



Next question: What policies and practices are needed?

## **Codes and Policy Audit answers two questions:**

### **Do city policies allow too much impervious area?**

For example does the city mandate excessive parking area?

Does it provide incentives to reduce impervious area?

### **Can the city manage and expand the urban forest?**

For example, are tree care and management well funded and implemented?

Does the city have a strategy for planting trees in areas most in need?

# A spreadsheet is used to track each city's codes and forest management

	A	B	C	D	E	F	G	H	I	J	
1	<b>Trees and Stormwater Code Audit</b>										
2	<b>TREE CARE AND PROTECTION</b>										
3	Understanding the codes and ordinances that impact individual trees paints a picture for impacts on the urban tree canopy as a whole. This includes information about										
4	tree protection requirements, tree care practices and requirements on tree planting.										
5				Present?	Municipality Comments	Reviewer Comments	Source	What to Look For	Score	Potential Score	
6	<b>Tree Protection</b>										
7			Are tree inventories required when greater than 10,000 square feet of land is being disturbed? What DBH trees must be inventoried?	Yes		A tree survey is required for all development sites and includes hardwood trees 18" caliper and over in the RCA and on buffers on-site. The inventory must also be completed 50' offsite and include all trees 18" caliper and over. It is recommended to extend this requirement to softwoods as well and to all areas, not only those in RCA and buffer areas.	<a href="#">UDO 8.1.3C2d</a>	Include hardwoods 18" and over, softwoods 24" and over, and understory species 8" and over in tree inventories of proposed development properties. Require inventories of the entirety of the property including 100' offsite from all property boundaries. Require correct species identification, DBH size, and, general condition description. Municipalities which include the above requirements, score one point.	0	1	
8			Is tree protection fencing required (TPF) on public property? Is it required on private property?	Yes		Tree protection fencing is required within the RCA and in areas designated as tree save areas. Fencing is to be placed at 1 foot away from the trunk per inch in caliper radius. Add tree protection signage to better communicate with the public.	UDO 8.1.2(G)	Require tree protection fencing on public and private property. Municipalities which require tree protection fence on both public and private property score two points. Municipalities which require tree protection fence on public property score one point. Municipalities which do not require tree protection fence at all score zero points.	2	2	
9			Are other kinds of tree protection allowed/enforced (e.g. root pruning, aeration, vertical mulching)?	Not specified		The UDO states that "protection measures must adhere to generally accepted good design standards and practices."	UDO 8.1.3(G)(2)(c)	Create root pruning, mulch matting, and aeration matting details. Require the inclusion of these details on development plans. Inspect the site for adequate tree protection mechanism installation before any further work is permitted on-site. If all details are required and construction may not proceed on-site until tree protection device inspections have been completed, apply one point. If details are required but inspections are not required or details are not required and inspections are not required, apply zero points.	0	1	

# Reduce parking space requirements and increase parking lot perviousness.



- Some parking lots have excess spaces and therefore excess impervious surfaces and more stormwater runoff.
- Use Low Impact Development (LID) technology to increase parking lot perviousness, provide more shade, and increase parking lot attractiveness.

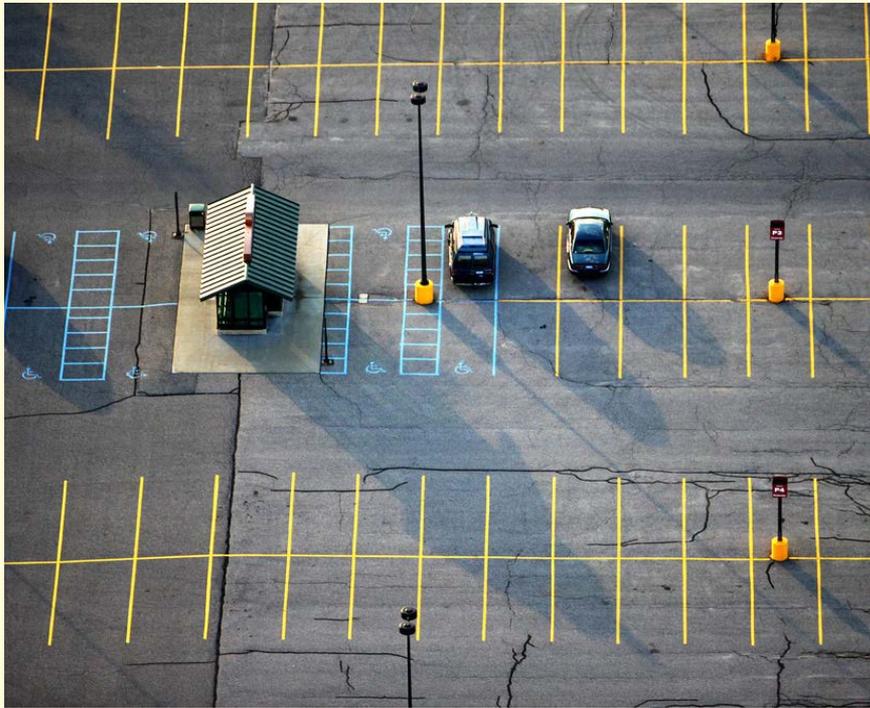
# Variable Space Sizing

Not all of us drive this →



← Some of us drive this.

# Changing Codes Example: Reduce Imperviousness in Parking Lots



## How?

- Match parking requirements to demand and sizing requirements
- Shrink some spaces and add trees with extra space – shaded pavement lasts longer!

