

Trees to Offset Stormwater

Follow-up on Green Infrastructure
Center recommendations

Overview

Case Study Report

- Purpose was to study City's forest canopy and the role that trees play in up taking, storing, and releasing water
 - Help evaluate integration of trees into stormwater management
 - Identify stormwater benefits of tree conservation and replanting
 - Evaluate need for improved forest management as City continues to develop
- Final report from GIC outlines 18 recommendations to help update City codes, ordinances, and practices

- GIC presented project outcome overview to Council
- Core staff review team:
 - Urban Forestry: Aaron Reese, Forestry Management Supervisor
 - Engineering: Rob Gordon, Plan Review Engineer
 - Stormwater: Anna Reh-Gingerich, Watershed Coordinator, Heal Our Waterways
 - Jennifer Butler, Stormwater Education Manager
 - Planning: Megan Upchurch, Associate Planner
 - GIS: Saskia Cohick, Stormwater GIS Manager
- These departments, as well as Manager's office, provided input
- GIC provided recommendations, but did not prioritize
- Recommendations prioritized based on staff assessment

What is the Urban Forest?

https://www.youtube.com/watch?v=gRVmv_uxfxE

What value do we get from our urban forest?

<http://www.treebenefits.com/calculator/index.cfm>

GIC Recommendations, Prioritized by Staff

Staff Priority 1:

GIC: Develop an Urban Forestry Management Plan (UFMP)

- **Definition:** a roadmap that creates a shared vision for the future of our tree canopy. Includes:
 - A Vision for the urban forest
 - Inventories and assessments of current urban forest
 - Strategic Plan: goals, objectives, and actions
 - Implementation Plan
 - Monitoring Plan
- **Budget impacts:**
 - Consultant to develop and write a comprehensive UFMP
- **Urban Forestry**

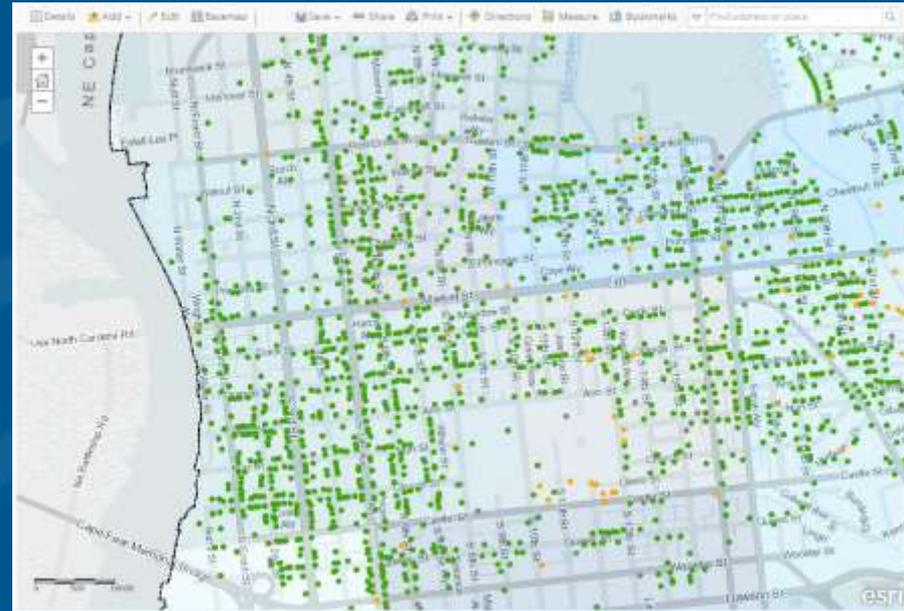
Potential Costs for UFMP

- \$100,000-\$220,000+
- Scope ranges from basic management program/needs assessment up to Urban Forest Master Plan
- Tree inventory
 - Estimate for full street tree inventory is \$120,000
 - Inventory can be performed in sections to reduce yearly budget impact
 - Start with 1945 limits, work outward in subsequent years

Staff Priority 2:

GIC: Determine urban forestry data needs and which software will best collect the needed data. Implement the data collection process.

