HOW A TREE PLAN CAN HELP WITH STORMWATER

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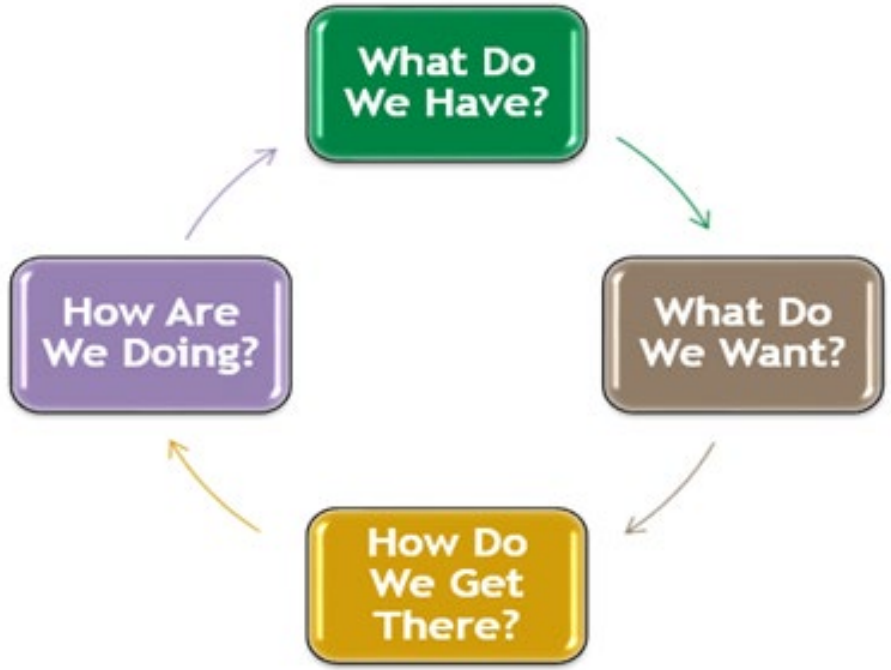
DAVEY Resource Group

AGENDA



Why Use Trees to Help with Stormwater

Information You Need to Develop a Tree Plan

How to Use the Findings to Set Goals for Tree Management to Help with Stormwater

THANK YOU

ShoresRivers for allowing us to use the *Urban Forest Stormwater Management Plan* developed for the Town Greensboro, Maryland in this presentation.

The project was funded by a grant from the Environmental Protection Agency (EPA) and National Fish and Wildlife Foundation's (NFWF) *Chesapeake Bay Technical Capacity Grant*

Reduce Air Pollution

Trees reduce noise levels, clean the air, produce oxygen and absorb carbon dioxide. They also can reduce air pollution by 60% (Coder, 1996) and reduce rates of asthma in children (Lovasi, 2008).

Reduce Energy Costs

Trees decrease energy use and moderate local climates by providing shade and windbreaks. Trees moderate temperatures throughout the year, saving on heating and cooling costs. (NCSU, 2012 and Heisler, 1986).

Reduce Runoff + Erosion

Trees slow down and reduce stormwater runoff. 100 Mature trees can intercept 100,000 gallons of rainfall! Additionally, trees stabilize soil and provide habitat for wildlife (USFS, 2003a).

Improve Perception of Business Districts

The quality of landscaping along the routes leading to business districts had a positive influence on consumers' perception of the area (Wolf, 2000).

Reduce Crime

Chicago apartment buildings with high amounts of greenery compared to none saw a 52% reduction in crime (Kuo and Sullivan, 2001a). Areas that have 'medium' amounts of greenery expereince a 42% reduction in crime (Kuo and Sullivan, 2001a).

Improve Property Value

Trees in a neighborhood or year increase residential property values by an average of 7%. Commercial property rentals were also 7% higher if trees were present on properties (Wolf 2007).

Improve Perception of Goods

On average consumers, will pay about 11% more for goods in landscaped areas and 50% more for convenience goods. Consumers feel the quality of goods is better in businesses districts surrounded by trees than those considered barren. (Wolf, 1998a, Wolf, 1999, and Wolf, 2003).

Reduce Stress

Trees reduce the stress of drivers. They also decrease traffic speeds creating safer streets. Also, psychosocial signs of stress, such as muscle tension and pulse rate decrease within 3 or 4 minutes when a person is surrounded by trees (Wolf 1998a, Kuo and Sullivan, 2001b).

