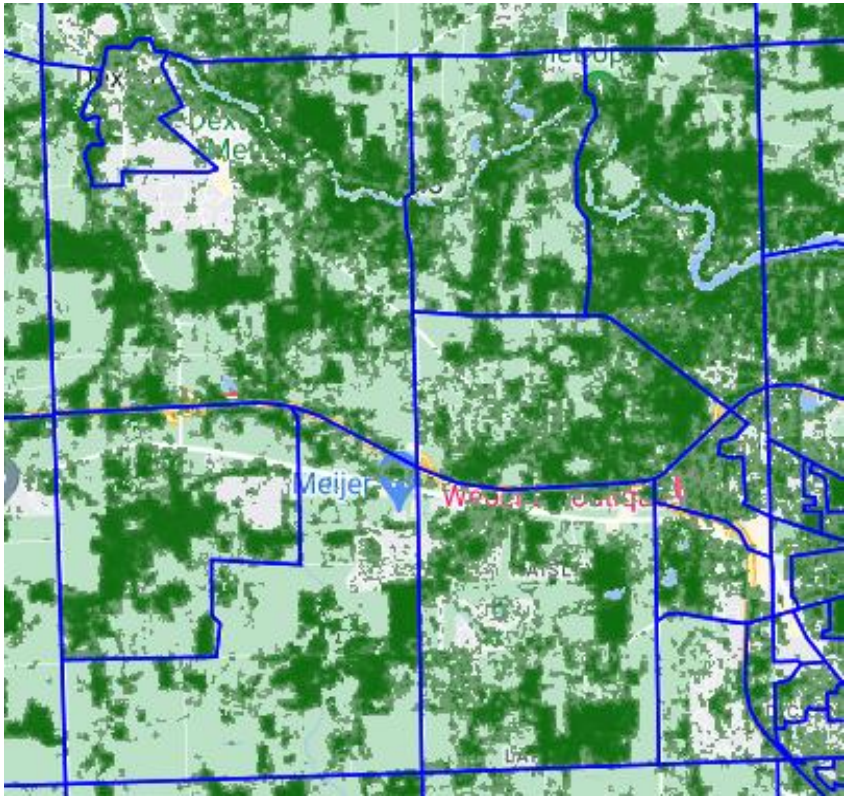
There are two public sources for tree canopy calculations:

SEMCOG Green Dashboard calculates Scio Township's Tree Canopy at 51.7%; 11,160 acres.



Tree Canopy Cover SEMCOG Green Dashboard (shaded area=least average cover)

i-Tree software "Our Trees" calculates Scio Township's Tree Canopy at 30.88%: 6,666 acres.



Tree Canopy Cover by census tract i-Tree

Tools to aid in the prioritization of reforestation and tree planting can be found in the i-Tree free software suite:

Core tools for assessing individual trees

1. MyTree - **Are you new to i-Tree?** Start with our EASIEST tool! MyTree helps you quickly understand the benefits of **individual trees** with a minimum of fuss. (*through your web browser*)
2. i-Tree Design - A full-featured web tool with expanded building interactions and forecasting for estimating the benefits of **individual trees**. (*through your web browser*)
3. i-Tree Eco - This is our flagship tool that can be used to evaluate an **existing tree inventory** OR **new field data collection** to derive **individual tree** benefit estimates. (*requires installation on a Windows computer*)

Core tree canopy area assessment tools

1. OurTrees - A great way to get fast facts about the **trees in your community as well as US Census information**. If you are **new to i-Tree** and looking to spread the word about the benefits of tree cover, start here!
2. i-Tree Landscape - US **tree canopy and Census information** at your fingertips! Identify **priority planting & protection** areas for **climate and social justice**. Many community forest-related map layers and data tables all in one place. (*through your web browser*)
3. i-Tree Canopy - From the chair in your office, easily **estimate land cover and tree canopy** plus benefits using random point sampling on aerial imagery. Use historical imagery in Google Earth to compare two i-Tree Canopy projects, past and present to monitor tree canopy change in your community. (*through your web browser*)

Core tools for tree planting

Specific tools to help with your **tree planting** projects:

- i-Tree Planting - mass planting benefits estimation forecasting (*through your web browser*)
- i-Tree Species - right tree, right place! (*through your web browser*)
- MyTreeMap - This was a demonstration for a collective mapping site for MyTree, ideally to help you track your community planting efforts. If funding can be secured, we will improve it and bring it back.