- Budget impact: Consultant
 - Use software/programs already in use if appropriate
 - Consultant initial for data collection (tree inventory)
- Urban Forestry GIS

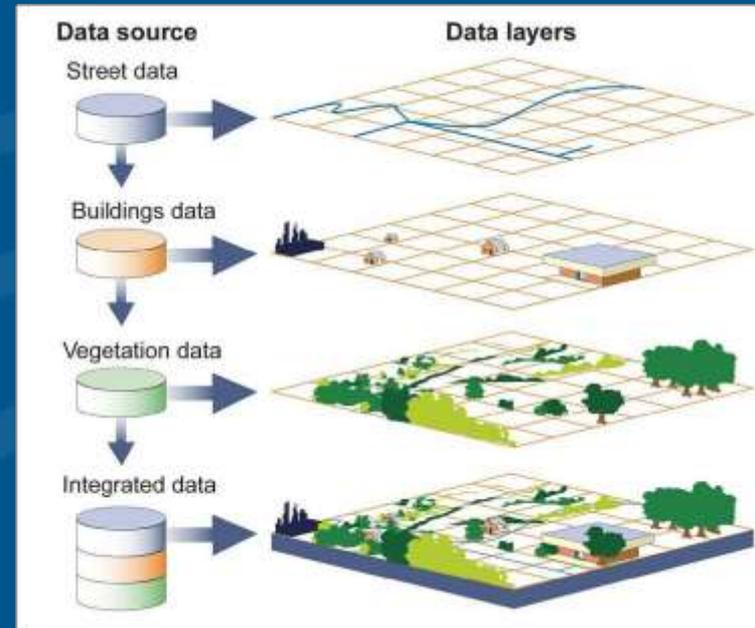


Staff Priority 3:

GIC: Add a Geographic Information Systems (GIS) staff person to the Parks and Recreation Department.

Staff recommends:

- Additional GIS resources
 - Shared between departments to reduce budget impact
- Parks, GIS

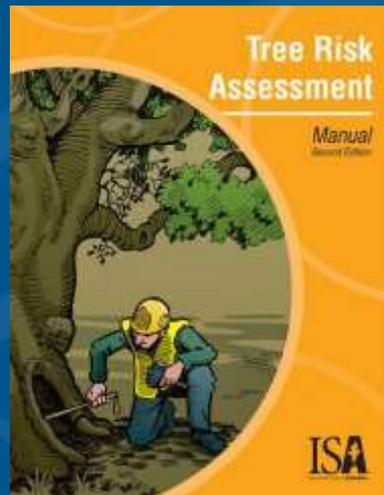


Source: GAO

Staff Priority 4:

GIC: Perform tree risk assessments. Increase assessment intervals in densely populated portions of the city.

- Budget impact: Additional training for current staff, possibly additional staff or consultant to get to proactive assessments
- Urban Forestry



ISA Basic Tree Risk Assessment Form

Client _____ Date _____ Time _____
Address/Tree location _____ Tree no. _____ Street _____ of _____
Tree species _____ dbh _____ Height _____ Crown spread dia. _____
Assessor(s) _____ Time taken _____ Tools used _____

Target ID	Target description	Target score			
		Target size	Target condition	Target proximity to people/property	Target potential for damage
1					
2					
3					
4					

Site Factors

History of failures _____ Topography Flat Slope _____ % Aspect _____
Site changes None Grade change Site clearing Chemical hydrology Root cut Describe _____
Soil conditions (moist volume) Saturated Shallow Compacted Poorment over root _____ % Describe _____
Prevailing wind direction _____ Common weather Strong wind Ice Snow Heavy rain Describe _____

Tree Health and Species Profile

Vigor Low Normal High Foliage None (season) None (year) Normal _____ % Chlorotic _____ % Necrotic _____ %
Pests _____ Abiotic _____
Species below profile: Branches Trunk Root Describe _____

Load Factors

Wind exposure Protected Partial Full Wind tunneling Relative crown size Small Medium Large
Crown density Sparse Normal Dense Interior branches Free Normal Dense View/Obstruction/Noise _____
Recent or planned change in load factors _____

Staff Priority 5:

GIC: Increase the number of tree protection mechanism inspections and enforcement staff.