Improve Health + Wellness

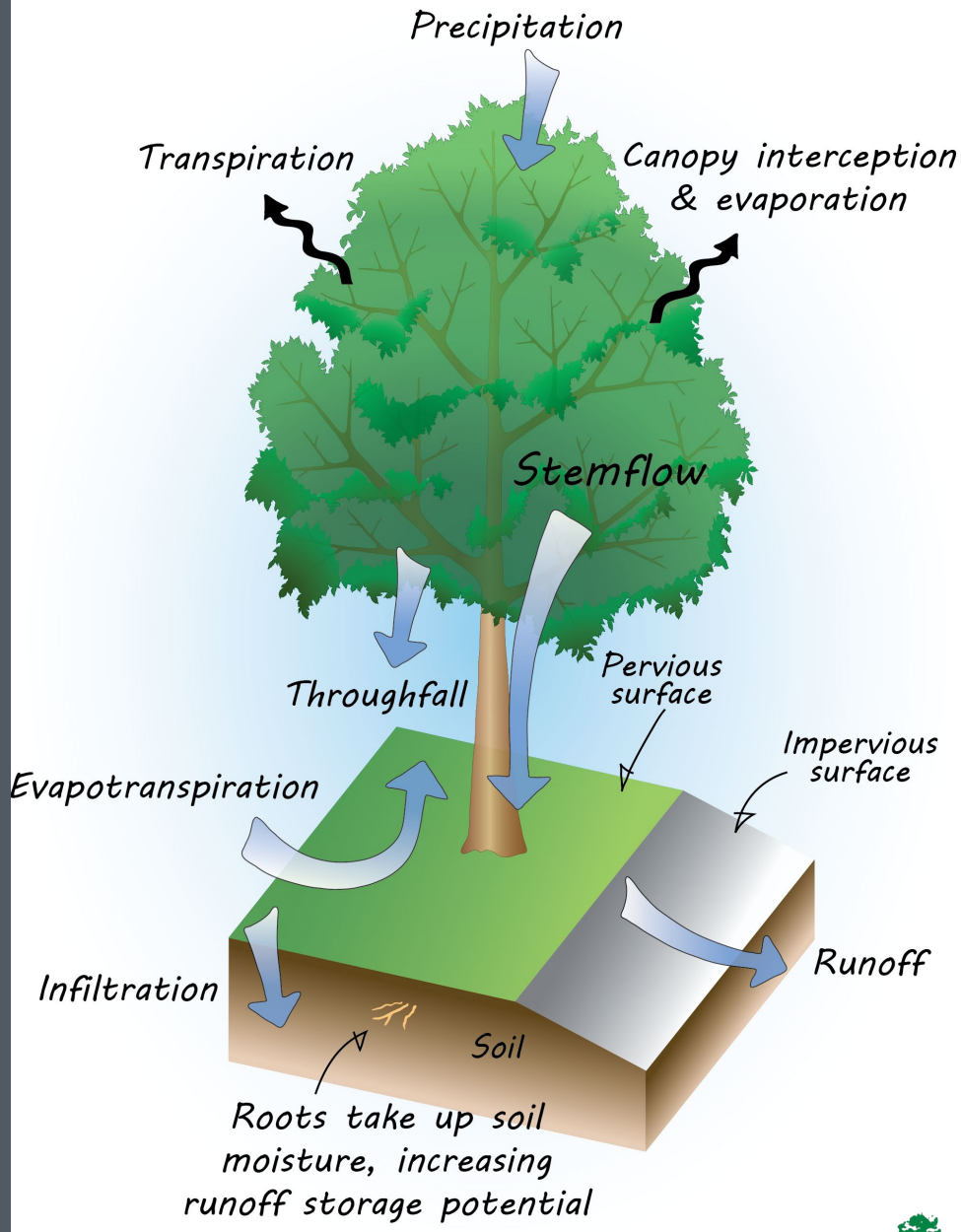
Employees who can see trees experience 23% less sick time and report higher satisfaction with their job (Wolf, 1998a). Recovering hospital patients who had a view of trees required fewer pain relievers, experienced fewer complications, and left sooner than other patients (Ulrich

TREE BENEFITS

Why use trees to help stormwater

STORMWATER-RELATED TREE BENEFITS

- Erosion control
- Rainfall interception and uptake
- Pollutant uptake



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Benefit	Quantity	Unit	Amount
AIR: Carbon Monoxide (CO) Removed	220	lbs.	$146
AIR: Nitrogen Dioxide (NO_2) Removed	1,169	lbs.	$125
AIR: Ozone (O_3) Removed	8,380	lbs.	$7,120
AIR: Sulfur Dioxide (SO_2) Removed	377	lbs.	$12
AIR: Dust, Soot, Other Particles Removed (Particulate Matter, PM_{10})	1,570	lbs.	$4,905
Carbon Sequestered	786	tons	$28,437
Avoided Stormwater Runoff	2,047,688	gals.	$2,048
Annual Benefits Value			**$42,793**
Carbon Storage Over Canopy's Lifetime (not an annual benefit)	18,723	tons	$677,040
Total Benefits Value Overall			$719,833

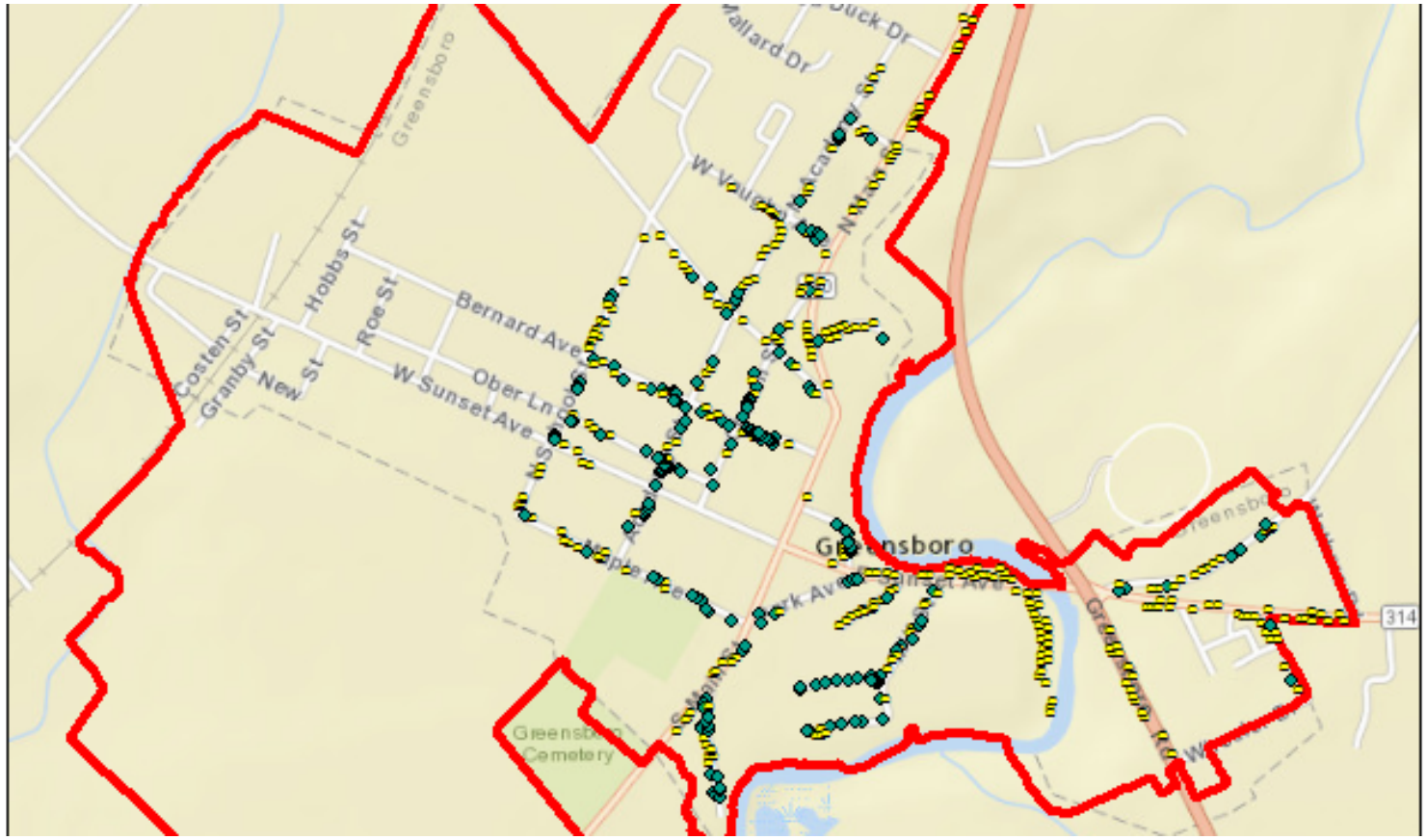
GREENSBORO'S TREE CANOPY PROVIDES:

TREE INVENTORY

TREE CANOPY ASSESSMENT

INPUT

INFORMATION NEEDED
TO DEVELOP A TREE PLAN



TREE INVENTORY

A tree inventory is a database which houses information about trees such as location, species, condition, and maintenance need. It also can have the locations of vacant planting site.

On-the-ground data collection by arborists.

Existing Trees
(Green)

Vacant Planting Sites
(Yellow)

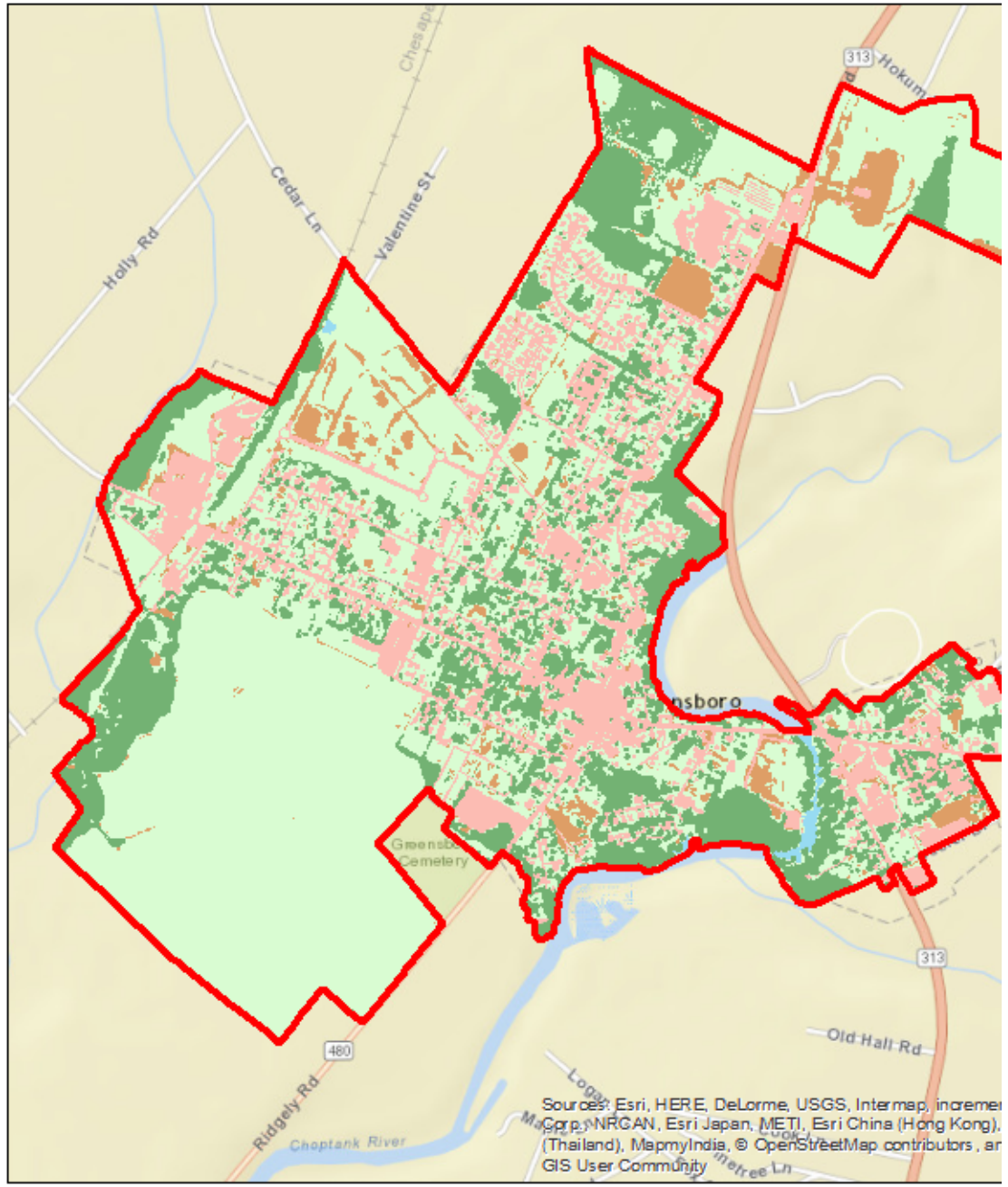
URBAN TREE CANOPY ASSESSMENT

An urban tree canopy assessment or UTC is a top down view of land cover.

Data collected for analysis are tree canopy, pervious/impervious surfaces, water and bare soils are mapped and their percent cover estimated.

GIS study.

Greensboro's tree canopy cover was 23% in 2015.



Land Use Type	Total Acres	Tree Canopy		Potential Future Canopy		
		Acres	Percent Cover	Potential for New Canopy (Acres)	Potential Future Percent Coverage	Maximum Tree Canopy Cover Possible
Agriculture	278	28	10%	0	0%	10%
Commercial	32	5	16%	10	31%	47%
Forest	17	15	87%	1	5%	93%
Industrial	23	5	22%	8	36%	58%
Institutional	27	5	19%	8	29%	47%
Other Developed Lands	22	6	28%	7	33%	62%
Residential - High Density	23	4	19%	8	37%	56%
Residential - Medium Density	162	45	27%	69	42%	70%
Residential - Low Density	83	32	39%	31	38%	76%
Residential - Very Low Density	17	11	63%	3	18%	81%
Wetlands	9	6	65%	1	12%	77%
Totals	693	162	23%	147	21%	45%

POTENTIAL TREE LOCATIONS

AND

CANOPY GOALS ARE DERIVED FROM THE **UTC**

INPUT

Staff, stakeholders, and public input is critical to the development, acceptance, and ultimately the implementation of any plan.