Calculating Tree Benefits: i-Tree is a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools. i-Tree is a valuable tool in evaluating priorities for tree fund projects, including environmental justice and equitable access. SEMCOG's GREEN Dashboard provides green metric descriptions and data for the South East Michigan region including Tree Canopy and Recreation Access. These tools, coupled with documenting current land use (i.e., productive farms, industrial sites, golf courses, preserves, wetlands, etc.) can be used to identify potential reforestation project sites.

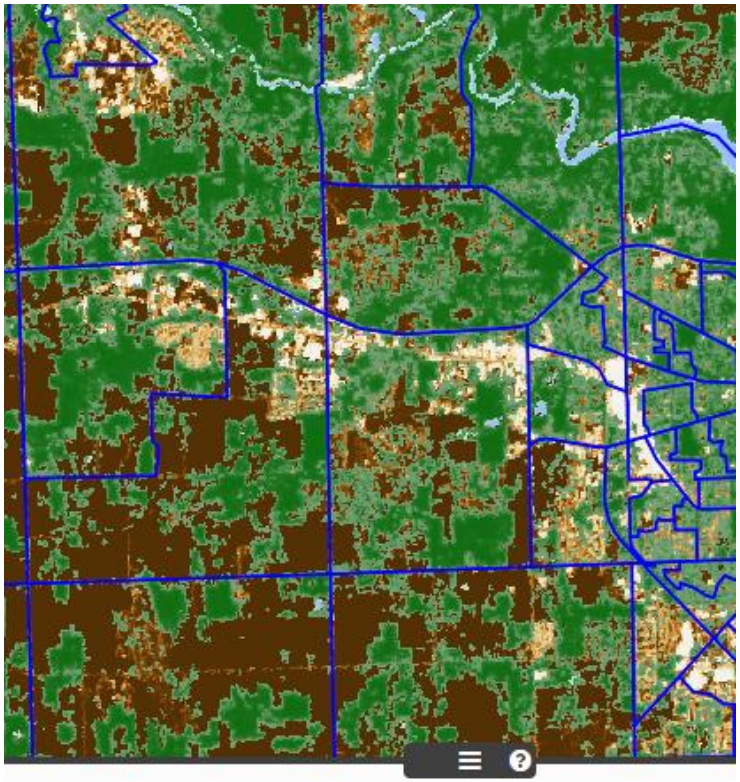
Based on the two Tree Canopy Cover Calculations, the following benefits are documented from I-Tree "Our Trees" Tool:

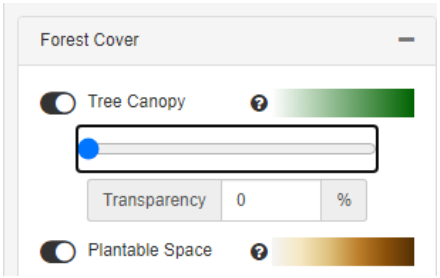
Tree Canopy Benefits		
21,587	**i-TREE**	**SEMCOG**
Canopy Cover	30.88%	51.70%
Acres	6,666	11,160
	Annual values:	
Carbon Dioxide Uptake	**$784,532**	**$ 1,313,481**
Carbon Sequestered (tn)	4,600	7,701
CO2 Equivalent[1] (tn)	16,867	28,239
Storm Water Mitigation	**$434,560**	**$ 727,550**
Runoff Avoided MG/yr	49	82
Rainfall Intercepted MG/yr	510	854
Air Pollution Removal	**$357,604**	**$ 598,709**
Carbon Monoxide lb/yr	5,417	9,069
Ozone lb/yr	304,906	510,481
Nitrogen Dioxide lb/yr	37,611	62,810
Sulfur Dioxide lb/yr	20,122	33,604
PM2.5 lb/yr	11,382	19,008
TOTALS TO DATE	**$47,876,196**	**$79,953,247**
Carbon Storage (tn)	280,715	468,794
CO2 Equivalent[1] (tn)	1,029,289	1,718,913

