



# **Natural Resources Inventory Update**

Council Retreat  
June 5, 2009

# NRI Current Status



- A key component of the NRI is the production of the land cover, including the tree canopy map with breakdown by species.
- The separation of tree canopy from tree shadows could not be fully automated using image classification software. Considerable manual effort was required to identify the tree canopy, esp. in the urbanized areas which has slowed the completion of the NRI document.

# Work In Progress



- Stormwater buffer areas by stream type
- Land use – development by watershed
- Platted, unplatted, developed, vacant, and development constrained by watershed
- CityGreen analysis: benefits of the existing tree canopy

# What the NRI includes



- Land cover: natural landscape recorded as surface components: forest, water, wetlands, urban, etc
- Geology: hazards
- Energy: fossil fuel, wind, solar, geothermal, biomass
- Soils: associations and erosion characteristics
- Physiography & Relief: Slope areas,
- Watersheds: land cover and development metrics

# What the NRI Includes



- Streams: classifications, sinuosity, flood plain, stormwater buffers
- Water pollution: types, sources, and threat areas
- Tree Canopy: coverage and composition
- Habitat: Types and spatial characteristics
- Cultural Resources: archeological survey areas, sites

# NRI Policy Analysis Applications

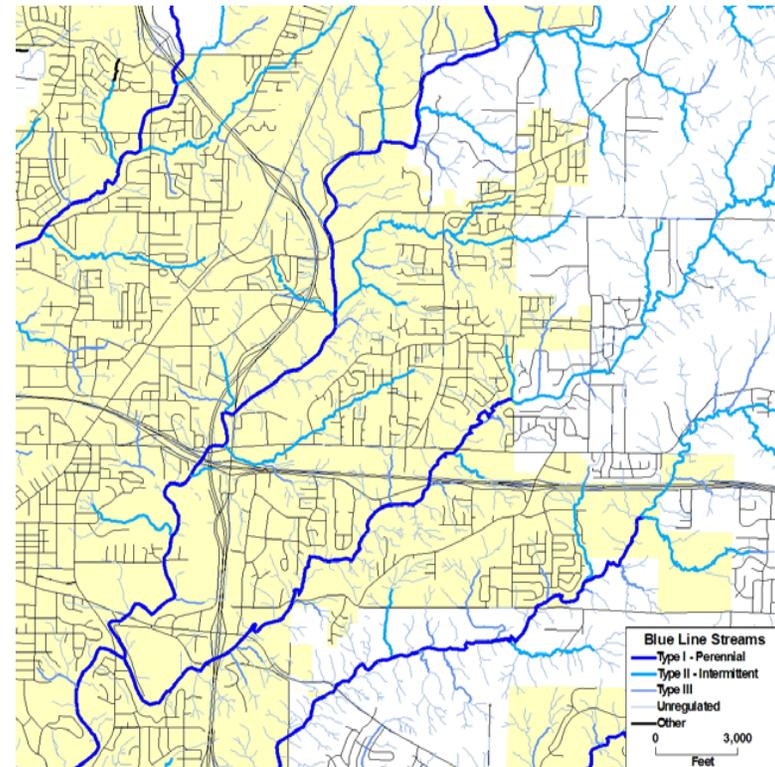


- Steep Slopes
- Flood Plain
- Storm Water Buffers
- Urban Forestry
- Land Preservation
- Land Use

# Streams



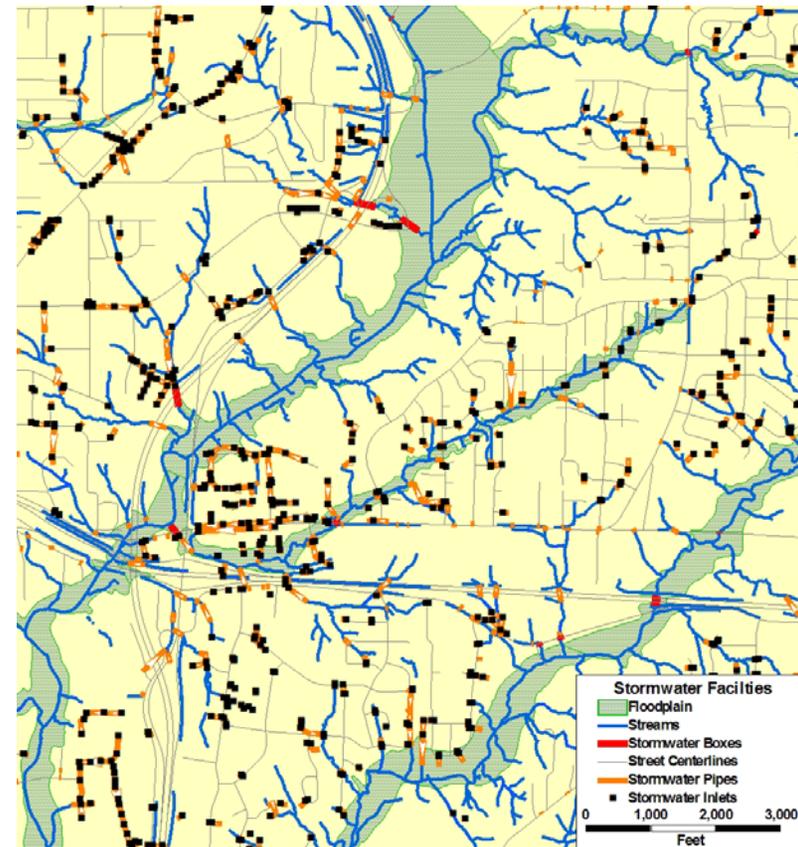
- Stream names
- DNR Stream ID's
- Stream classification
- Stream sinuosity
- Stream gradient
- Stream bed
- Streams with aquatic life
- Stream water quality
- Water quality threats