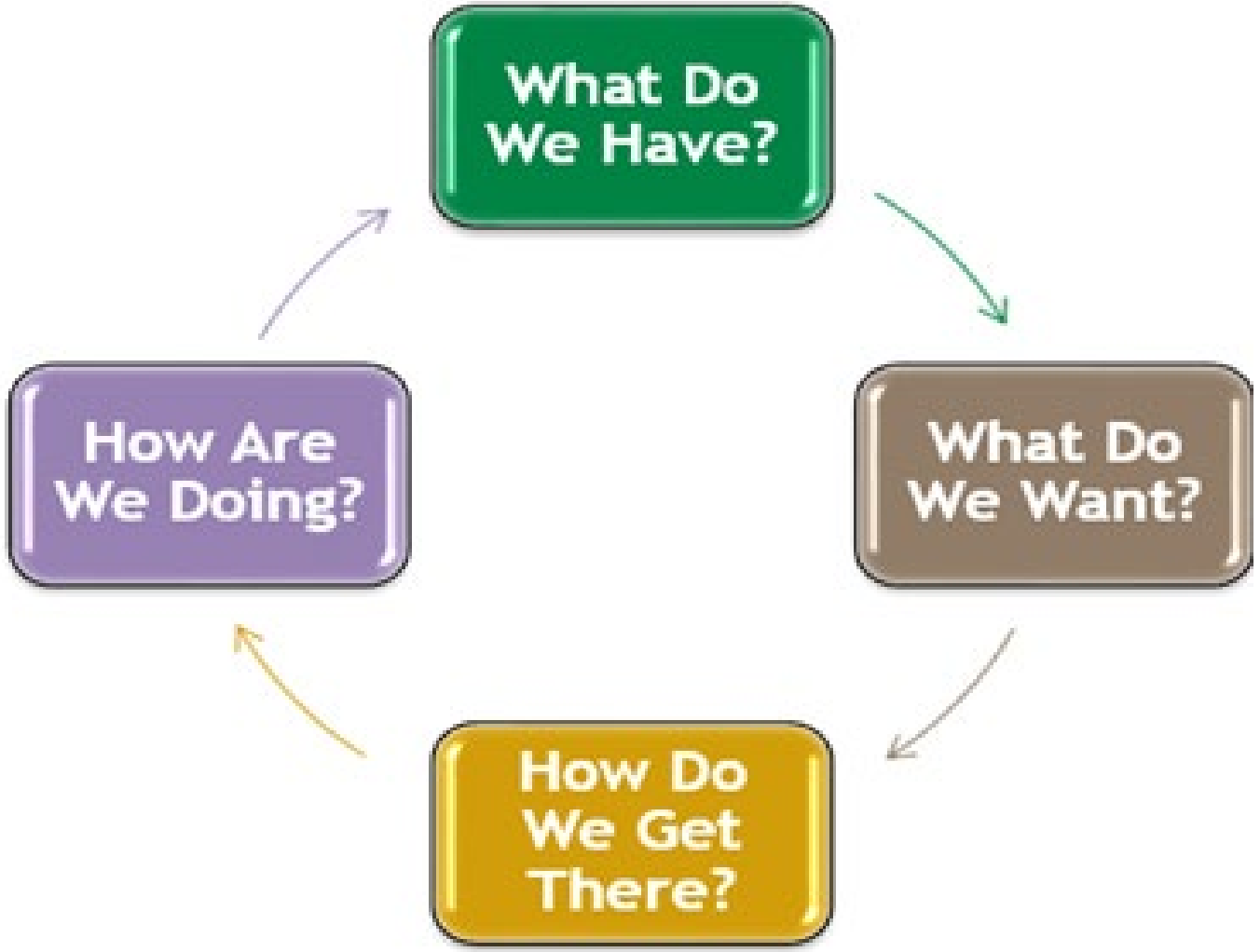
Helps to determine what we have and move forward to determining what we want.

In Greensboro, it is estimated that 90% of the tree canopy is privately owned.

For this reason, conveying the value of trees and tree canopy to the public is essential...

How do we Get There?

- Industry Standards
- Research
- Look to other programs
- Consider specific needs
- Education



Shores Rivers:
Goals and Strategies

Goal: Reduce Pollution

Goal: Increase the benefits trees provide

Strategy : Set a canopy goal

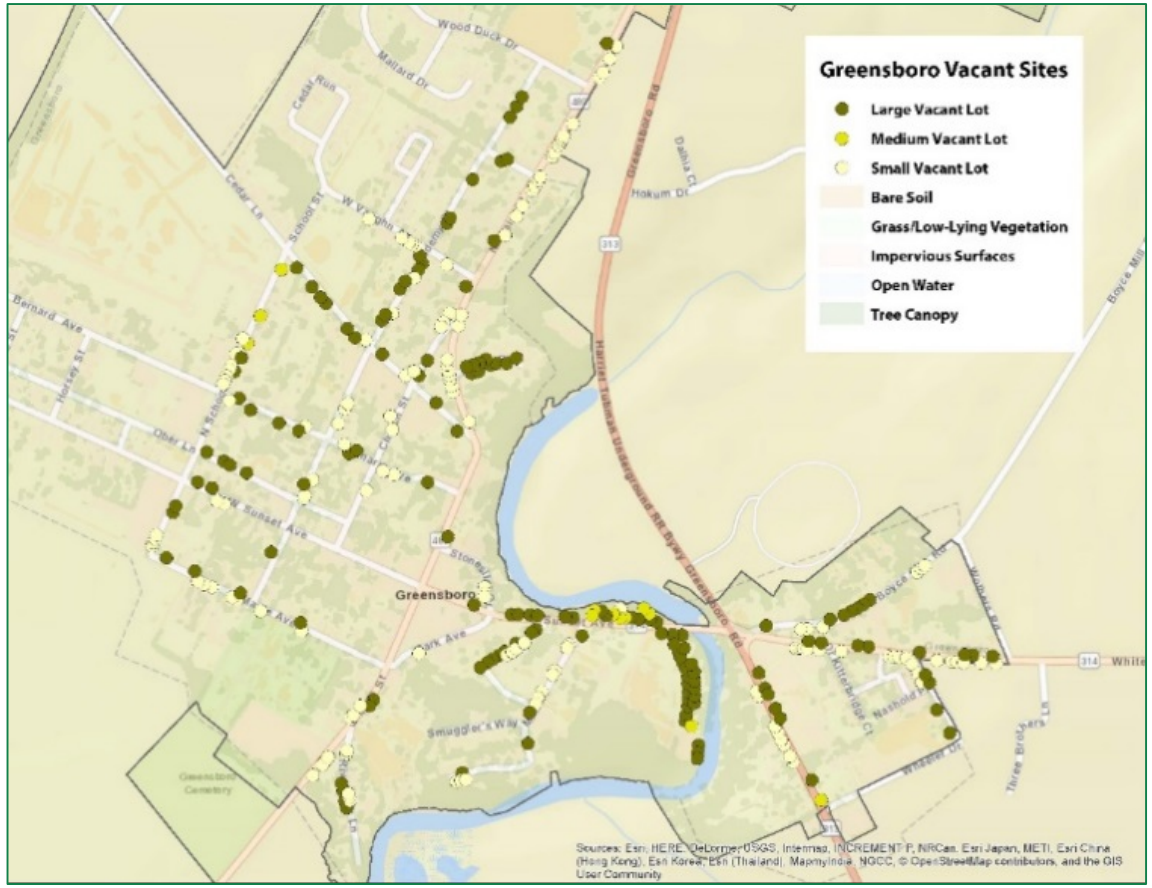
Strategy : Educate the public on the value of existing trees

