

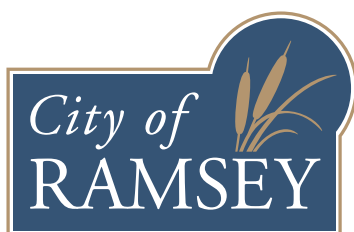
Money Does Grow on Trees! Investing in Ramsey's Streetside Urban Forest



Prepared by
Ada Moreno Gomez, Nick Kieser, and
Victoria Dan

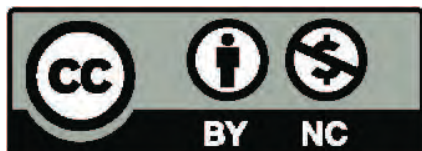
Students in PA 5211 Land Use Planning
Instructor: Dr. Fernando Burga
Hubert H. Humphrey School of Public Affairs

Prepared in Collaboration with
Chris Anderson
City Planner
City of Ramsey



The project on which this report is based was completed in collaboration with the City of Ramsey as part of the 2017–2018 Resilient Communities Project (RCP) partnership. RCP is a program at the University of Minnesota’s Center for Urban and Regional Affairs (CURA) that connects University faculty and students with Minnesota communities to address strategic projects that advance local resilience and sustainability.

The contents of this report represent the views of the authors, and do not necessarily reflect those of RCP, CURA, the Regents of the University of Minnesota, or the City of Ramsey.



This work is licensed under a Creative Commons Attribution-NonCommercial 3.0 Unported License. To view a copy of this license, visit www.creativecommons.org/licenses/by-nc/3.0/ or send a letter to Creative Commons, 444 Castro Street, Suite 900, Mountain View, California, 94041, USA. Any reproduction, distribution, or derivative use of this work under this license must be accompanied by the following attribution: “Produced by the Resilient Communities Project (www.rcp.umn.edu) at the University of Minnesota. Reproduced under a Creative Commons Attribution-NonCommercial 3.0 Unported License.”

This publication may be available in alternate formats upon request.

Resilient Communities Project

University of Minnesota
330 HHHSPA
301—19th Avenue South
Minneapolis, Minnesota 55455
Phone: (612) 625-7501
E-mail: rcp@umn.edu
Web site: <http://www.rcp.umn.edu>



The University of Minnesota is committed to the policy that all persons shall have equal access to its programs, facilities, and employment without regard to race, color, creed, religion, national origin, sex, age, marital status, disability, public assistance status, veteran status, or sexual orientation.



Money Does Grow on Trees!

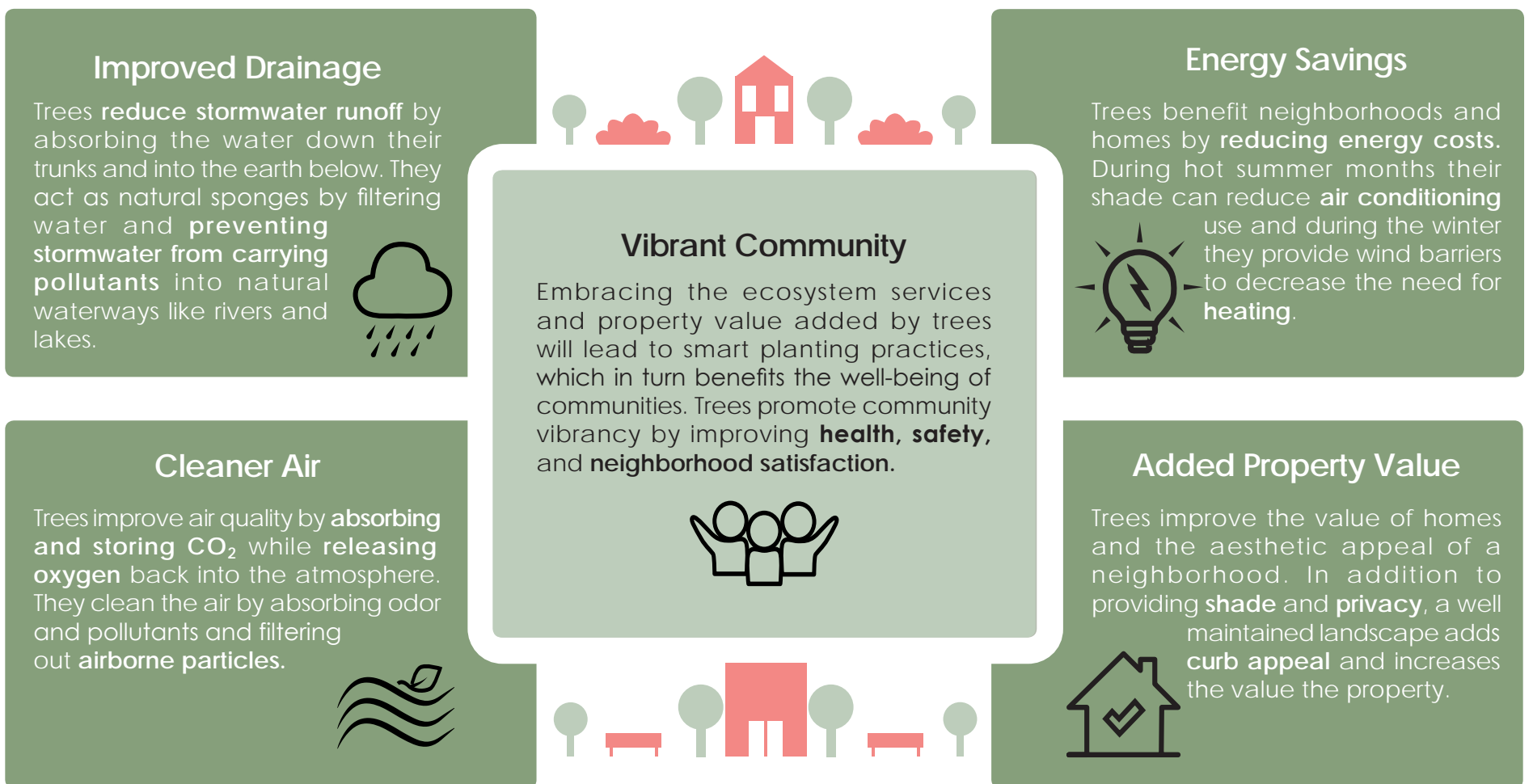
Investing in Ramsey's Streetside Urban Forest

Introduction

Planting ahead: Ramsey's street tree inventory as a proactive approach to planning for a resilient city

Tree inventories are used to assess and manage forest and community trees. As a tool for Urban Forest Management, they guide and inform public officials to **prioritize and budget for the proactive management of public trees**. Beyond aesthetic appeal, trees provide a multitude of **ecosystem services (stormwater benefits, pollution mitigation, and energy savings)** to individuals, businesses, and visitors alike. An inventory can be used for management and policy recommendations, to quantify the dollar value of a city's urban forest, and to educate residents about the benefits of a well-managed community forest.