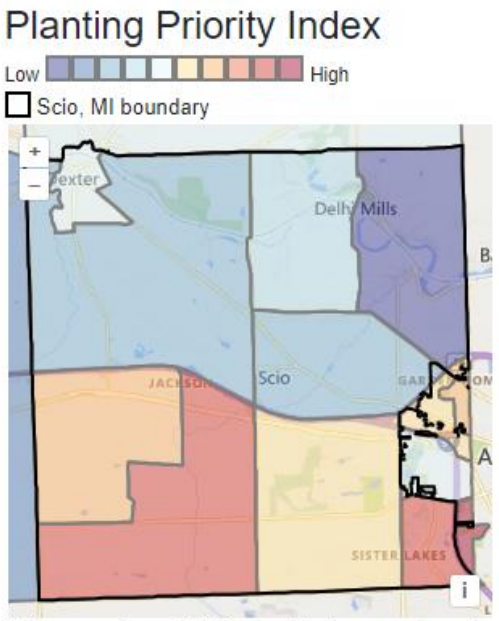
[1] CO_2 equivalent is estimated by calculating how much atmospheric CO_2 is taken in by trees to provide the carbon stored in the tissues of individual trees.

Abbreviations:

- CO_2 = Carbon dioxide
- $PM_{2.5}$ = Particulate matter 2.5 microns or less
- tn =Short ton (US)
- t = Tonne / metric ton
- MG/yr = Millions of gallons per year
- m^3/yr = Cubic meters per year
- lb/yr = Pounds per year
- kg/yr = Kilograms per year



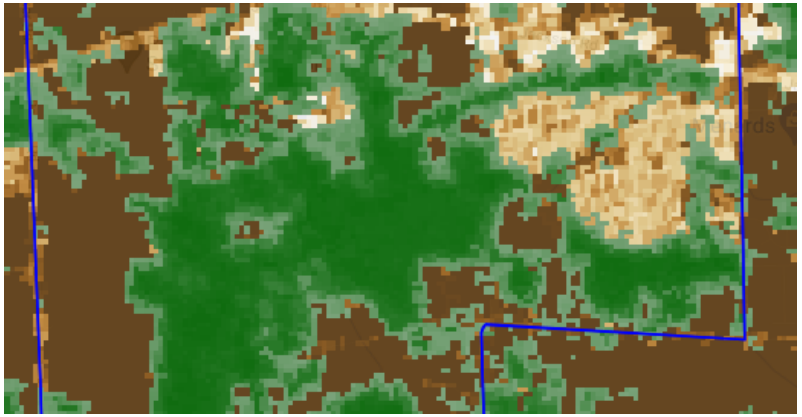




This maps shows US Census block groups in and around Scio, MI ranked by an index weighted toward areas with a relatively high proportion of population below the poverty line, low tree cover per capita, and high available planting space. For

FIRST REFORESTATION PROJECT RECOMMENDATION

Based on this analysis, along with the detailed plant and animal inventory work that has been done on Scio Township preserves (https://www.sciotownship.org/community/parks-preserves-and-pathways), the SE corner of West Scio preserve is the first recommended location for reforestation.



TREE LISTS FOR REFORESTATION & LANDSCAPING/STREET TREES

General principles for selecting preferred tree species for reforestation of Scio Parks and Preserves

Tree species shall be selected based on the species characteristic of the natural area to be reforested, as reflected in the Michigan Natural Features Inventory map of estimated vegetation in 1800 (https://mnfi.anr.msu.edu/data/veg1800/washtenaw.pdf) and as presently classified using the Michigan Natural Features Inventory natural community classification (https://mnfi.anr.msu.edu/communities/classification).

Any site to be reforested shall first have a basic botanical inventory done to identify existing tree species and to assess the natural community classification(s) of the site. Species to be planted can then be selected as appropriate for the natural community (communities) on the site.

Additional native tree species can be added to offer greater diversity (reflecting the patchy nature of the habitat) and to increase resilience in the face of climate change and emerging diseases (such as oak wilt and beech leaf disease), to offer additional canopy structure and resources for wildlife (including birds and native bees), and to allow species that might succeed in wetter or shadier microsites.