Avoided Stormwater Runoff = 2,047,688 gals/yr.

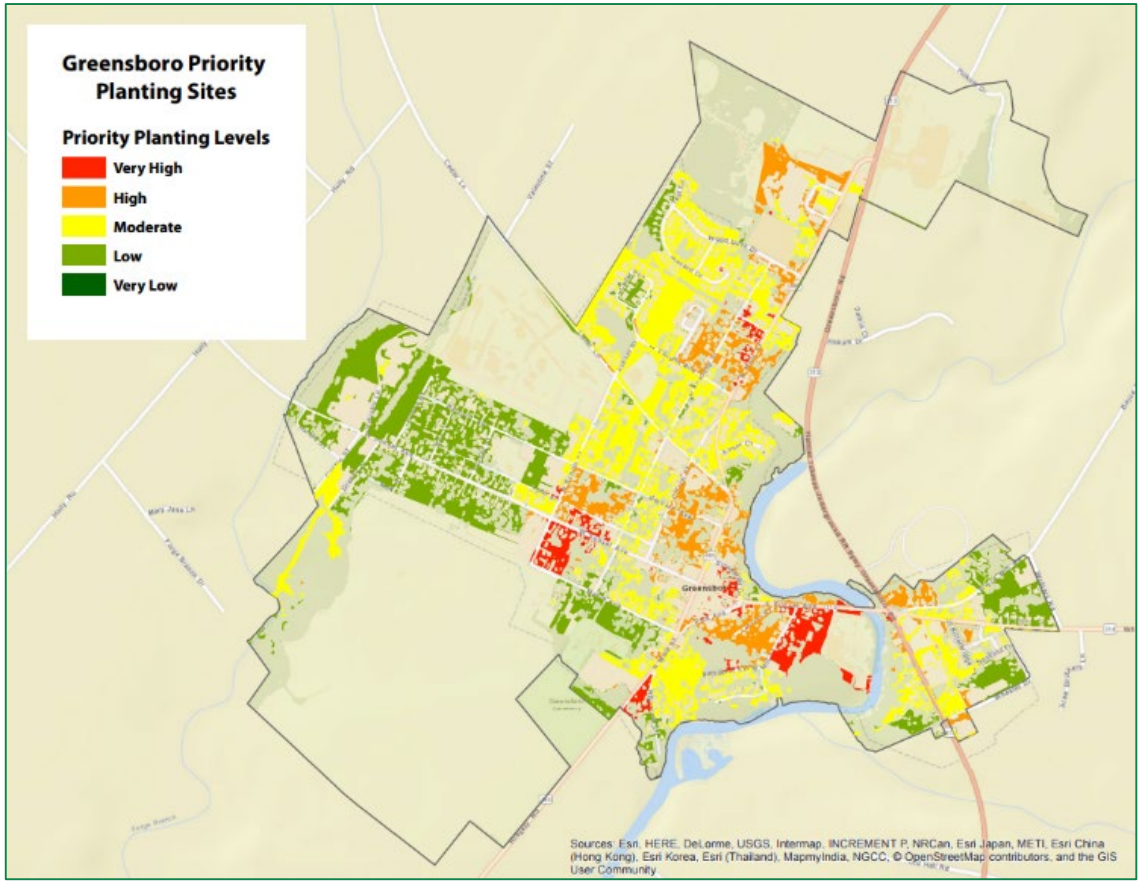
Strategy: Develop a “Heritage Tree Program”