A regularly updated inventory provides Ramsey with crucial data for maintaining its trees, enabling Ramsey to eventually **manage larger and more complex urban forests**. Well-managed trees will ensure that **future generations of Ramsey residents** will share in the benefits of **more engaging public spaces** and a **connected community**.



We have three main objectives for developing a street tree planting framework

Information • Provide the City of Ramsey with the information and resources necessary to make better budgetary and management decisions for their upcoming Comprehensive Plan

Pilot • Examine the value of an inventory through a "micro" pilot of Sunwood Drive, which assesses tree genus, diameter at breast height (DBH), location, and canopy quality

Vision • Suggest a long-range vision for tree planting in Ramsey, which can be made possible through regular inventorying and assessment

We will see the benefits of a tree inventory in the following posters...



PA 5211 Land Use Planning • TEAM: Ada Moreno Gomez, Nick Kieser, Victoria Dan • INSTRUCTOR: Fernando Burga, Ph.D.



References:
HendState Extension (2017). Conducting a Community Tree Inventory. Retrieved from <https://extension.psu.edu/conducting-a-community-tree-inventory>
United States Forest Service. Tree Design (Version 6.0) (web application). Available from <http://design.investor.org>



Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Benefits

**An appreciative tree advantage:
A look at the 20-year benefits of street trees**

Trees are unique assets to cities and properties because they generally appreciate in value as they grow and age. Some trees do survive the urban environment for over a century, but most city street trees have a lifespan of up to 20 years.

Even so, in two decades a tree can impart significant benefits, and as the tree ages it adds to **property values** and more efficiently provides **ecosystem services** to owners and the wider community. With patience, young trees will start generating more value than the cost of planting and maintenance.



Over the next 20 years, these two oak trees outside Ramsey City Hall will perform valuable services and increase property value as the canopy grows...

2017 **\$47** > 2037 **\$154** > 20 years **\$1,168**

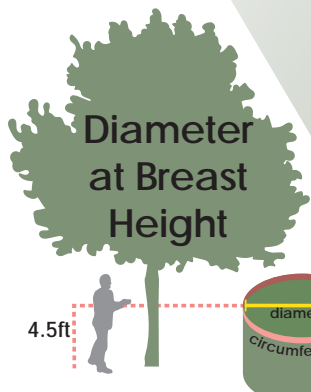
Return on Investment
over one year



\$1 spent on tree management



\$4 returned to the community



A tree's age and size is inferred from its Diameter at Breast Height (DBH), which is the trunk diameter at 4.5 ft from the ground. Measuring DBH is non-invasive: find the diameter using a diameter tape or by calculating from the circumference.



More Property Value

\$44
if each tree grows to 10" DBH

Compared to **\$23 in 2017** with approximately 4"-5" DBH



CO₂ Removal



10,676 LB

Equivalent to the annual emission of a typical passenger vehicle



Electricity Savings



1,461 KWH

Enough to power a household microwave for 81 days



Stormwater Interception



19,093 GALLONS

Stores and filters enough runoff to fill **477 bathtubs**

Natural Gas Savings



285 THERMS

Enough to operate a household dryer for 59 days

Trees Generate Diverse Benefits and Savings

Trees are nature's workhorse, and they provide significant and measurable benefits to communities. Street trees **clean the air, reduce energy expenses, filter stormwater, and increase property values.** We will first explore how street trees help **maximize stormwater management by reducing surface water pollution.**





Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Stormwater



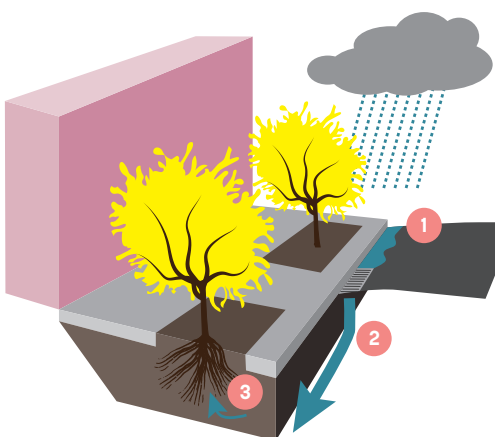
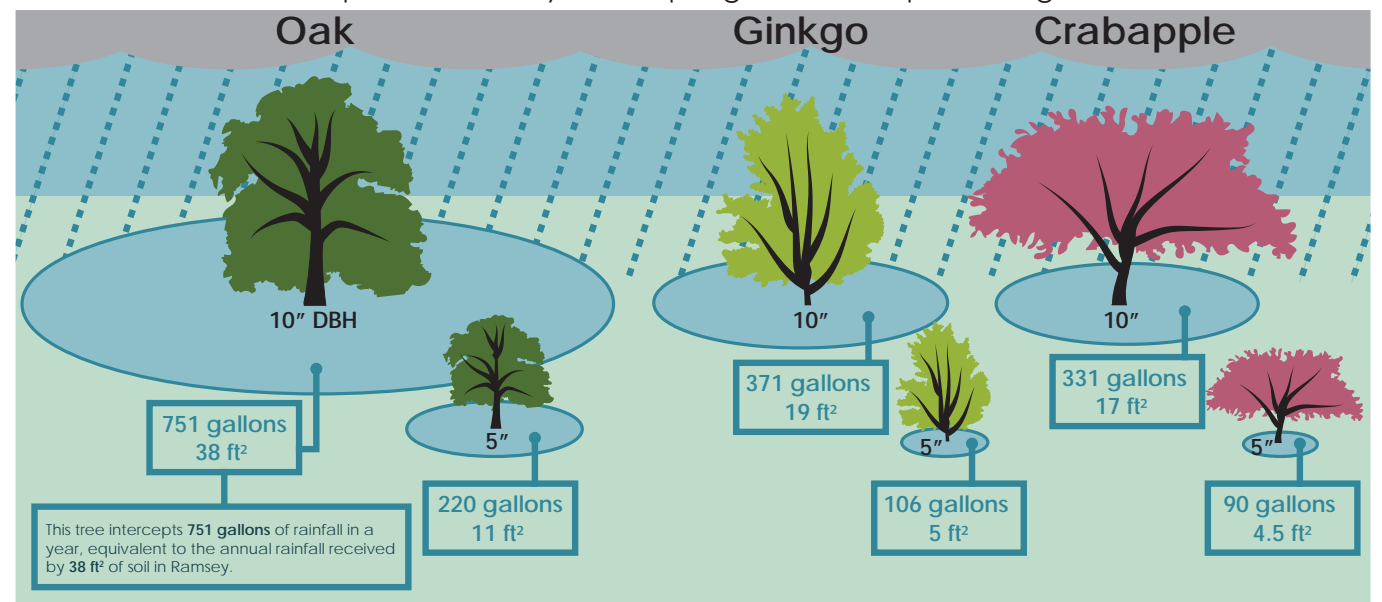
Each year, Ramsey receives 14 to 15 billion gallons of rainfall. New development expands **impervious surface area**, which includes surfaces like parking lots and roofs that are impenetrable by water. Stormwater systems mitigate flooding by channeling rainfall to stormwater ponds and other surface waters (e.g. wetlands, lakes, and rivers).