# Clearing Land

Example from a pilot city:

- Ordinance allowed lot line to lot line clearing
- Revised ordinance proposes tree canopy requirements by district
  - 0% Downtown District
  - 10% Traditional Character District
  - 25% Suburban Character District
  - 15% Coastal Character District

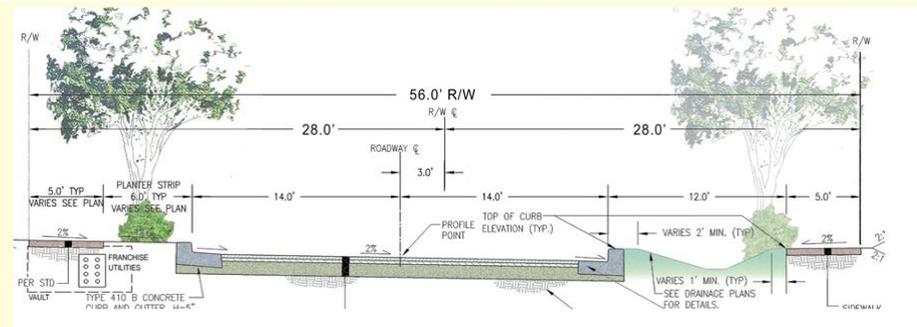
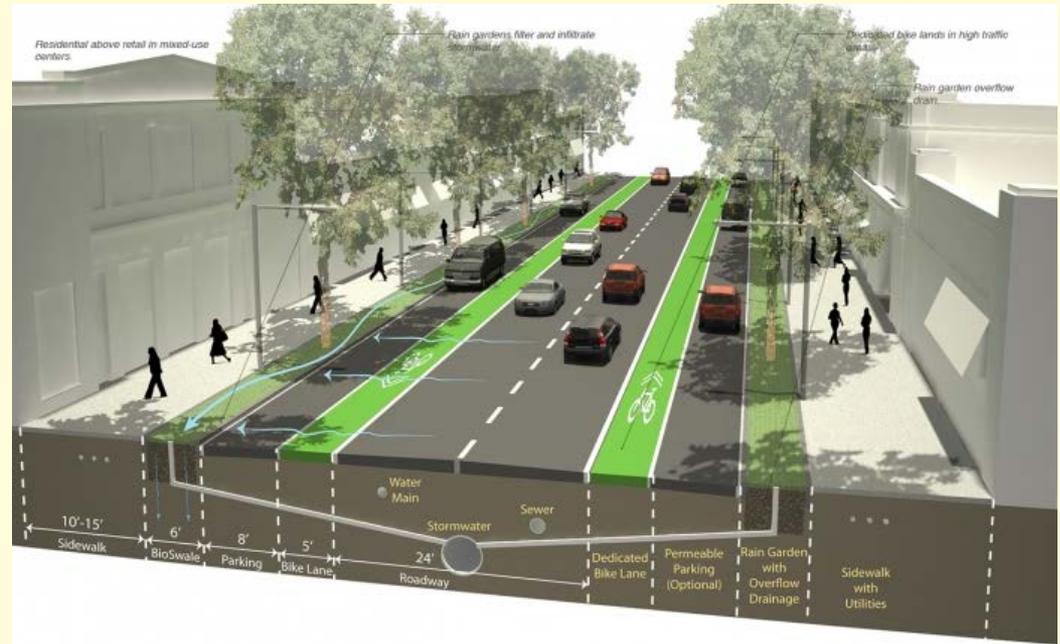


While this is better than before,  
the downtown should not be 0!

# Redesign Streets as Complete 'Green' Streets

Complete green streets allow for

- ✓ Treatment of stormwater on site
- ✓ Reduction of urban heat island effect
- ✓ Beautification: increase in downtown foot traffic
- ✓ Habitat corridors



# Benefits of Trees In Developed Areas

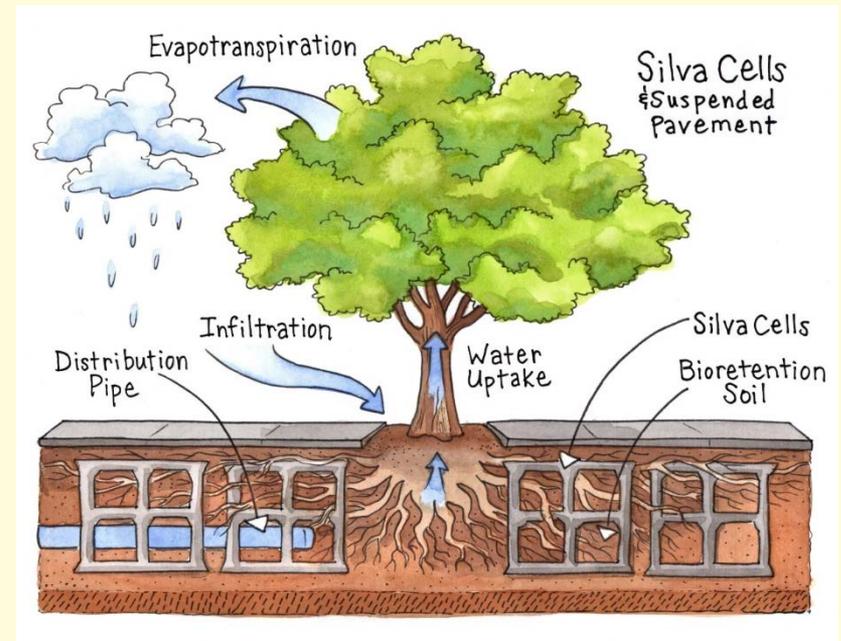
- Stormwater flow can be integrated into the streetscape in a way that provides multiple benefits – traffic calming, pedestrian safety and landscaping.
- Think outside the box:  
Allow flexibility for not meeting canopy requirements by planting projects such as pocket parks



# Accommodate Large Trees



Avoid this!