- Budget impacts: 1 FTE
- Additional staff needed to inspect and enforce compliance with tree protection measures
 - Also: TRC plan review and tree permits
 - ISA Certified Arborist
- Zoning, Planning, Urban Forestry



GIC: Develop a forestry emergency response plan.

Priority Level: HIGH

- Budget impact: Hire consultant
- Part of UFMP
- Urban Forestry



URBAN FORESTRY EMERGENCY OPERATIONS PLANNING GUIDE FOR STORM RESPONSE

GIC: Work with developers to shrink the development footprint to minimize impervious surface.

Priority Level: HIGH

- Variable application based on urban context
- Already being done at TRC concept review
 - Possibility of pre-concept planning review being discussed
- Focus on priority watersheds
- No direct budget impact
- No additional staff
- Planning (LDC)
Stormwater/HOW



GIC: Use Silva Cells or other similar trade product, to provide adequate soil volume for trees in dense urban conditions.

Priority Level: HIGH

- Budget impact: Significant costs in CIPs
- No additional staff
- Planning (LDC)
Engineering
(Tech. standards, inspectors)



GIC: Revise city planting lists to reduce the number of non-native invasive species listed. Develop a prohibited planting list.

Priority Level: HIGH

- No direct budget impact
- No additional staff
- Urban Forestry, Planning (LDC), Stormwater/HOW
- Being addressed in Code rewrite
- Consider a policy regarding non-native/invasive tree species

GIC: Remove the extra spaces requirement when using variable space sizing in parking lots.

Priority Level: HIGH

- No direct budget impact
- No additional staff
- Planning (LDC)
 - In process with Code rewrite
 - “Right-sizing” parking

GIC: Publicize Wilmington's ROW tree planting program and encourage more citizens to plant in ROWs near their homes.

Priority Level: High

- Budget impact: staff time
- No additional staff
- Tree giveaways
- HOW:
 - Funds for trees to be planted in priority watersheds
- Urban Forestry
Stormwater/HOW
Wilmington Tree Commission



GIC: Devote city resources to organization and training of a Wilmington tree stewards group.

Priority Level: High

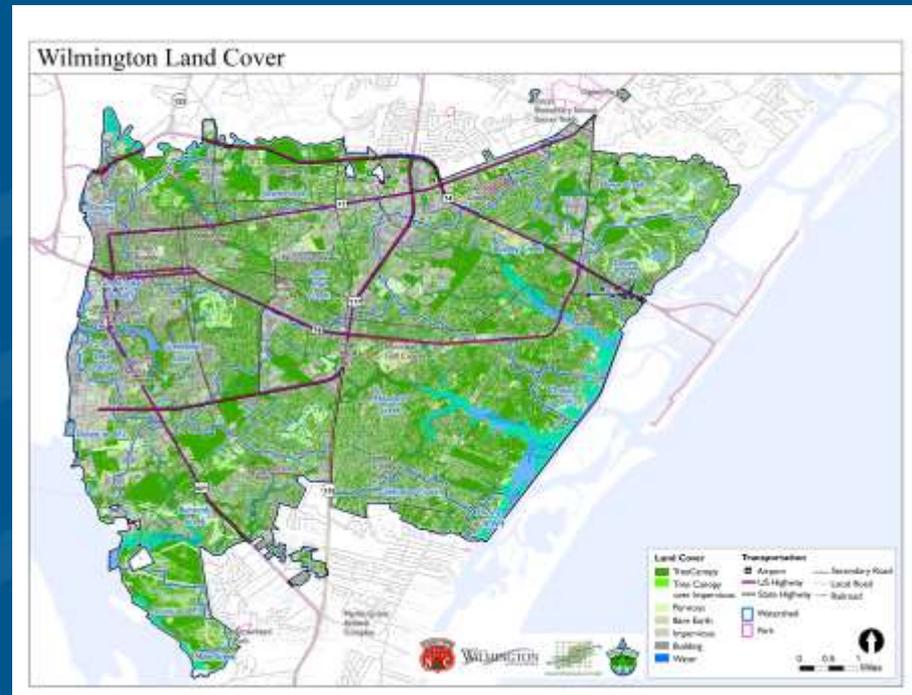
- Budget impact: ongoing staff support
- Community engagement for planting new trees and basic maintenance of young trees
 - Grant-funded plantings
 - Re-establish “Pruning Corps”
- Urban Forestry, WTC