However, **runoff contaminates surface water** when it carries oil, litter, and other pollutants. Trees improve stormwater management by promoting infiltration (movement of water into soil), which helps **filter pollutants** and **recharge aquifers**.

Rainfall Interception

A tree will absorb more water as its **Diameter at Breast Height (DBH)** increases. However, **water interception also varies by species**. In areas that experience heavy runoff, oaks would be effective at intercepting large volumes of water. However, **oaks grow large** and may not fare well in narrow spaces. **Ginkgos** can grow large, but they are **slower-growing** and would be more appropriate in **confined spaces**. In small planting spaces with less runoff, **small trees like crabapples** would be a good alternative.

Annual Rainfall More development means less surface soil for water infiltration; trees make up for this loss by intercepting water and promoting infiltration.

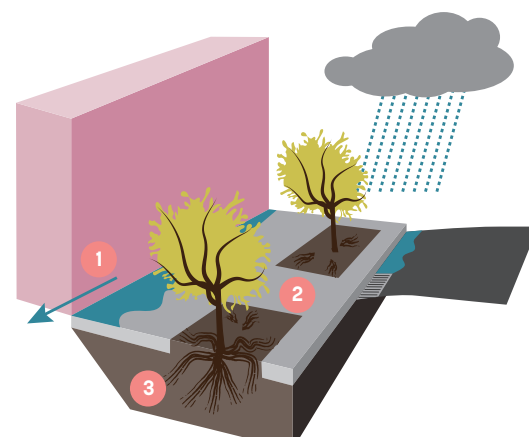


Prototypical perspectival section

Stormwater Flow

- 1 Stormwater flows into inlet
- 2 Water distributes and infiltrates through soil
- 3 Tree roots take up and hold water

Filtered and excess water flows through pipes into the stormwater sewer.



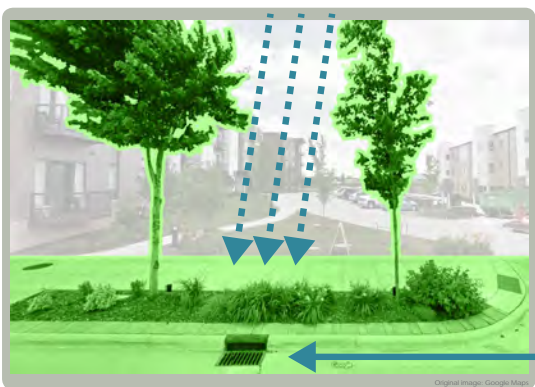
Prototypical perspectival section

Common Issues

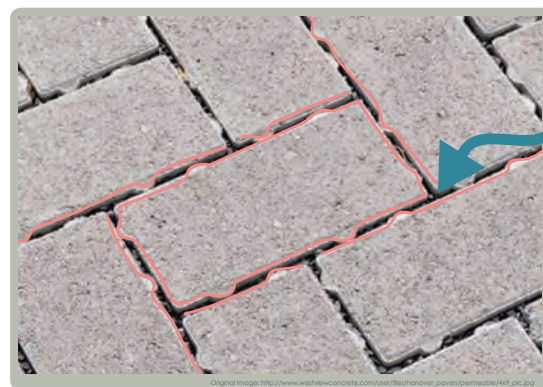
- 1 Water pools away from drainage sites
- 2 Trees lacking moisture and oxygen send roots to the surface
- 3 Compacted soil and insufficient root space prevents stormwater absorption

Trees underperform in poor site conditions

Optimizing Stormwater Systems



In the COR, tree pits combine with planters, and these connect to stormwater sewer inlets. This maximizes the runoff capture from direct rainfall and inlet flow.



Permeable pavers enhance street tree systems by allowing water to pass through small spaces in the sidewalk. This ensures that more water moves into the soil instead of pooling away from trees.

Trees Protect Our Cities from Storms

No one wants to be caught unprepared in a rainstorm. Fortunately, street trees are on the first line of defense when it comes to **intercepting stormwater pollutants**. Next, we see how Ramsey can utilize street trees to **improve air quality by filtering pollutants and reducing pollutant emissions**.

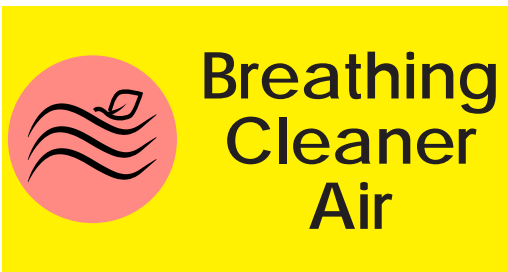




Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Air Quality



Trees in urban areas significantly affect local and regional air quality. It is commonly known that trees **release oxygen** and **capture carbon dioxide**, but the impact of trees on urban air quality is broad and complex. Trees alter the urban atmosphere and affect air quality in cities by **reducing temperatures, removing air pollutants**, changing building energy use, and releasing volatile organic compounds. Using a tree inventory, city officials can improve the air quality within their cities and build healthier communities by planting tree species that reduce the formation of smog.

Temperature Reduction

Air temperature decreases when trees transpire and water vapor from their leaves is released into the atmosphere. By reducing air temperatures, **trees provide cooler summer months**. The **distribution of trees** also **affects temperature**, which is why an **informed and organized tree planting plan** not only contributes to a **healthy and well maintained community forest**, but to **increased wellbeing for Ramsey's residents**.