Preferred tree species for West Scio Preserve

West Scio Preserve is characterized by a mix of natural communities, including dry-mesic southern forest, southern hardwood swamp, and vernal pools (https://www.sciotownship.org/home/showpublisheddocument/2564/638266706188970000; https://mnfi.anr.msu.edu/communities/description/10685/dry-mesic-southern-forest, https://mnfi.anr.msu.edu/communities/description/10655/Southern-Hardwood-Swamp,https://mnfi.anr.msu.edu/abstracts/ecology/Vernal_Pool.pdf). The old-field agricultural areas where planting is proposed were primarily dry-mesic southern forest, although some low-lying areas might have been vernal pools or patches of southern hardwood swamp. Therefore, the proposed species list is primarily composed of species typical of dry-mesic southern forest, as identified by the Michigan Natural Features Inventory (https://mnfi.anr.msu.edu/communities/description/10685/dry-mesic-southern-forest):

- red maple (*Acer rubrum*)
- juneberry (*Amelanchier arborea*)
- bitternut hickory (*Carya cordiformis*)
- pignut hickory (*Carya glabra*)
- shagbark hickory (*Carya ovata*)
- alternate-leaved dogwood (*Cornus alternifolia*)
- flowering dogwood (*Cornus florida*)
- white ash (*Fraxinus americana*)
- ironwood (*Ostrya virginiana*)
- black cherry (*Prunus serotina*)
- white oak (*Quercus alba*)
- northern pin oak (*Quercus ellipsoidalis*)
- red oak (*Quercus rubra*)
- black oak (*Quercus velutina*)
- sassafras (*Sassafras albidum*)
- basswood (*Tilia americana*)

The following additional species could also be included to offer further diversity (reflecting the patchy nature of the habitat) and resilience in the face of climate change and emerging diseases (such as oak wilt and beech leaf disease), to offer additional canopy structure and resources for wildlife (including birds and native bees), and to allow species that might succeed in wetter or shadier microsites.

- pawpaw (*Asimina triloba)*
- silver maple (*Acer saccharinum)*
- black maple (*Acer nigrum)*
- yellow birch (*Betula allegheniensis)*
- gray birch (*Betula populifolia)*
- musclewood (*Carpinus caroliniana*)
- hackberry (*Celtis occidentalis)*

- redbud (*Cercis canadensis*, native genotypes only)
- hawthorn (native genotypes only, *Crataegus* species)
- American beech (*Fagus grandifolia*)
- blue ash *(Fraxinus quadrangulata)*
- crab apple (native genotypes only, *Malus coronaria)*
- black gum (*Nyssa sylvatica)*
- cottonwood (*Populus deltoides*)
- trembling aspen (*Populus tremuloides*)
- American wild plum (*Prunus americana)*
- Canada wild plum *(Prunus nigra)*
- pin cherry (*Prunus pensylvanica)*
- swamp white oak (*Quercus bicolor)*
- bur oak (*Quercus macrocarpa)*
- pin oak (*Quercus palustris)*
- shingle oak (*Quercus imbricaria)*
- willow, black (*Salix nigra)*
- willow, peach-leaved (*Salix amygdaloides)*
- arbor-vitae (*Thuja occidentalis,* native genotypes only)
- hemlock (*Tsuga canadensis,* native genotypes only*)*
- American elm (*Ulmus americana*)

Preferred tree species for landscaping/street trees to be planted using Scio Tree Fund monies

The Tree Fund Planning Committee shall develop and annually review the list of preferred tree species for planting using Scio Tree Fund monies.

In general, preference shall be given to species native to Michigan, so that they are adapted to existing conditions and can survive and thrive with minimum inputs, and so that they offer habitat and resources for native insects, birds, and wildlife that have co-evolved with them. Although cultivars of native species may be used in landscape plantings, native genotypes are preferred when possible.

Great care should be taken to avoid planting species that are known to be invasive (either in Michigan or elsewhere). Species from genera with invasive members should be rigorously assessed for potential invasiveness (their ability to spread to and reproduce in nearby natural areas). For example, several maple species are already widely invasive in the Northeastern and Midwestern U.S. and Great Lakes state, including Norway maple (*Acer platanoides*), Amur maple (*Acer ginnala*), and Tatarian maple (*Acer tataricum*); therefore, non-native maples should be avoided when possible.