Larger trees offer greater benefits – so think carefully when setting planting goals for streets!

Consider using suspended pavement systems, rather than just choosing small trees! Trees will pay back your investment!

## Urban Trees Under Stress



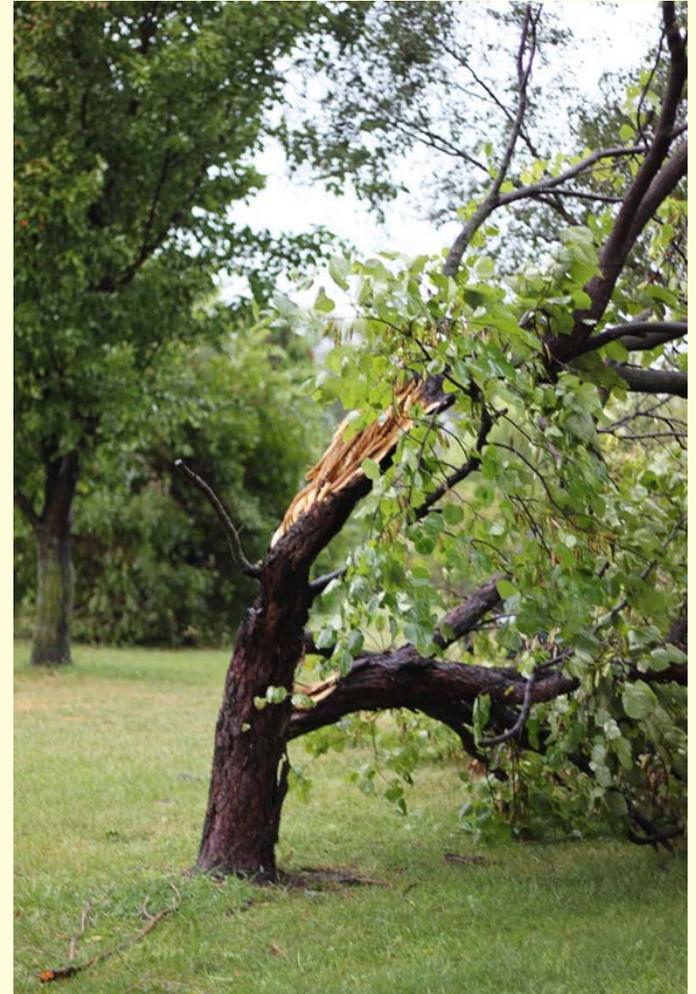
Tree in a mall

- Are trees monitored and post development for survival?
- Is a process in place to maintain records on tree care requests, inspections, evaluations, and mitigation of risk? Is it being consistently used/updated?

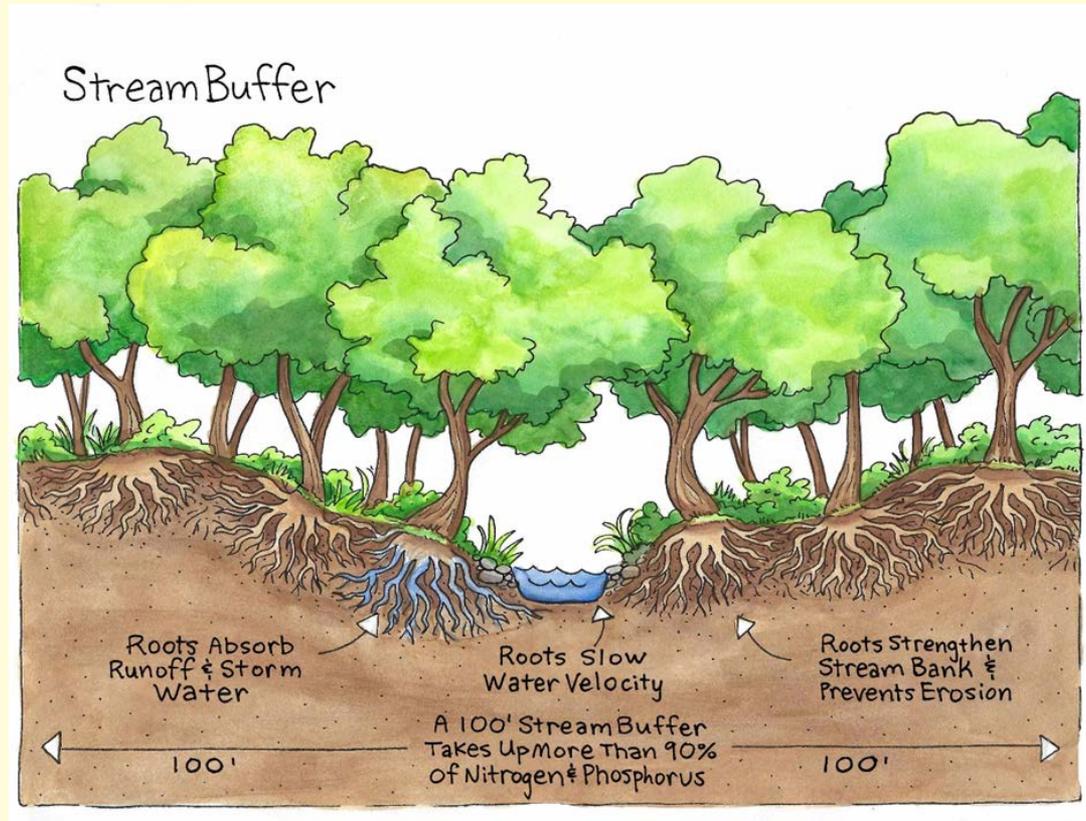
## Develop a forestry emergency response plan