Release of Volatile Organic Compounds (VOCs)

Some tree species are better suited for congested streets as they can **reduce the formation of smog**. Although trees give off chemicals called volatile organic compounds (VOCs), tree species differ in the amount of VOCs they emit. Cities should plan ahead to plant lower VOC-emitting trees along streets with heavy traffic.

Removing Air Pollutants

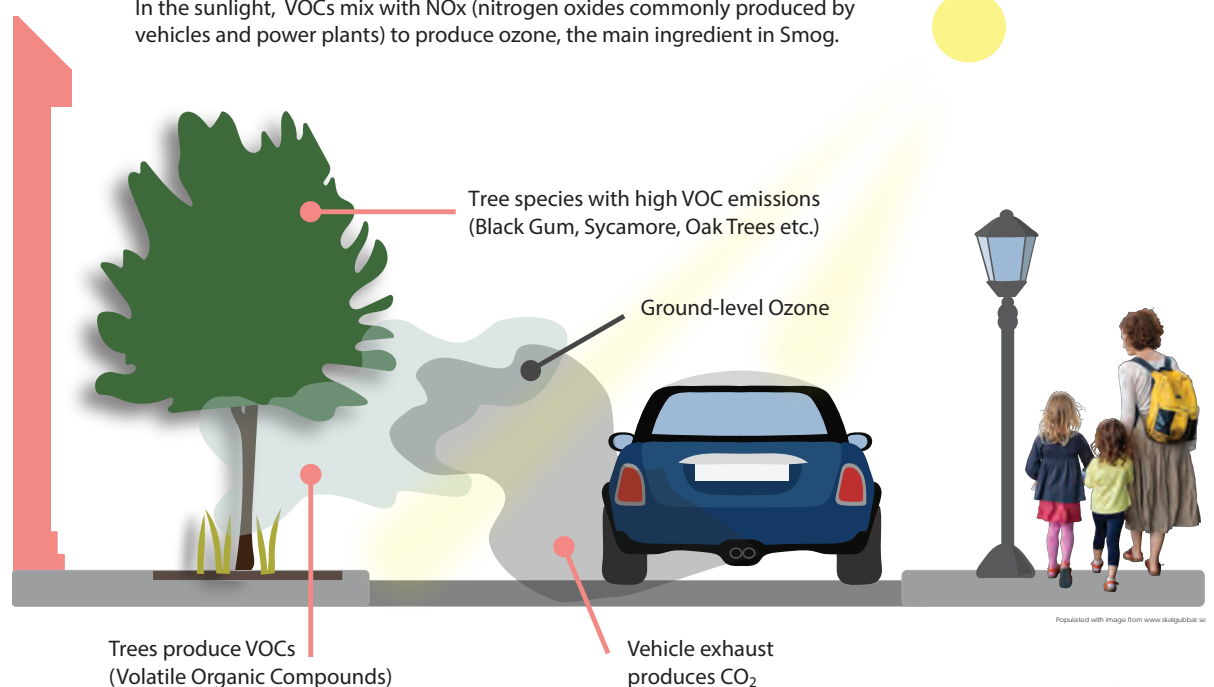
Trees **remove air pollution** by intercepting and absorbing airborne particles. The larger tree canopy cover a city has, the greater total pollution removal.

Changing Building Energy Use

Trees change building energy use by providing shade during the summer and blocking winds during the winter. As a building's energy use decreases, so do the pollutants being emitted. **Improper tree placement** can lead to **higher utility bills**, so Urban Forest Management allows cities to maximize a tree's energy conservation benefits.

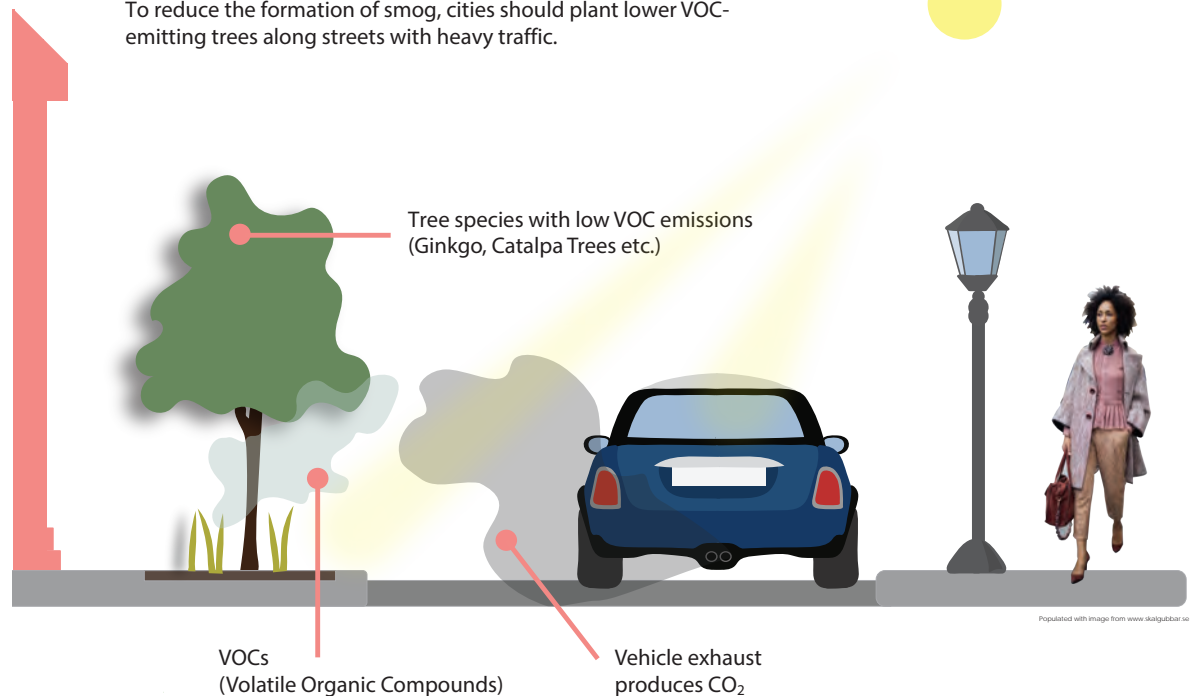
City Street with Poor Air Quality

In the sunlight, VOCs mix with NOx (nitrogen oxides commonly produced by vehicles and power plants) to produce ozone, the main ingredient in Smog.



City Street with Good Air Quality

To reduce the formation of smog, cities should plant lower VOC-emitting trees along streets with heavy traffic.