Scio Ordinance provides a list of species for landscaping use, although some species have become documented problems since the list was developed (such as the Callery flowering pear, which is extremely invasive in the Eastern U.S.), so the list should be reviewed annually and revised as new information emerges.

Scio Ordinance also lists species prohibited for landscape use, including all willows (*Salix* species, including natives) and prickly-ash (*Zanthoxylum americanum*). However, since the Tree Fund is not primarily for landscape planting, these species might be sometimes be appropriate in natural settings or for certain priorities. For example, native willows provide excellent storm-water absorption in flood-prone areas, and offer vital resources for native bees in early spring. Prickly-ash is a preferred food for giant swallowtail caterpillars, and would be acceptable in reforestation projects.

Below is preliminary list of species to consider for landscaping using the Scio Tree Fund:

Preferred trees for landscaping with the Scio Tree Fund		
Evergreen/conifers		
Common name	Latin name	Notes
Balsam fir	*Abies balsamea*	
Red cedar	*Juniperus virginiana*	
White spruce	*Picea glauca*	
Black spruce	*Picea mariana*	
Red pine	*Pinus resinosa*	
White pine	*Pinus strobus*	
Bald cypress	*Taxodium distichum*	Not native to Michigan but native farther south and east
Arborvitae	*Thuja occidentalis*	
Eastern hemlock	*Tsuga canadensis*	
Large deciduous canopy trees		
Maple (native species only)	*Acer nigrum, A. rubrum, A. saccharum*	
Ohio buckeye	*Aesculus glabra*	
Birch	*Betula allegheniensis, B. nigra, B. papyrifera, B. populifolia*	
Hickory (native species)	*Carya cordiformis, C. glabra, C. ovata, C. tomentosa*	
American chestnut	*Castanea dentatum*	Choose native blight-resistant varieties
Hackberry	*Celtis occidentalis*	
Beech	*Fagus grandifolia*	
Ash	*Fraxinus quadrangulata*	Among ash species, this one appears most resistant to Emerald Ash borer
Kentucky coffee-tree	*Gymnocladus dioicus*	
Tulip-tree	*Liriodendron tulipifera*	
Black gum	*Nyssa sylvatica*	

Sycamore	*Platanus occidentalis*	
Wild black cherry	*Prunus serotina*	
Oaks (native species)	*Quercus alba, Q. bicolor, Q. ellipsoidalis, Q. imbricaria, Q. macrocarpa, Q.muehlenbergii, Q. palustris, Q. rubra, Q. shumardii, Q. velutina*	*Q. montana,* native to neighboring states is also acceptable
Sassafras	*Sassafras albidum*	
Linden	*Tilia americana*	
Small deciduous ornamental trees		
Mountain maple	*Acer spicatum*	
Serviceberry	*Amelanchier arborea, A. laevis*	
Musclewood	*Carpinus caroliniana*	
Redbud	*Cercis canadensis*	
Flowering and pagoda dogwood	*Cornus alternifolia, C. florida*	
Hawthorn	*Crataegus* spp.	
Flowering crabapple	*Malus coronaria*	
Hop-hornbeam	*Ostrya virginiana*	
Cherry (native species)	*Prunus americana, P. nigra, P. pensylvanica*	
Mountain-ash	*Sorbus aucuparia, S. decora*	

Tree Fund Committee to develop implementation guidelines

The Tree Fund Committee shall develop and annually review implementation guidelines for reforestation of preserves and natural areas. A preliminary document has been drafted to offer the foundation for developing an RFP for reforestation of West Scio Preserve (below).

The Tree Fund Committee shall develop clear guidelines to implement all other tree planting priorities that are adopted.

REFORESTATION OF PRESERVES AND NATURAL AREAS:

DRAFT TREE PLANTING IMPLEMENTATION PLAN

GOAL:

Use Tree Fund to reforest selected old-field areas of Scio Preserves that were historically dry-mesic southern forest.

SITE SELECTION:

The Scio Township Parks, Preserves, and Pathways Department manages >600 acres of land. There are many variables that should be considered during site selection for reforestation. Some key variables to take into account are habitat type, connectivity (a primary goal of PPP delineated in the PROS Plan), wildlife buffers, previous research-based land management recommendations, ease of access for planting and management, and resident accessibility.