GIC: Conduct a land cover assessment every four years to determine and allow for comparison of tree canopy coverage change over time.

Priority Level: Medium

- Additional GIS resources
 - See Priority 2
- Canopy coverage map developed
 - Provides baseline canopy data
 - Can be updated to view changes
 - **2017**: very good at **48%** canopy coverage, but unevenly distributed
 - 999 acres of tree canopy
- Urban Forestry, GIS



Tree Canopy Comparison

- The following targets are recommended for cities east of the Mississippi*:
 - 40% tree canopy overall or city wide
 - 50% tree canopy in suburban residential areas
 - 23% tree canopy in urban residential areas
 - 15% tree canopy in central business districts

*Recommended by American Forests, a national non-profit tree conservation group

Canopy Coverage Comparisons

GIC Study

State	Locality	TOTAL CANOPY COVERAGE
AL	Auburn	54%
GA	Alpharetta	53%
VA	Lynchburg	51%
SC	Charleston	50%
NC	Wilmington	48%
NC	Apex	46%
FL	Jacksonville	42%
GA	Norcross	38%
FL	Orange County	33%
VA	Harisonburg	27%
VA	Norfolk	26%
FL	Miami	17%

Various US Cities

City/State	Canpy Coverage
Lynchburg, VA	51%
Orange County, FL	51%
Wilmington, NC	48%
Columbia, PA	43%
Annapolis, MD	41%
Roanoke, VA	35%
Boston, MA	29%
New York City, NY	24%
Seattle, WA	23%
Milwaukee, WI	21%
Baltimore, MD	20%
St. Louis City, MO	18%
Chicago, IL	17%
Denver, CO	10%

GIC: Require tree canopy coverage percentages by land use.

Priority Level: Medium

- No direct budget impact
- No additional staff needed
- Being evaluated relative to current standards in LDC
 - Staff recommends percentage by land *type*
- Planning