Trees Make Clean Air

As the number of cars and industries in Ramsey grows, **strategic tree planting initiatives** could **reduce carbon emissions** and **prevent respiratory diseases**. Planting trees with low VOC emissions in congested streets ensures the amount of airborne chemicals in the atmosphere remains low. Likewise, an **informed plan for tree planting guarantees economic returns** for the city and its residents by **raising property values**.

Energy + Property

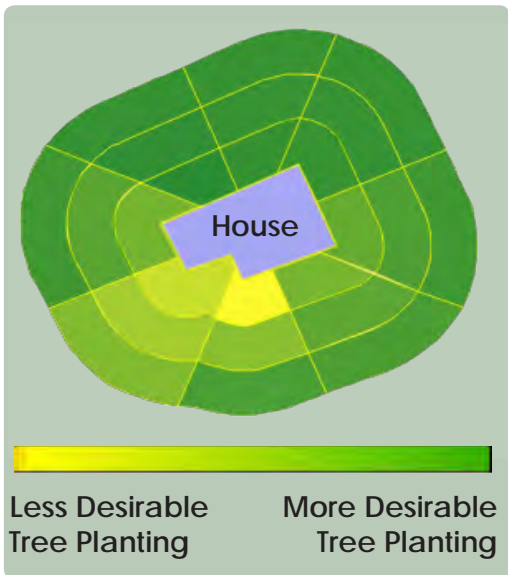


Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Reducing Energy Expenses

Trees planted in a strategic manner are able to conserve energy for homes and reduce energy bills. In the summer, the leaves of trees provide shade that will reduce the amount of air conditioning a house will use. In the winter, deciduous trees allow more sunlight into homes, which can reduce the amount of heating that is needed. Trees that are planted to the south are the least prioritized. Trees that give shade to an air conditioner can increase the efficiency by 10%. This type of strategic planning is called smart landscaping.



Digital Resource: i-Tree

i-Tree is an easy to use online application that can provide essential information to Ramsey officials and residents. The picture to the left depicts a function of i-Tree; it shows where it is most beneficial to plant a tree on a specific property. i-Tree can also determine the money saved from the existing trees.

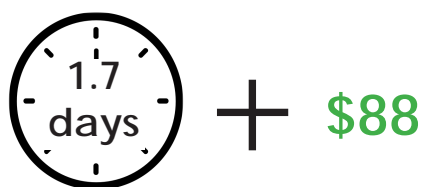


The energy savings from the street trees in the above photo total **\$41.34** in 2017. As these trees mature, their canopy will increase which will result in higher savings.

The U.S. Department of Energy predicts that the proper placement of only 3 trees can save an average household between **\$100 and \$250** in energy costs annually. Evergreen trees are beneficial to plant in areas that will not shade the home in the winter, but will serve as a windbreak. On average, evergreen trees that are placed properly as a windbreak will decrease a home's fuel consumption by **25%**.

Adding to Property Values

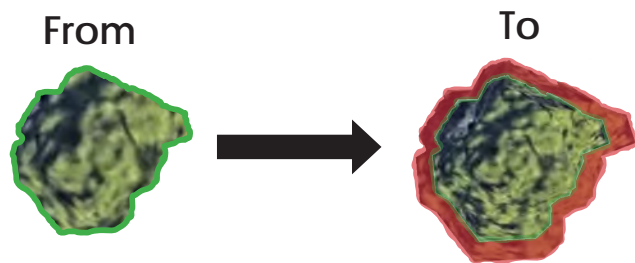
Street trees increase the property values of every property. The trees bring an aesthetic appeal along with their other benefits, which can increase the value of the property. The U.S. Forest Service estimates that mature street trees can increase a property's value by **10%** on average. As property values increase then the revenue that is acquired from taxes will increase as well bringing more money into the local municipality.



Homes that are within 100 ft of a street tree have an average reduction of 1.7 days on the market which adds **\$88** on average to the selling price.



A mature street tree that has a 300 square foot canopy cover can add approximately **\$7,000** to the property value.



10% tree canopy cover increase = **\$1,371**

A study done in Ramsey and Dakota Counties concluded that a **10%** increase in tree cover that is within 100 meters of a house will add approximately **\$1,371** to the market value.

Trees Save Energy and Add Property Value

Street trees provide energy savings and increase property value, most notably in the residential areas. i-Tree is an easy and informative tool that residents in Ramsey can use to maximize the benefits of planting trees on their property. The benefit of street trees that is most evident is the added vibrancy and health to the community.





Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Community



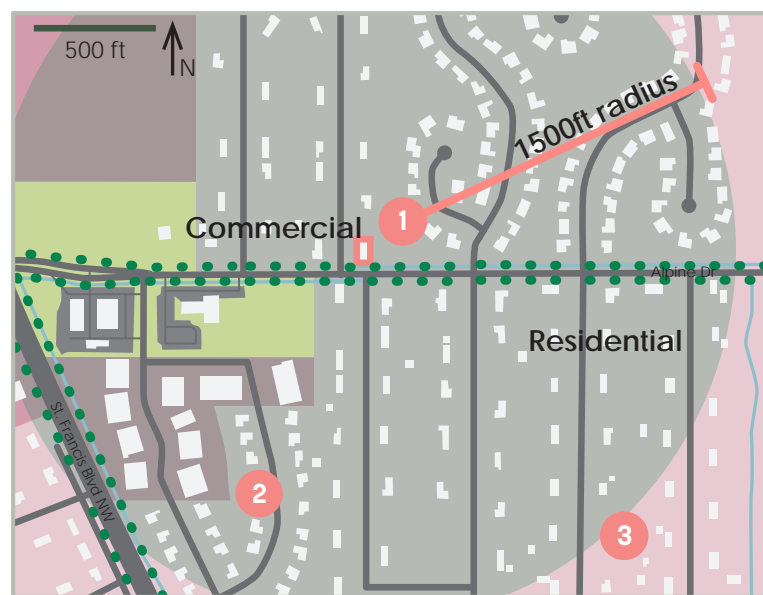
The long-lasting benefit of street trees is that they add to a more vibrant and healthy community. Street trees impact how people interact with, move through, and perceive their environment. As Ramsey grows, it is important that residents and visitors continue to feel **safe, connected, and comfortable**. The community will experience big changes as Ramsey develops, and the City can proactively support this transition with street tree planting solutions.

Tree Attraction

In spaces where commercial and residential uses overlap or are proximal, **street trees help mediate the relationship between places that would otherwise be in conflict**.

Street trees can impact driving behavior and route choice, and they can be used to **attract people to retail, restaurants, and other destinations**.

Residents will also have a **higher quality of life** in neighborhoods with dense street tree planting.