The PPP Old Field Map shows old field habitat types in Scio Township parks and preserves. Old-field habitat type is a prime candidate for reforestation as these open fields once used for agriculture are now dominated by invasive species that threaten to move into neighboring wooded areas, pushing out native plants needed for healthy ecosystem function. Reforesting these fields would not only help to manage invasive species, it would also increase connectivity which allows for larger swaths of forest, a necessity for certain species to thrive.

As described in the "Breeding Bird and Invasive Plant Research Report" written by Parks, Preserves, and Pathways Research Interns in 2023, the old fields in West Scio Preserve are excellent candidates for reforestation. The Research Interns state that while there are a few different management strategies possible for these old fields, such as agriculture or prairie restoration, allowing them to return to forest would provide long-term protection for forest bird species shown to be potentially decreasing in population in West Scio Preserve.

Easily accessible by S Staebler Rd and Park Rd., the old fields in West Scio Preserve are accessible for maintenance and management. Additionally, Scio Farms Trails abut these old fields, and trails could easily be extended into the reforested fields when appropriate.

OBJECTIVES:

Reforest 6-12 acres of old field adjacent to a forested area that has a mix of dry-mesic southern forest with some vernal pools, and a southern hardwood swamp. This area is easily accessible to roads, and the plantings would provide an additional buffer for a key woodland bird nesting site to the north.

The project would include several stages:

- Develop pilot project plan, to cover 3-5 years, to include the following elements (at a minimum):
  - Prepare site (using prescribed burns, if possible, or repeated mowing over the course of a year, or weed smothering with cardboard/shade; herbicides should not be used on this site due to the proximity of the heron rookery);
  - Finalize species selection based on the list provided below;
  - Plant large numbers of small trees (1-3 feet tall, ½ to 1" diameter at base);
  - Aim for initial planting in fall of 2024 OR spring 2025;
  - Fence and/or protect from deer with fences around patches (or tree tubes around individual trees); and
  - Assess tree survival and qualitative indicators of growth/success for two years (indicators could include wildlife habitat and social use, as well as tree success);
  - Maintain for two years post-planting (replanting any trees that die within the first 3 months, etc.)

    - Evaluate and suggest management adaptations for the next planting project.
- Develop an RFP, to invite proposals from local native plant, ecological restoration, and arboriculture firms;
- Select a contractor who will participate in the final planning and design process.

SPECIES SELECTION:

West Scio Preserve is characterized by a mix of natural communities, including dry-mesic southern forest, southern hardwood swamp, and vernal pools (https://www.sciotownship.org/home/showpublisheddocument/2564/638266706188970000; https://mnfi.anr.msu.edu/data/veg1800/washtenaw.pdf; https://mnfi.anr.msu.edu/communities/description/10685/dry-mesic-southern-forest, https://mnfi.anr.msu.edu/communities/description/10655/Southern-Hardwood-Swamp,https://mnfi.anr.msu.edu/abstracts/ecology/Vernal_Pool.pdf). The old-field areas where planting is proposed were primarily dry-mesic southern forest, although some low-lying areas might have been vernal pools or patches of southern hardwood swamp. Therefore, the proposed species list is primarily composed of species typical of dry-mesic southern forest, as identified by the Michigan Natural Features Inventory (https://mnfi.anr.msu.edu/communities/description/10685/dry-mesic-southern-forest):

- red maple (*Acer rubrum*)
- juneberry (*Amelanchier arborea*)
- bitternut hickory (*Carya cordiformis*)
- pignut hickory (*Carya glabra*)
- shagbark hickory (*Carya ovata*)
- alternate-leaved dogwood (*Cornus alternifolia*)
- flowering dogwood (*Cornus florida*)
- white ash (*Fraxinus americana*)
- ironwood (*Ostrya virginiana*)
- black cherry (*Prunus serotina*)
- white oak (*Quercus alba*)
- northern pin oak (*Quercus ellipsoidalis*)
- red oak (*Quercus rubra*)
- black oak (*Quercus velutina*)
- sassafras (*Sassafras albidum*)
- basswood (*Tilia americana*)

The following additional species are suggested to offer further diversity (reflecting the patchy nature of the habitat) and resilience in the face of climate change and emerging diseases (such as oak wilt and beech leaf disease), to offer additional canopy structure and resources for wildlife (including birds and native bees), and to allow species that might succeed in wetter or shadier microsites.