Municipalities typically plan well for the removal of vegetation and debris directly following a storm. However, much less foresight is typically put into *replanting* after a storm. FEMA can reimburse for lost trees if they are mapped and designated as “green infrastructure”

Develop a forestry emergency response plan which addresses funding and timelines for replanting following a storm.



# Adopt a stream buffer ordinance



A 100-foot wide buffer removes more than 90% of nitrogen, phosphorus and sediment from overland runoff. Localities outside the mandatory Ches Bay area can also adopt stream buffers.

# Strategy: Plant more trees

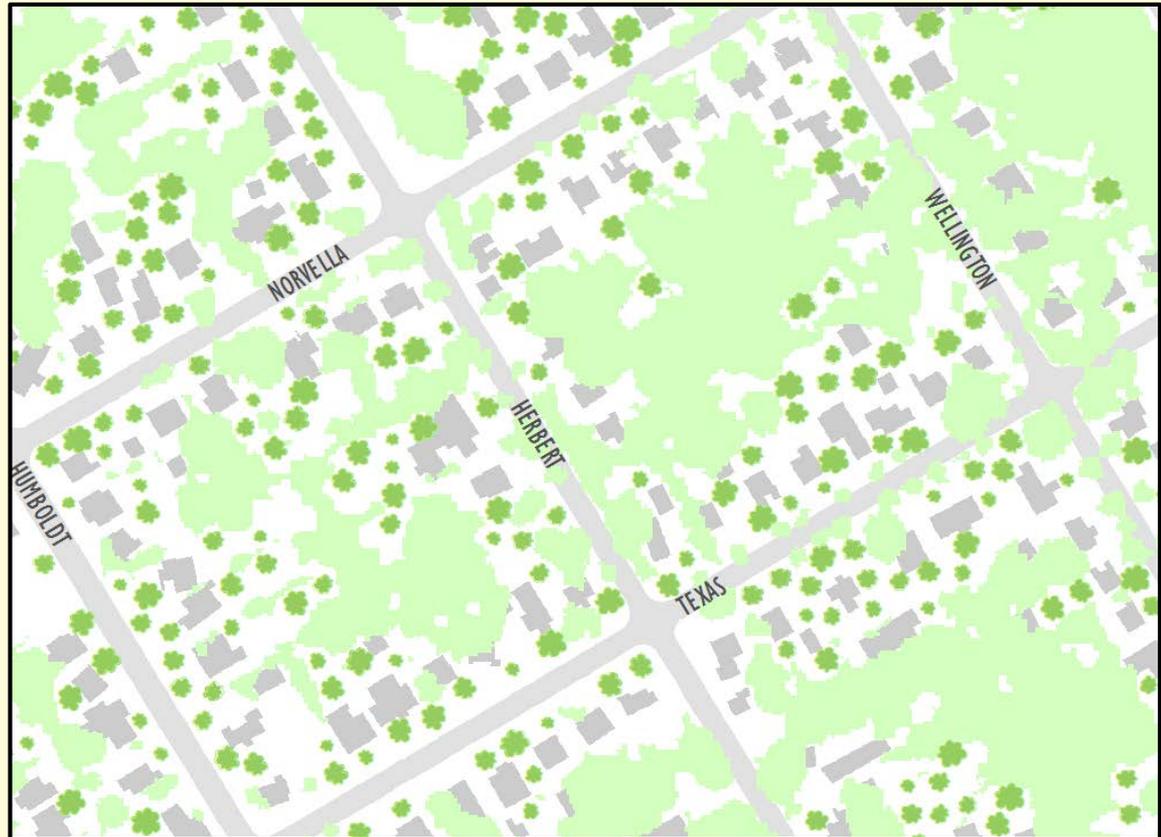
Voluntary planting is key as most open spaces are on private property!



# Example: Type of Analysis for Private Land – e.g. Norfolk

## Individuals actions can make a big impact!

- ~**47,500** parcels with single family homes
- ~**31,000** of these have room for at least 1 tree
- If everyone planted a single tree, they would intercept **62 million gallons** of rainwater every year (1.5 million bathtubs!)



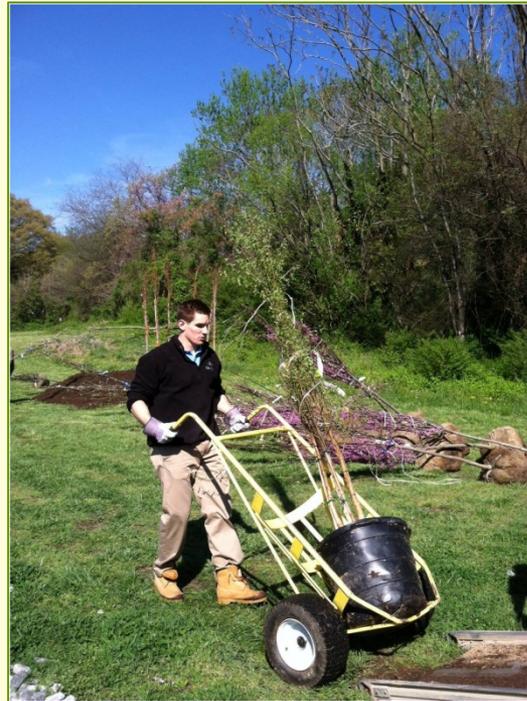
Each tree icon represents a possible tree planting location that avoids buildings, underground utilities, and other infrastructure. Tree spacing is 30 feet.