The intersection of Alpine Dr. & St. Francis Blvd NW is an example of adjacent commercial and low-density residential uses in Ramsey.

1 Because it generates traffic, nearby retail reduces neighborhood satisfaction for residents living in single-family homes; for these residents, trees within 1500ft **improve satisfaction**.



2 More than half the time, local residents will **choose scenic driving routes** over faster routes. Planting trees on arterial roads can mitigate thru-traffic on residential streets.

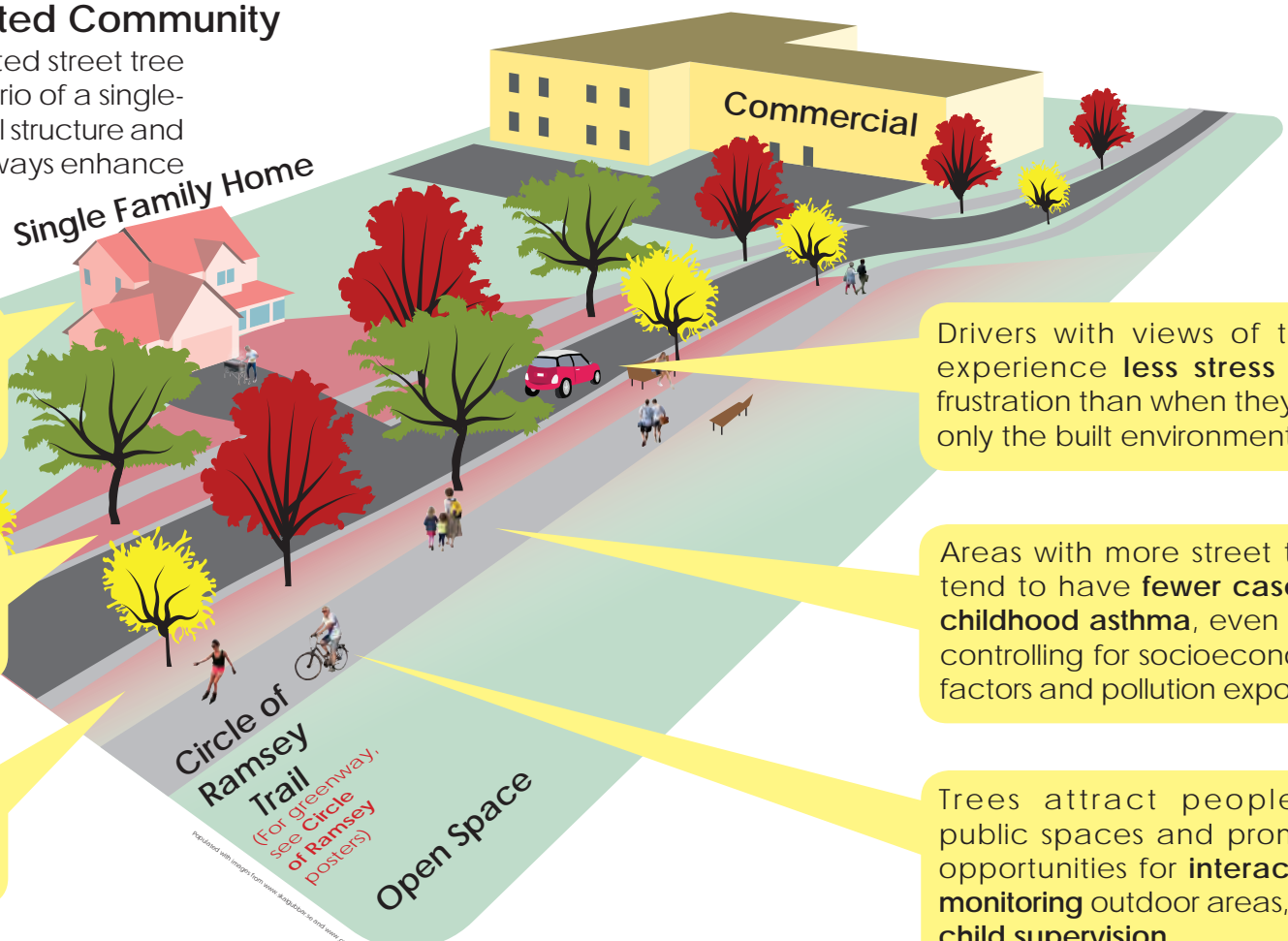


3 On suburban roads, people **drive slower** where there are street trees.



Envisioning a Tree-Oriented Community

An example of community-oriented street tree planting in a hypothetical scenario of a single-family home next to a commercial structure and open space. Sidewalks and bikeways enhance the functions of street trees.



Residents who can **see trees from their living rooms** have higher neighborhood satisfaction.

Drivers with views of trees experience **less stress** and frustration than when they see only the built environment.

On the rural-urban fringe, residents prefer environments of **rural character**, which can be evoked with tree planting.

Areas with more street trees tend to have **fewer cases of childhood asthma**, even after controlling for socioeconomic factors and pollution exposure.

A public tree in right-of-way is **40% more effective at reducing crime** than a private tree.

Trees attract people to public spaces and promote opportunities for **interaction, monitoring** outdoor areas, and **child supervision**.

Trees Create Communities

Trees bring communities alive by enhancing the experiences of residents and visitors. They promote the **well-being of all people**--drivers and pedestrians, young and old, locals and out-of-towners. Next, we will learn the **benefits and disadvantages of planting specific kinds of trees** on Ramsey streets.



Money Does Grow on Trees!

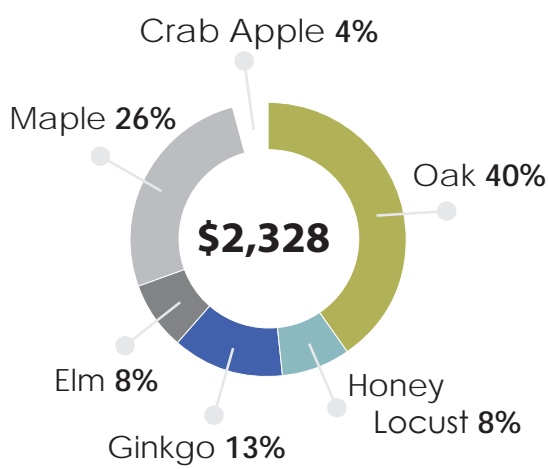
Investing in Ramsey's Streetside Urban Forest