- pawpaw (*Asimina triloba)*
- silver maple (*Acer saccharinum)*
- black maple (*Acer nigrum)*
- yellow birch (*Betula allegheniensis)*
- gray birch (*Betula populifolia)*
- musclewood (*Carpinus caroliniana*)
- hackberry (*Celtis occidentalis)*
- redbud (*Cercis canadensis*, native genotypes only)
- hawthorn (native genotypes only, *Crataegus* species)
- American beech (*Fagus grandifolia*)
- blue ash *(Fraxinus quadrangulata)*
- crab apple (native genotypes only, *Malus coronaria)*
- black gum (*Nyssa sylvatica)*
- cottonwood (*Populus deltoides*)
- trembling aspen (*Populus tremuloides*)
- American wild plum (*Prunus americana)*
- Canada wild plum *(Prunus nigra)*
- pin cherry (*Prunus pensylvanica)*
- swamp white oak (*Quercus bicolor)*
- bur oak (*Quercus macrocarpa)*
- pin oak (*Quercus palustris)*
- shingle oak (*Quercus imbricaria)*
- willow, black (*Salix nigra)*
- willow, peach-leaved (*Salix amygdaloides)*

- arbor-vitae (*Thuja occidentalis,* native genotypes only)
- hemlock (*Tsuga canadensis,* native genotypes only*)*
- American elm (*Ulmus americana*)

PLANTING DESIGN:
We encourage contractors to consider and propose planting designs that encourage species and habitat diversity, providing for wildlife including birds, butterflies, and native bees. In addition, designs should consider the following approaches for resilience in the face of climate change and resilience:

- Plant many small trees in dense patches, along the lines of the pocket forest idea first developed by Japanese botanist Akira Miyawaki (1999, https://www.jstage.jst.go.jp/article/plantbiotechnology1997/16/1/16_1_15/_pdf) and now used in many parts of the world (https://www.sugiproject.com/blog/the-miyawaki-method-for-creating-forests), including an effort in Ann Arbor (https://pocketforests.org). The idea is to plant small trees of diverse species in densely packed "pockets," with a density of 3-4 saplings per square yard, so that the trees will quickly grow tall and the canopy will quickly fill in enough to offer shade, which will offer benefits for the soil as well as for wildlife. Diverse species are planted in each patch, to offer resilience (a greater chance that some species may survive and thrive whatever the weather) as well as benefits for pollinators and birds.

- Plant patches with spacing between them (248 feet or greater).
  - The presence of grassland between forest patches should allow for continued habitat for grassland birds using the site.
  - Spacing the tree patches at greater than 248 feet will help reduce root grafts between trees in different patches, with the idea that this kind of planting pattern will allow for greater resilience in the case of future oak wilt infection, so that oak wilt might be limited to individual patches rather than affecting more of the forest.

- Proposals should explicitly address how the planting design will include oak species (which are key in the dry-mesic southern forest type and for wildlife), but in such a way as to promote resilience in the case of future oak wilt outbreaks, including the following strategies.
  - Use a higher proportion of white oak group than red oak group species, to reduce vulnerability to oak wilt.
  - Use species diversity to reduce the density of any one kind of oak species (or for that matter, any other species which, if planted densely, might be more susceptible to larger impacts from disease or insect outbreaks). Thus, in general, patches should be planted with a mix of many species. Intermingling diverse species can help to "de-densify" oak plantings to help minimize oak wilt transmission via root grafting in the event of future oak wilt epidemics. Where possible, small trees that offer flowers and fruit for wildlife can be incorporated within patches to provide wildlife food and habitat while reducing density of oak tree species. (Note: the tree fund cannot be used to pay for shrubs, but shrubs could also be incorporated in the mix if other funding sources are found).
  - Use insect- and disease-resistant species and/or genotypes when possible, so long as they are still native. For example, blue ash appears to be more resistant to emerald ash borer than other ash species, so it could be planted rather than white ash, green ash, or black ash, which are more typical of the forest types here. Similarly, if there are sources for blight-resistant native American elm or American chestnut, these could also be used.