This example is for Norfolk, VA.

Engage the Community in the Solution! Once we have data, it's time for action! Tree plantings, nature trails, stream buffers, teaching!

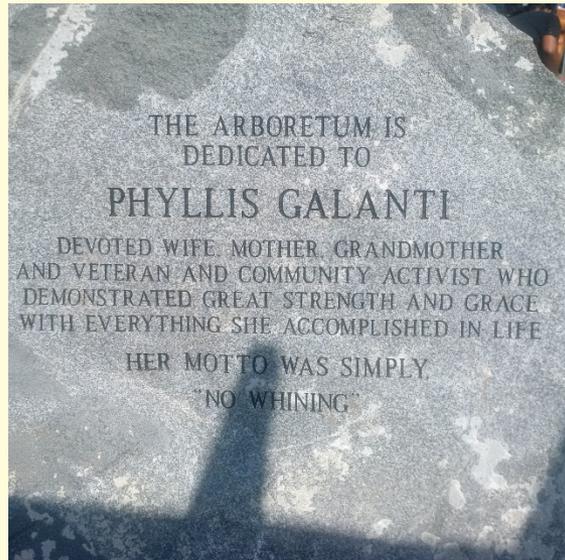


# Help the Community Plant Trees



Volunteer planting is key as most open spaces are on private property! The GIC has planted trees on both public and private property. Cities usually need to launch a planting campaign to meet planting goals. Above are images of GIC volunteers and staff planting trees for stream buffers and safe routes to school.

GIC and partners created an Arboretum at McGuire Veterans Hospital as a healing site for patients, staff and visitors. It also converts the landscape to be more absorptive.

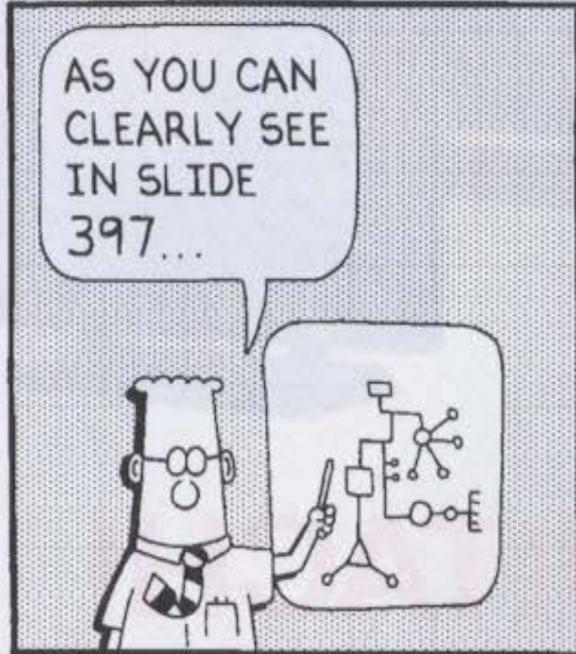


## In conclusion ...

- ✓ In cities, streams or bays are often overwhelmed by piped stormwater discharges so buffers alone are not enough.
- ✓ If you are interested in protecting or improving the health of your water, you need to understand the land cover in your watershed.
- ✓ You can use tools such as LIA to identify areas that are treed, open, impervious etc. and target where more planting may be needed.
- ✓ Identify the most important assets –forests, water supply and recharge areas and ensure they are protected (buffer them, change zoning, add incentives, educate the public and plant more trees).

Hope you've made it this far...

# DILBERT



www.dilbert.com scottadams@aol.com



© 2000 United Feature Syndicate, Inc.



DILBERT reprinted by permission of United Feature Syndicate, Inc.