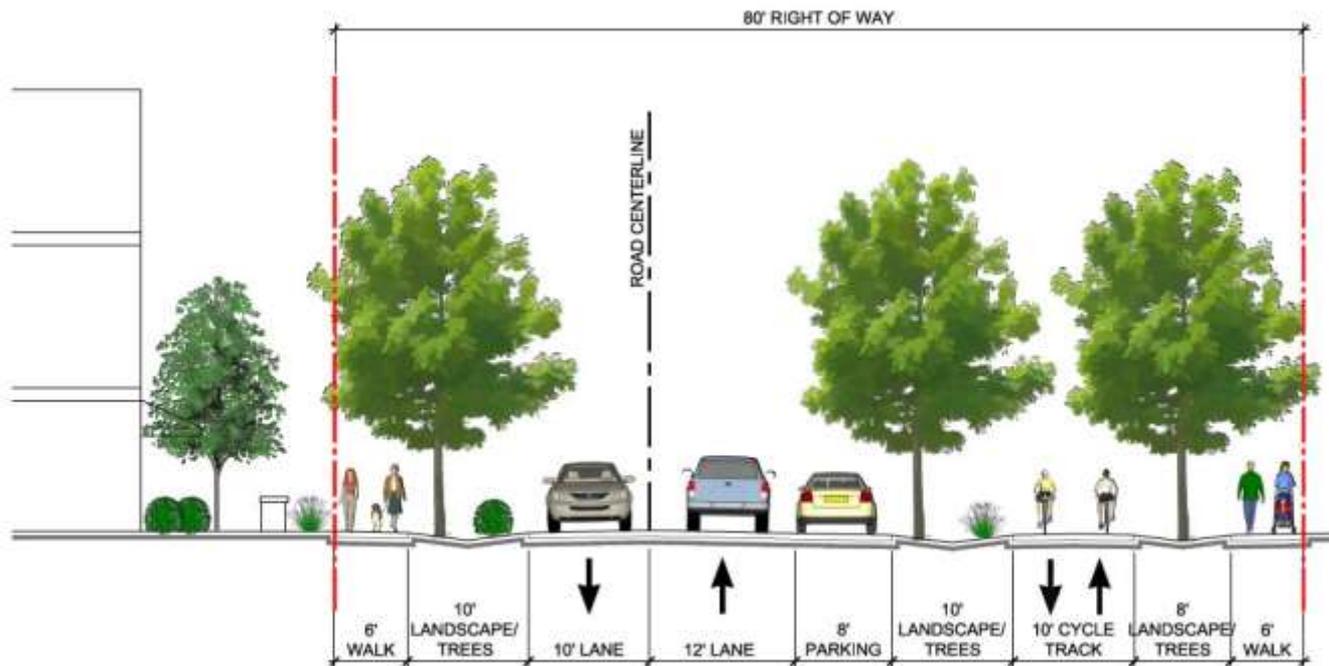


GIC: Adopt a complete green streets policy.

Priority Level: Medium

- A street with dedicated space for vehicles, cyclists, and pedestrians, incorporating green space and retention areas to treat stormwater runoff
- Budget impact: additional costs in CIPs
- No additional staff, possibly consultant
- All City departments





2 EAST SECTION: CYCLE TRACK & SIDEWALKS, NO CURBING OR PARKING
SCALE 1/4" = 1'-0"

GIC: Use the GIC's stormwater uptake calculator to determine the benefits of maintaining or increasing tree canopy goals by watershed.

Priority Level: Medium

- No direct budget impacts
- No additional staff; possible intern project
- Focus on priority watersheds
- Planning Stormwater/HOW Urban Forestry

Wilmington, NC Urban Tree Canopy Stormwater Model version July 15, 2016

The Green Infrastructure Urban Tree Canopy Stormwater Model estimates stormwater runoff yields for current and potential land cover. The methodology is based upon the NRCS TR-55 method for small urban watersheds. It is used to provide better estimates using GIC's high-resolution land cover and modeling of potential canopy area.