Strategy : Demonstration project –Show the impacts of trees

Strategy: Develop and Implement a Multi-Year Community Tree Planting Plan



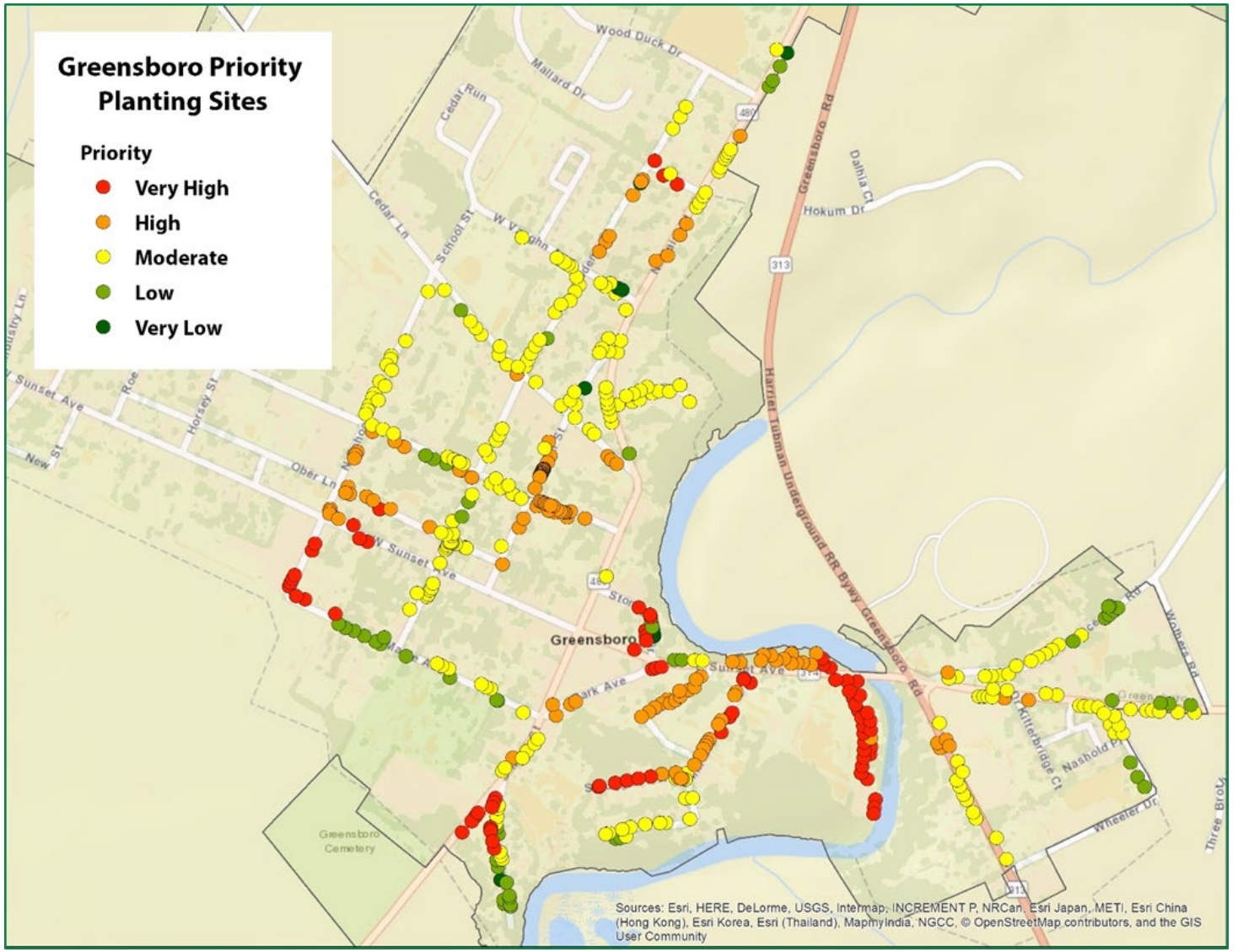
Planting locations in Greensboro



Priority planting areas in Greensboro

PRIORITIZE TREE PLANTING EFFORTS

Focus tree planting in areas that will do the most immediate good.



FIELD DOC

High Priority Planting Site

USFW

INSTALLATION SUMMARY

	Installed 2016-09-15	Planned 2016-06-15	Installed To-Date
Length of Buffer Installed (ft)	920	920	**920.00**
Average Buffer Width (ft)	20	20	--
Number of Trees Planted	46	46	**46**
Tree Density (# per acre)	**108.90**	**108.90**	--

LOAD & REDUCTIONS

	Pre-BMP Load	Installed Reduction 2016-09-15	Planned Reduction 2016-06-15	Reduction To-date
Nitrogen (lbs/yr)	6.93	3.62	3.62	**3.62** lbs/yr
Phosphorus (lbs/yr)	0.29	0.20	0.20	**0.20** lbs/yr
Sediment (tons/yr)	0.02	0.02	0.02	**0.02** lbs/yr

CHESAPEAKE BAY METRICS

	Installed 2016-09-15	Planned 2016-06-15	Installed To-date
Acres of Riparian Restoration	0.42	0.42	**0.42** acres
Miles of Riparian Restoration	0.17	0.17	**0.17** miles
Number of Trees Planted	46	46	**46** trees

"RIGHT TREE, RIGHT PLACE"

Best overall performing was sweetgum for storm water attenuation 2.9 m3 (766 Gallons) or 17% to 27% over 7 years.

London Planetree was the best if judged solely on evaporation and attenuation.

Silver maple was ranked best in growth rate and increase in leaf area as a form of attenuation.

GO BIG – UNDERGROUND SPACE MATTERS

For stormwater management, always plant the right tree in the right place.

And...

Use **engineered systems** designed to store a volume of runoff or create underground space for tree roots thrive.