# GIC Inc.

440 Premier Circle, Suite 220

Charlottesville, VA, 22901

434-244-0322

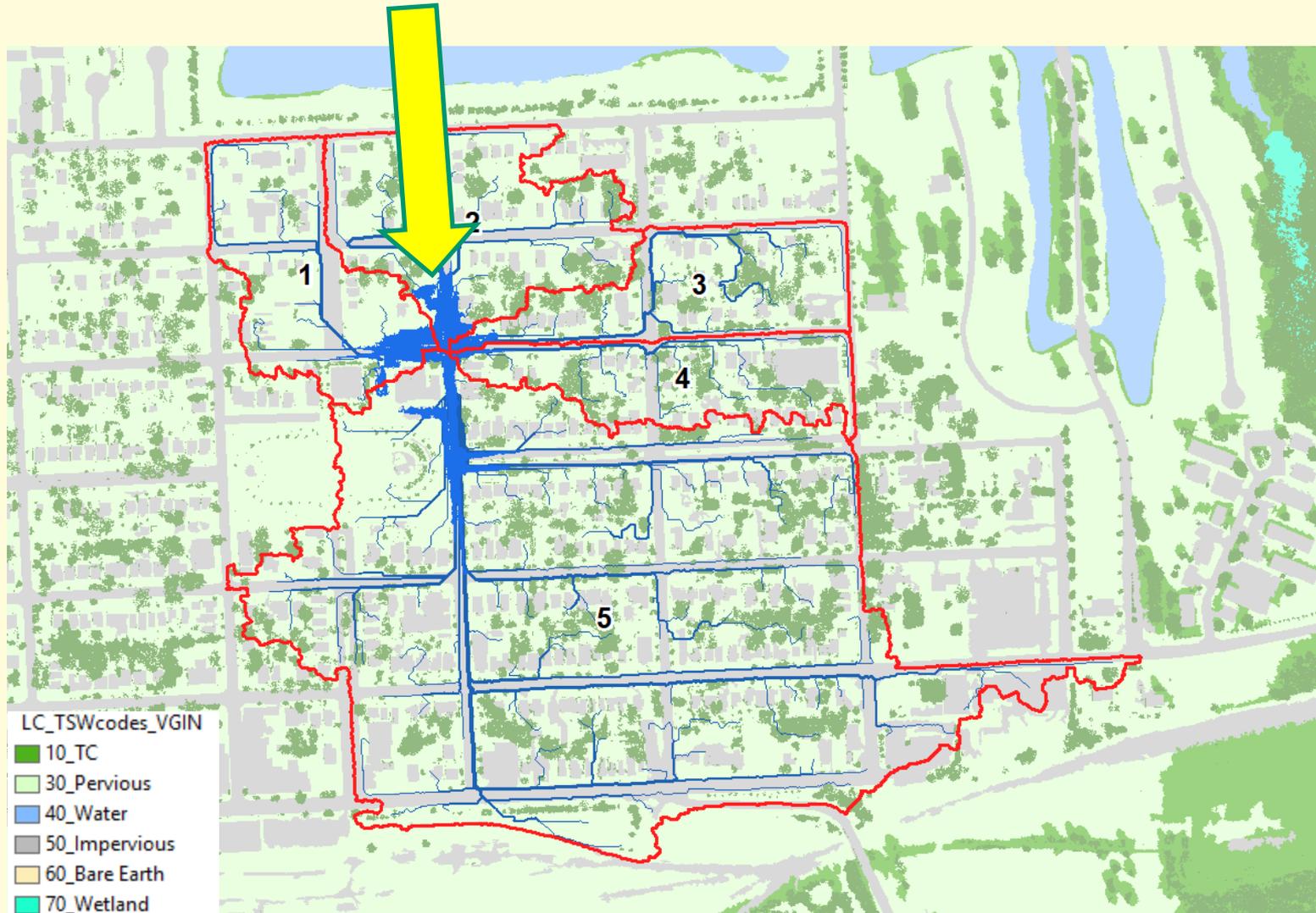
[www.gicinc.org](http://www.gicinc.org)

[Firehock@gicinc.org](mailto:Firehock@gicinc.org)