COR Inventory

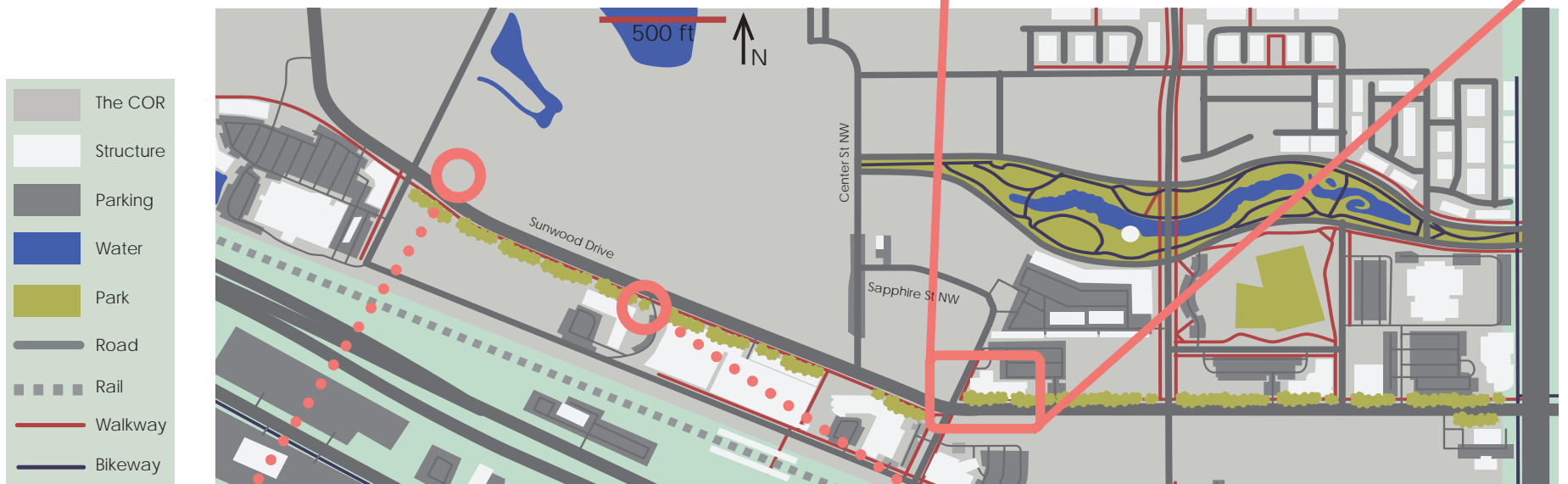
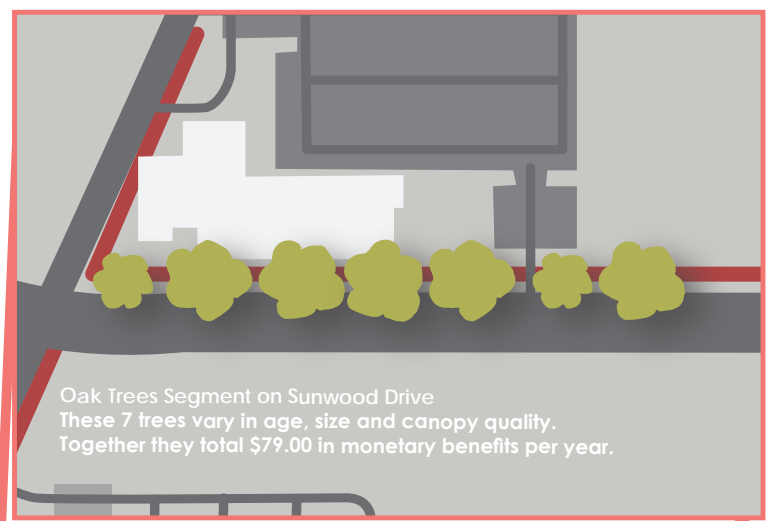
The COR trees as place-makers enhance downtown character through diverse street tree planting

A pilot tree inventory was taken on Sunwood Drive on what is defined as a 'destination street' throughout The COR. A total of **97 trees** were inventoried comprised of 6 species of trees: the **Bicolor Oak, Skyline Honey Locust, Ginkgo, Accolade Elm, Sienna Glenn Maple** and **Crabapple**. The trees along Sunwood Drive **provide variety, ensuring protection against diseases and visual aesthetics** for a street projected to support commerce and attract shoppers and employees. The age of the trees inventoried ranged from 9 to 50 years of age. However, to guarantee trees don't wither and decay at the same time, they should be **planted sparsely**. If a large section of trees reaches the end of its life span at the same time the cost of replacement will be higher for Ramsey.

Tree Diversity on Sunwood Dr.



Total Monetary Benefits Per Year	\$2,328.00
Average Monetary Benefits Per Tree	\$25.58
Average Canopy Quality	3.7
Average Diameter	5.1 Inches



Current View
→
Future Possibility



Proper placement is vital to enhance the **ecosystem services** trees provide. This young **Oak tree** located in front of **Ramsey's City Hall** provides **aesthetic appeal** to destination streets.

Trees Define Destinations

The **97 street trees** inventoried on The COR's Sunwood Drive total **\$2,328 in economic benefits** for the City of Ramsey. The trees planted vary in species and age, but as more trees are planted throughout destination and downtown streets, **city officials must consider the lifespan of trees** and their **cost of replacement**. These considerations must also extend to other arteries within The COR, and street planting in residential areas.



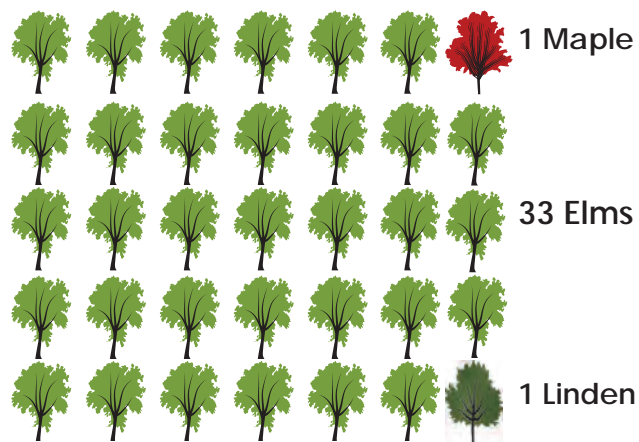
Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