- Consider including native species that are not typically found in dry-mesic southern forest but that might benefit from planting. For example, beech trees are declining in Michigan due to Beech Bark Disease and Beech Leaf Disease, but because this site is far from the centers of disease, planting beech trees in the most amenable parts of the site might increase the chance that the species will persist in the County. Similar, Eastern hemlock is being damaged by hemlock

woolly adelgids in many parts of Michigan, so planting some trees here, distant from areas with dense hemlock stands, could help the species while also providing important wildlife cover.

Contractors are encouraged to provide additional ideas for species selection and planting design based on their native planting experience. Contractors are further encouraged to address how their proposal will integrate and meet standards for ecological restoration set forth by the Society for Ecological Restoration (https://onlinelibrary.wiley.com/doi/full/10.1111/rec.13035).

BUDGET AND TIMELINE

The total budget for the forest restoration project will be $500,000 over a period of 3 years, for around $130,000 per year, with the goal of planting on up to 12 acres. Our aim is to have initial planting take place in Fall 2024 or Spring 2025, with additional planting each of the following two years.

For example, the planting design might include planting ¼ to 1/8 of each acre (roughly 500-1,000 square yards) in separate high-density patches at a density of 3 small tree seedlings per square meter = 1500 small tree seedlings per acre. If the total cost were $20 per tree (for site preparation, planting, and protection, and follow-up monitoring), a little over 4 acres could be planted for the $130,000 budget per year. Planting at this rate would result in reforesting all 12 of the available acres over the course of 3 years.

Because this proposal calls for starting with small trees (½-1" trees, 2–4-year-old-saplings), we anticipate a considerably lower cost per tree than starting with 1.5" saplings. Furthermore, a planting design that uses small dense patches should reduce the cost of site preparation from what would be needed to blanket the entire field with rows of trees. However, we understand that obtaining or growing native tree seedlings in the numbers called for here cannot be done overnight, and that a Fall 2024 start date might not be possible. Furthermore, we recognize that site preparation and deer protection can be costly and time consuming. Therefore, potential contractors should address the budget and timeline in detail, and propose a total acreage to be planted.

NEW TREE CARE TIPS

Please help this new tree thriving in its new home by following these tree care tips:

GUARANTEE

This tree is guaranteed by XXXX for X years after planting. If the tree dies within the guarantee period, it will be replaced by XXX.

WATERING

• Water once a week during the first two summers. Then water once a month the next two summers. If it has rained at least 1" during the week, watering is not necessary.

• Water deeply so the water can soak down to the depth of the root system (12-18"). The soil should be moist but not soggy.

• A good watering is 15 gallons applied slowly with a soaker hose or a hose on a slow trickle for approximately 30 minutes, within the mulched area.

AROUND THE TREE

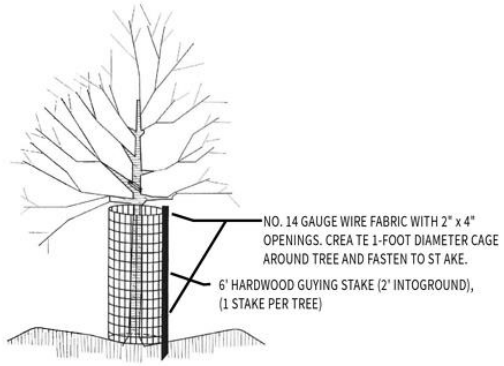
• Maintain a 3-inch thick mulch/wood chip ring around the base of the tree and **not touching** the trunk. Mulch piled up against the trunk, "mulch volcanoes," can kill the tree.

• The mulch ring will help retain soil moisture, improve soil quality, impede weeds and protect the tree from weed whip/ mower damage.

• Avoid spraying any broad-leaf weed killers near the base of the tree.

• Keep weed whips/lawn mowers away from the trunk. Weed whip/ lawn mowers hitting the trunk can cause death due to repeated trunk injury.

MINIMUM DEER TREE PROTECTION [Note: a 4-foot fence might not be adequate to prevent topping of trees less than 7 feet tall; fencing designs should account for tree size and high deer densities.}



Notes:
1. Height of cage shall be 4-feet (min.).
2. Cage shall be fastened to stake with two (min.) 11-inch releasable cable ties (one at top and one 6" (min.) above the ground.
3. Do not damage tree during installation.