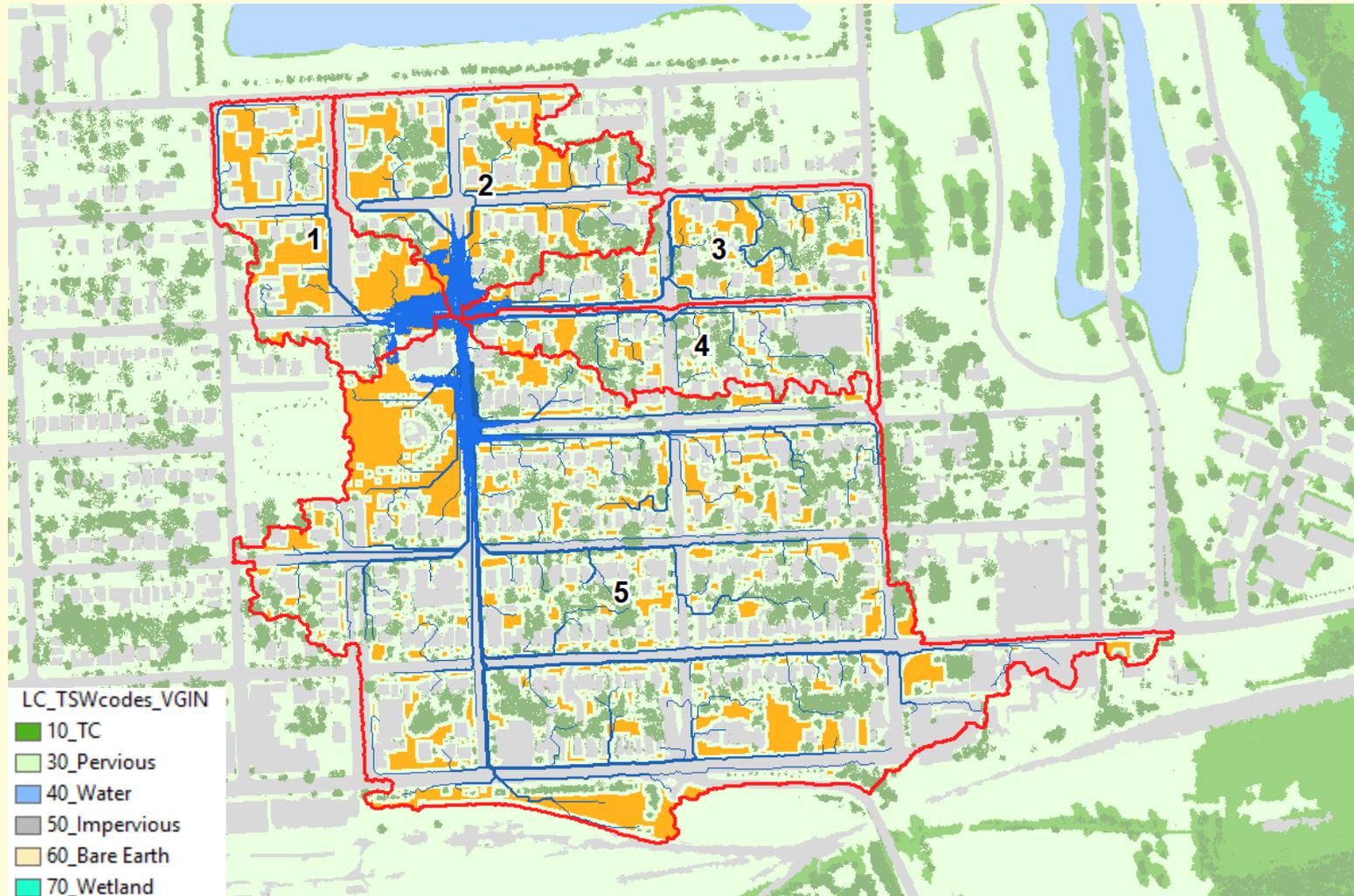




# Known Flooding Spot “Ground Zero” contributing area



# Potential Planting Area

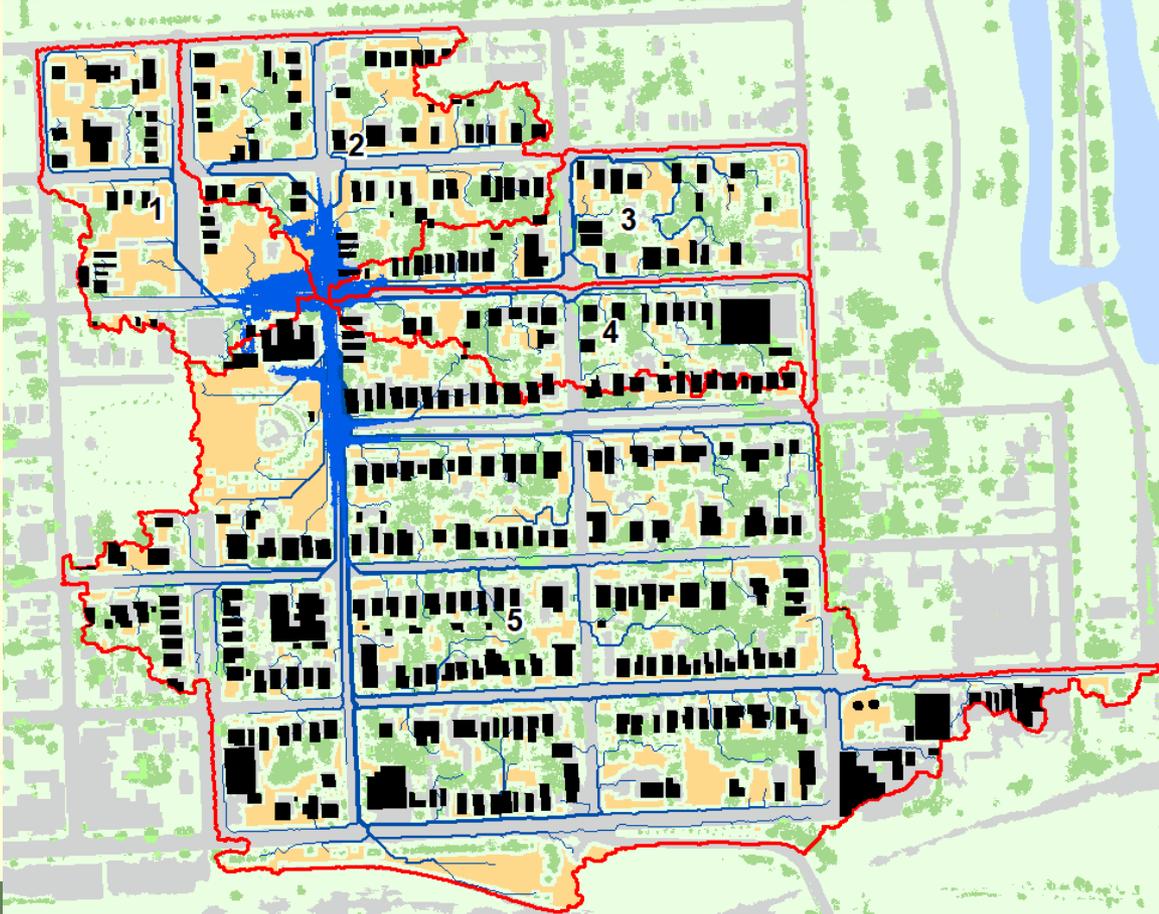


The Green Infrastructure Urban Tree Canopy Stormwater Model estimates stormwater runoff yields for current and potential land cover. The methodology is based upon the NRCS TR-55 method for small urban watersheds. It is used to provide better estimates using GIC's high-resolution land cover and modeling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