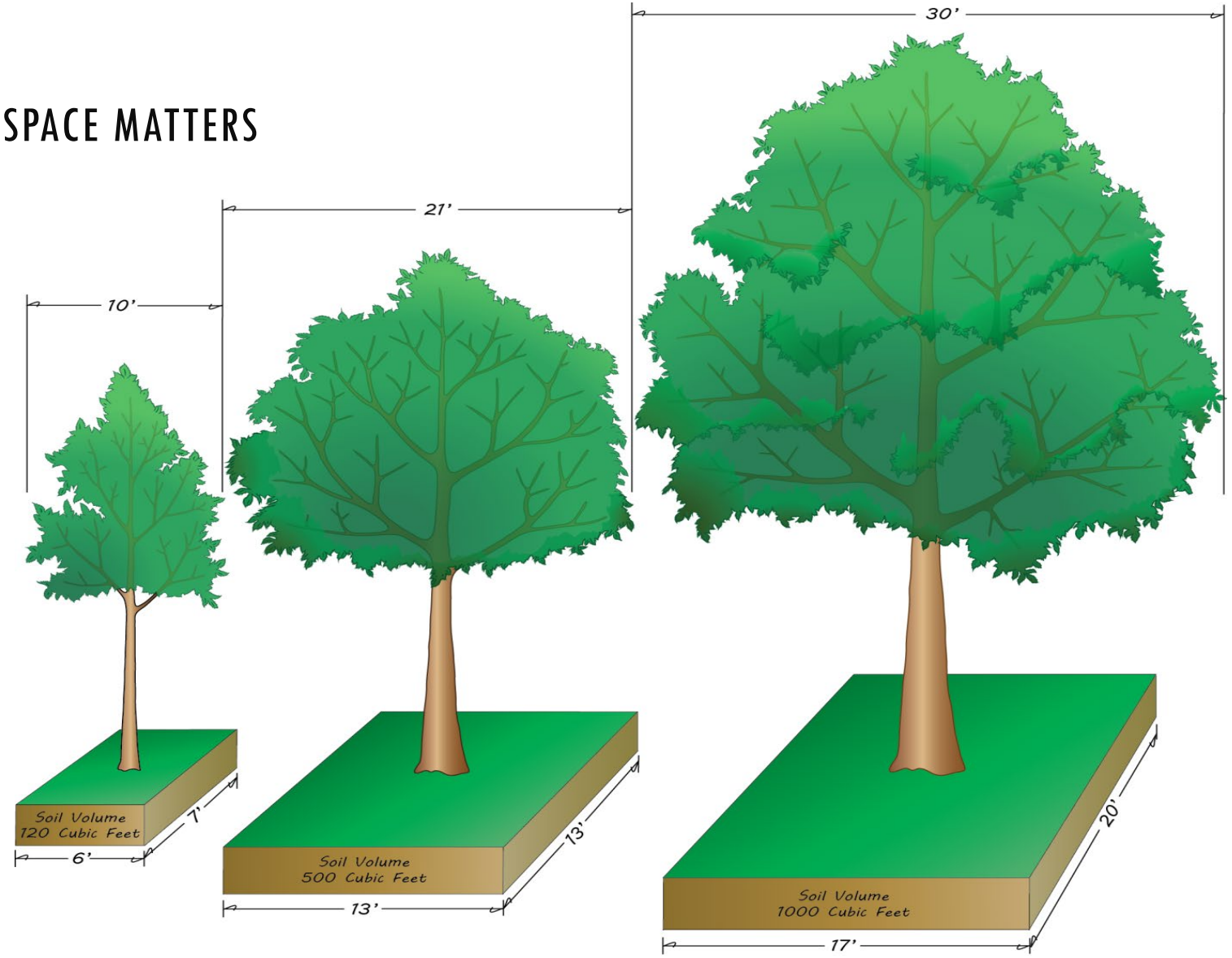
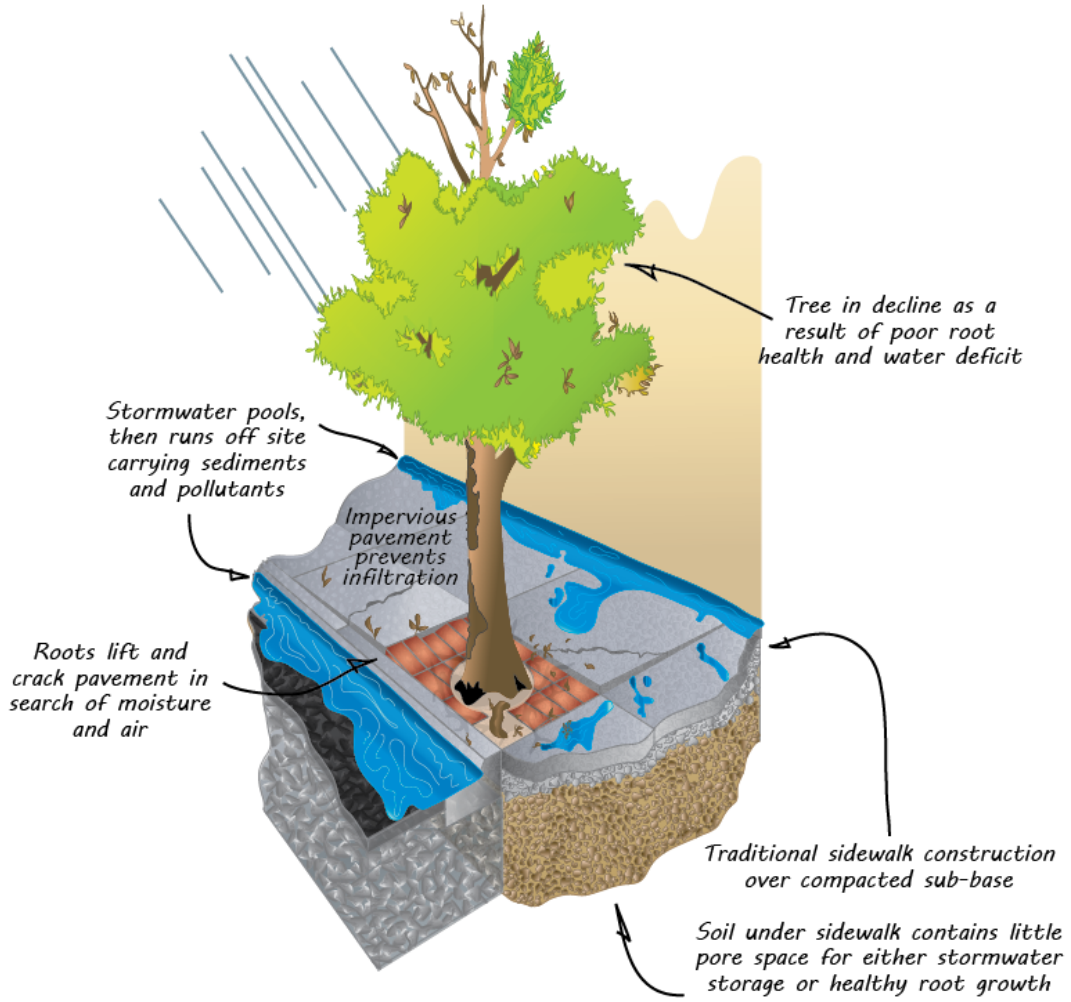
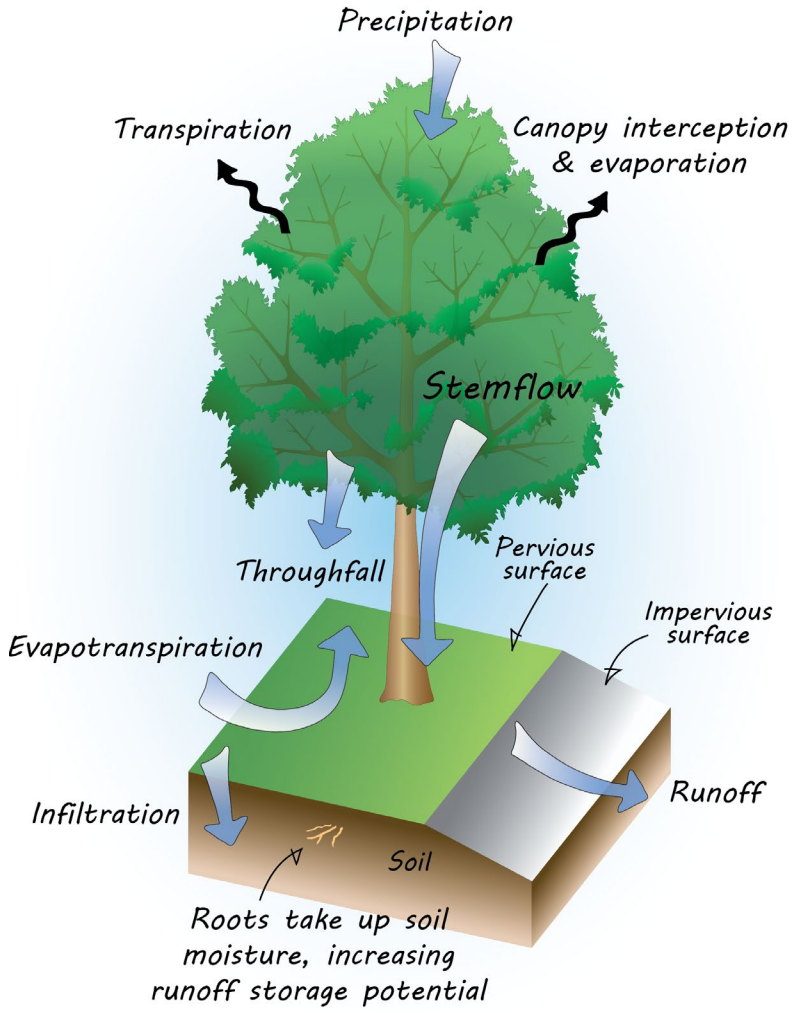
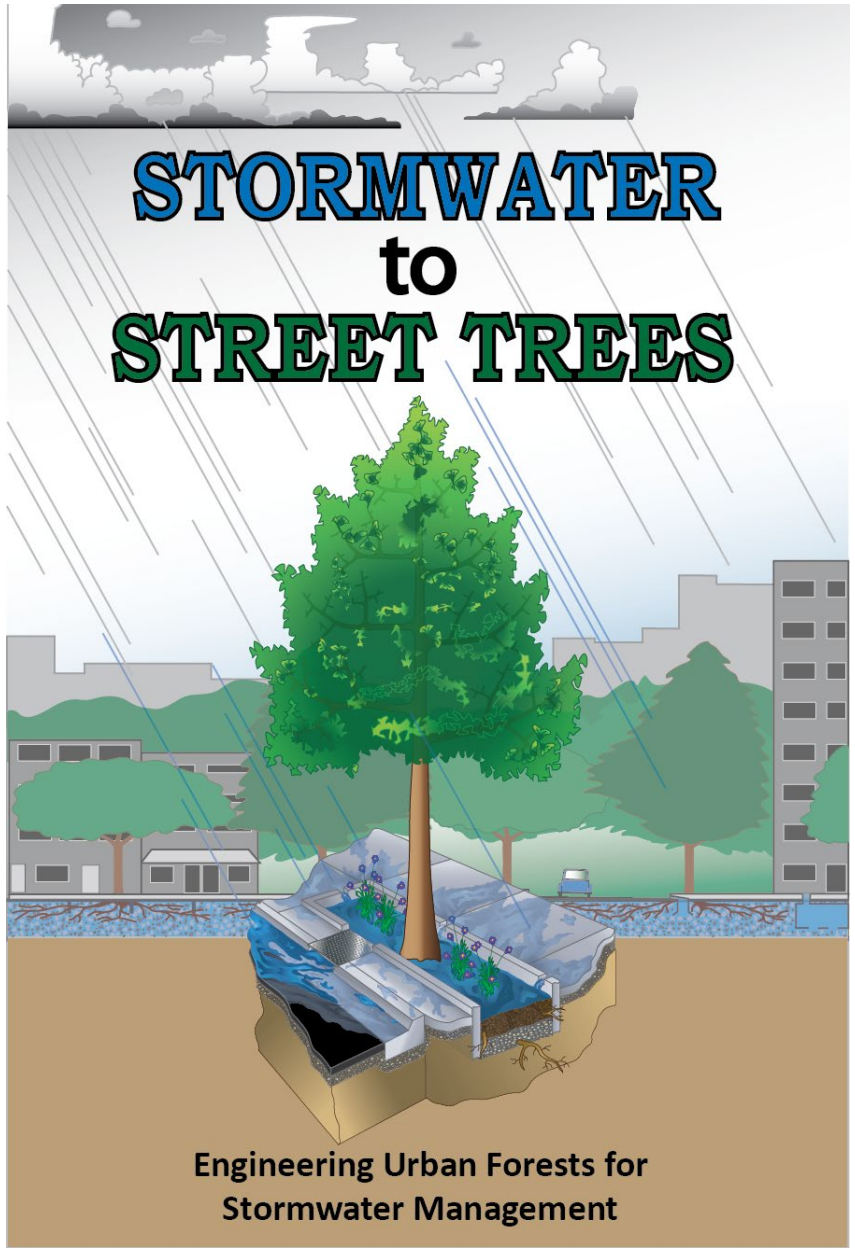


Diagram based on the work of Casey Trees, 2008


Tree in decline as a result of poor root health and water deficit
Stormwater pools, then runs off site carrying sediments and pollutants
Impervious pavement prevents infiltration
Roots lift and crack pavement in search of moisture and air
Traditional sidewalk construction over compacted sub-base
Soil under sidewalk contains little pore space for either stormwater storage or healthy root growth


Precipitation
Transpiration
Canopy interception & evaporation
Stemflow
Throughfall
Pervious surface
Impervious surface
Evapotranspiration
Infiltration
Runoff
Soil
Roots take up soil moisture, increasing runoff storage potential

USEPA


STORMWATER
to
STREET TREES
Engineering Urban Forests for
Stormwater Management

SUMMARY—MAKE TREES PART OF YOUR PLAN

Trees reduce:

Erosion

Runoff

Throughfall

Pollutants entering Waterways

Trees benefit not only water quality, but also:

Human Health

Property Values

Value of Goods

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THANK YOU