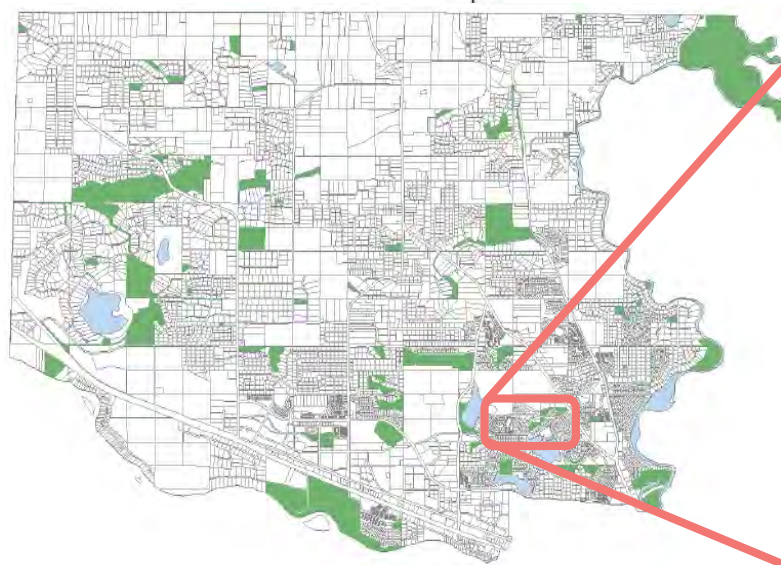
Residential trees as local heritage show the lasting benefits of neighborhood street trees

The residential tree inventory was taken on Sunwood Drive, between Potassium Street and 147th Street. The trees in this inventory are more mature compared to the trees in The COR inventory. From this small sample, the main issue with the trees in the residential corridor is the lack of diversity. The majority of the trees sampled were Elms with only one Maple and one Linden. With the lack of diversity, there is a higher chance of all the trees dying from a species-specific disease. If all of the Elms died from a disease, then there would be great financial, environmental and social burdens put on Ramsey to replace those trees.

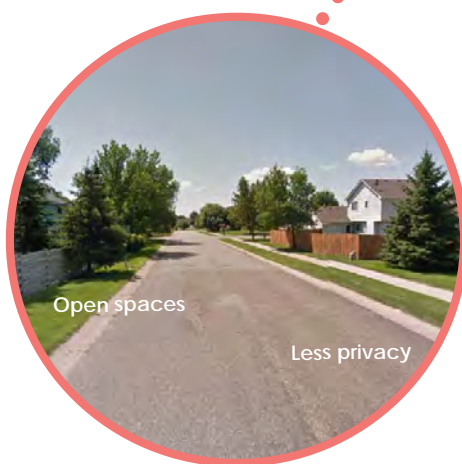
Tree Diversity between Potassium St. and 147th St.



Total Monetary Benefits Per Year	\$2,640.00
Average Monetary Benefit Per Tree	\$75.43
Average Canopy Quality	3.4
Average Diameter	8.9 Inches



Sunwood Drive is a good example of a residential street that has good quality mature street trees. The picture to the right shows Potassium Street south of Sunwood Drive. The benefits that are laid out in the earlier posters show how residents can benefit from having street trees in their neighborhood. To maximize the benefits of street trees, there needs to be a system in place to plant a more diverse group of trees in residential areas. In this small tree inventory, there is an overwhelming number of Elm trees. If a more diverse group of trees is planted then there will be less risk of spreading diseases.



Current View
→
Future Possibility



Trees Make a Home

These mature street trees along Sunwood Drive are a good example to show how Ramsey can showcase the benefits of residential street trees. These images also show what the future neighborhoods can look like if street trees are planted. A tree inventory is essential for all of Ramsey to calculate the existing tree population and to check the quality of each tree.



Money Does Grow on Trees!

Investing in Ramsey's Streetside Urban Forest

Conclusion

Envision all trees lead to the COR in a street tree network concept for Ramsey

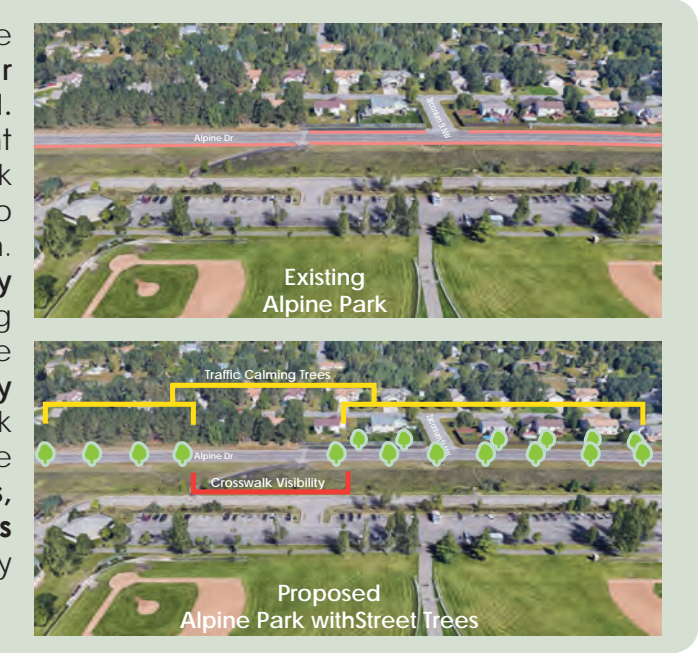
Each street tree bestows unique benefits, but **collectively a street tree network can create a green roadmap serving an entire community**. Ramsey's most ambitious street tree planting is occurring in the COR, the mixed use downtown development that will provide jobs, housing, retail, and recreation for a growing city. Within a network, street trees would serve as **guideposts for directing movement in and out of The COR**; they would also **create a spatial narrative about moving and experiencing the city and enhance Ramsey's identity through place-making**.

Our concept for a potential street tree network in Ramsey.



In a potential street tree network, spokes of trees radiate from the COR, **centralizing connections** along arterials and congested local roads. This would encourage **travel choices** along major routes while also generating **traffic calming** benefits.

Some public spaces are **vehicle-oriented rather than pedestrian-oriented**. At Alpine Park, an adjacent neighborhood has crosswalk access, but there is no crossing signal or stop sign. Trees can enhance **safety** by **calming traffic** leading up to the crosswalk, while leaving space for **visibility** at the immediate crosswalk area. This approach can be used with streets at **parks, schools, and shopping areas** where pedestrian safety can be improved.



Street trees tell a story: This is Ramsey.

In many ways, Ramsey will **change, grow, and mature** as a city. Street trees are a smart investment that generates **savings from ecosystem services** while also **enhancing the social character of a community**. Furthermore, a **network of trees connects people to places** as well as **people to ideas of identity, pride, and values** that are vital to a city's integrity.