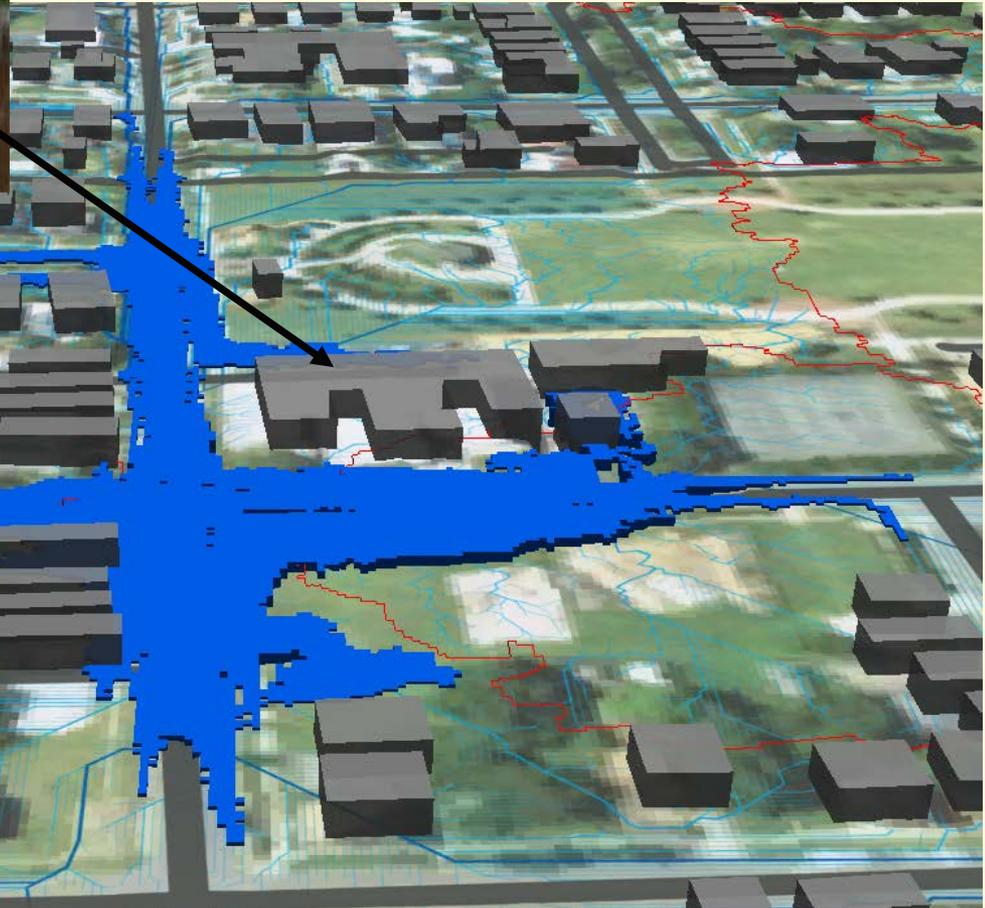


		million gallons			PUDDLE is 0.39 million gal. (388,201 gal)			Rooftop Area collects 1,123,810 gal (total)													
TOTALS		17%	34.3%	0.0659	-	0.0423	30%	11% Percent of Puddle Reduced.						3.7%	3.8%	1.0%	3.1%	3.1%	0.8%		
Statistics by Drainage Basin (current settings)							Variable							Statistics by Drainage Basin (current settings)							
Area	Current Tree Cover	Current Impervious Cover	Tree H2O Capture	Increased H2O w/xx% tree loss	Added H2O Capture w/xx% PPA	Tree Cover Goal	Pick an Event			Pick a loss scenario			Converted Land	Canopy Added	Enter % to be planted	Canopy Pollution Load % Reduction			Additional Canopy Pollution Load % Reduction		
	%		million gallons			%	Event	% UTC loss	% FOS Loss	% Imperv	PCA	PPA	% of Land	% of PPA	N	P	Sed	N	P	Sed	
1_WS	7.6%	34.4%	0.0015	-	0.0049	34%	2017-Jun-5	0%	0%	0%	33.7%	26.2%	26.2%	100%	1.8%	1.8%	0.4%	6.1%	6.1%	1.5%	
2_WS	18.8%	28.0%	0.0061	-	0.0056	37%	2017-Jun-5	0%	0%	0%	37.5%	18.7%	18.7%	100%	4.3%	4.3%	1.1%	4.3%	4.4%	1.1%	
3_WS	21.8%	28.2%	0.0070	-	0.0029	32%	2017-Jun-5	0%	0%	0%	32.4%	10.5%	10.5%	100%	4.8%	4.8%	1.3%	2.5%	2.5%	0.6%	
4_WS	23.1%	34.2%	0.0067	-	0.0017	29%	2017-Jun-5	0%	0%	0%	29.3%	6.3%	6.3%	100%	5.0%	5.1%	1.4%	1.4%	1.4%	0.4%	
5_WS	16.7%	36.2%	0.0446	-	0.0273	28%	2017-Jun-5	0%	0%	0%	28.3%	11.6%	11.6%	100%	3.6%	3.7%	1.0%	2.7%	2.7%	0.7%	

- Tree Canopy = 17.1%
- Potential Canopy = 30.33%
- Puddle = 388,201 gal. from Storm Event of 2.95 inches
- If plant 100% of the PPA, the amount of water going into flooded area would be reduced by 11%
- Rooftops account for 1 million gallons.
- Puddle alone = 77 Cisterns



Flat roofs could be converted to green roofs (\$\$\$\$) or, cisterns could be added (less \$)



# Possible cistern locations