TOTALS		45.3%	27.6%	112.2	68.9	33.4	90%							
Statistics by Drainage Basin (current settings)														
Area	Tree Cover %	Impervious Cover %	Tree H2O Capture	Increased H2O w/oc% tree loss	Added H2O Capture w/oc% PFA	Tree Cover Goal %	Peak an Event	Peak 2-505 estimate		Enter Canopy % (current)	To be Installed			
								% UTC loss	%FUG Loss			PCA	PFA	Add Canopy
1) Barnards Creek	46.6%	33.8%	3,114	7,24	3.88	57%	3 yr / 24 hour	10%		34.4%	14.8%	4%	15.4%	5,172
2) Bradley Creek	46.6%	35.3%	3,539	33.88	4.01	52%	3 yr / 24 hour	10%		31.4%	12.8%	3%	20.8%	4,809
3) Burnt Mill Creek	43.3%	37.8%	3,201	6.28	3.69	46%	2 yr / 24 hour	10%		35.4%	11.1%	2%	20.8%	4,207
4) Drains to CF1	34.8%	48.8%	1,117	5.51	0.54	10%	3 yr / 24 hour	10%		44.9%	14.4%	4%	15.4%	833
5) Drains to CF2	27.1%	45.4%	3,571	5.59	1.05	11%	3 yr / 24 hour	10%		43.9%	16.4%	4%	15.4%	1,588
6) Drains to CF3	52.6%	31.9%	1,73	5.34	0.39	44%	3 yr / 24 hour	10%		37.3%	8.6%	2%	20.8%	711
7) Drains to KCW3	53.8%	28.8%	4,41	2.88	2.28	54%	3 yr / 24 hour	10%		39.3%	16.1%	4%	15.4%	1,314
8) Drains to KCW5	48.1%	32.9%	3,34	0.75	0.54	49%	3 yr / 24 hour	10%		38.3%	12.4%	2%	20.8%	482
9) Drains to KCW4	38.1%	47.9%	853	6.31	0.37	41%	3 yr / 24 hour	10%		36.8%	12.4%	2%	20.8%	488
10) Greenfield Lake	41.3%	48.4%	5.96	4.54	2.11	44%	3 yr / 24 hour	10%		34.3%	15.4%	2%	20.8%	581
11) Greenfield Lake Outfall1	43.3%	35.4%	8.52	6.27	0.31	44%	3 yr / 24 hour	10%		35.3%	10.8%	2%	20.8%	581
12) Greenfield Lake Outfall2	43.6%	32.2%	6.29	8.83	0.23	52%	3 yr / 24 hour	10%		38.4%	10.8%	2%	20.8%	521
13) Hewlett Creek	55.6%	33.6%	16.54	15.46	7.33	54%	3 yr / 24 hour	10%		43.4%	11.8%	3%	20.8%	7,643
14) Howe Creek	43.3%	34.8%	7.54	4.17	3.15	38%	3 yr / 24 hour	10%		36.4%	20.4%	3%	15.4%	2,544
15) Mott Creek	48.9%	33.8%	6.81	6.86	0.25	52%	3 yr / 24 hour	10%		40.4%	11.4%	2%	20.8%	272
16) Smith Creek	42.8%	34.3%	8.25	6.59	3.68	46%	3 yr / 24 hour	10%		34.4%	14.4%	4%	15.4%	3,314
17) Whiskey Creek	53.6%	28.5%	3.86	0.98	0.98	57%	3 yr / 24 hour	10%		37.3%	14.2%	4%	15.4%	539

GIC: Remove the exception for tree inventory requirements on lots with single family homes that are two acres or smaller.

Priority: Low

- Currently, permits/tree inventories are required for all lots 2 acres or more
 - May be reduced to 1 acre with LDC rewrite
- Planning

GIC: Offer stormwater fee reduction credits for tree plantings. *

Priority Level: Low

- Budget impact: additional staff needed for increased inspections and enforcement
- A credit program is already in place
 - Credits only for permitted stormwater BMPs
 - Review and make adjustments, if needed
- Stormwater/HOW

- *Seen as any incentive to plant trees on residential or commercial properties.

Next Steps

- Proceed with RFP for development of Urban Forestry Management Plan
 - FY 20/21, budget impact: \$100,000-\$220,000+
- Provide dedicated GIS resources to maintain urban forest management records
 - FY 20/21, estimated budget impact: \$36,000/1,000 FTE hours
- Formalize current practices into an Emergency Management plan to replant trees after severe storms
 - FY 20, budget impact: staff time

Next Steps

- Establish stakeholder committee to:
 - Study and propose a methodology for implementing stormwater credits for tree planting and for existing tree canopy
 - Assess resident attitudes about impediments to maintaining and expanding trees on residential lots
 - Assess and prepare a financial benefit calculation showing tree canopy impact provided to Stormwater Enterprise Fund
 - Based on benefit, recommend proposed payment to tree management program in the General Fund
- FY 20/21, budget impact: need staff assigned to support committee

Next Steps

- Perform tree risk assessment of public trees
 - Completed after or in conjunction with Urban Forestry Management Plan
 - FY 21/22
- Maintain per capita funding devoted to Urban Forestry at least until UFMP is completed.
 - Currently \$8.33 per capita
 - NC average for Tree City USA communities in 2017 was \$7.57
- WTC work with staff to substantially increase public education and engagement about value of trees

“Without a management plan, the governments and individuals responsible for taking care of an urban forest will not be effective in meeting the true needs of the trees and the community. A management plan establishes a clear set of priorities and objectives related to the goal of maintaining a productive and beneficial community forest.”

--American Public Works Association, 2007c

Questions?



Liuzhou Forest City, China (under construction)