# Stormwater



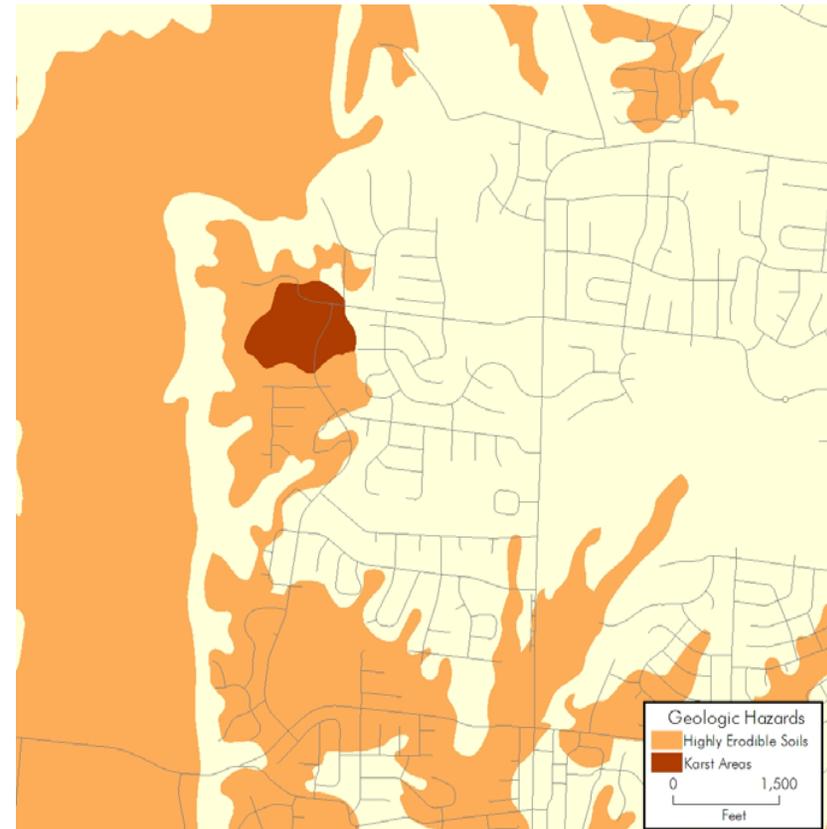
- Type 1, 2, and 3 streams
- Unregulated drainages
- Flood plain
- Stormwater buffer areas (regulated & unregulated)
- Stormwater pipes, junctions, culverts, inlets
- Stormwater outfalls
- National Pollution Discharge Elimination System (NPDES) permits and outfalls



# Geologic Hazards



- Flood plain
- Highly erodible soils
- Karst areas
- Slope
- Steep slopes
- Exposed rock



# Land Cover



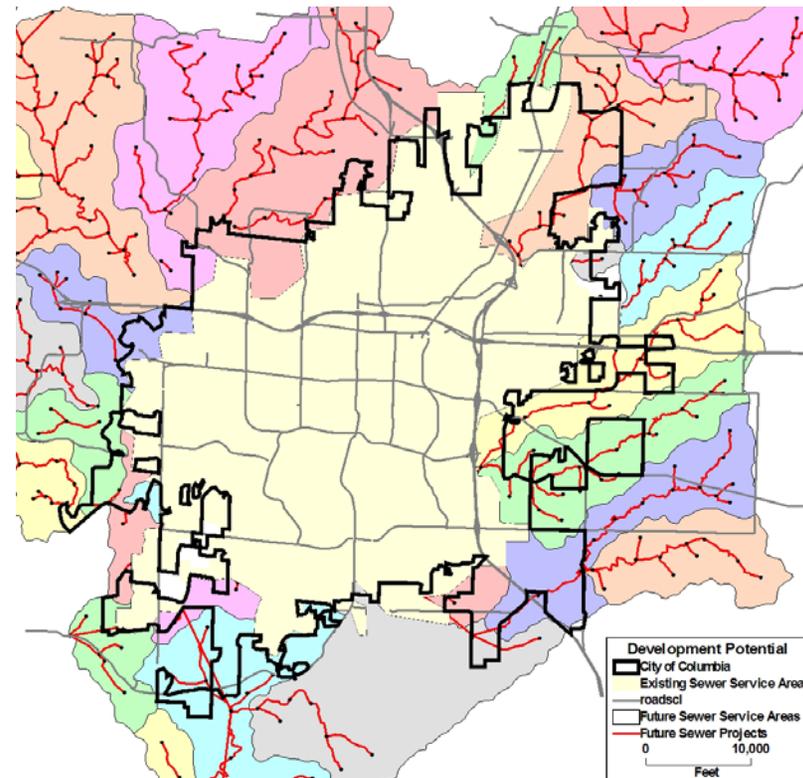
- Urban/Impervious
- Tree canopy
- Cropland
- Water
- Sparsely Vegetated/Disturbed
- Grass



# Development Potential



- Developable area
- Development constrained area
- Vacant developable area
- Platted/Unplatted: vacant & developed
- Sewer: available, programmed, planned, no sewer

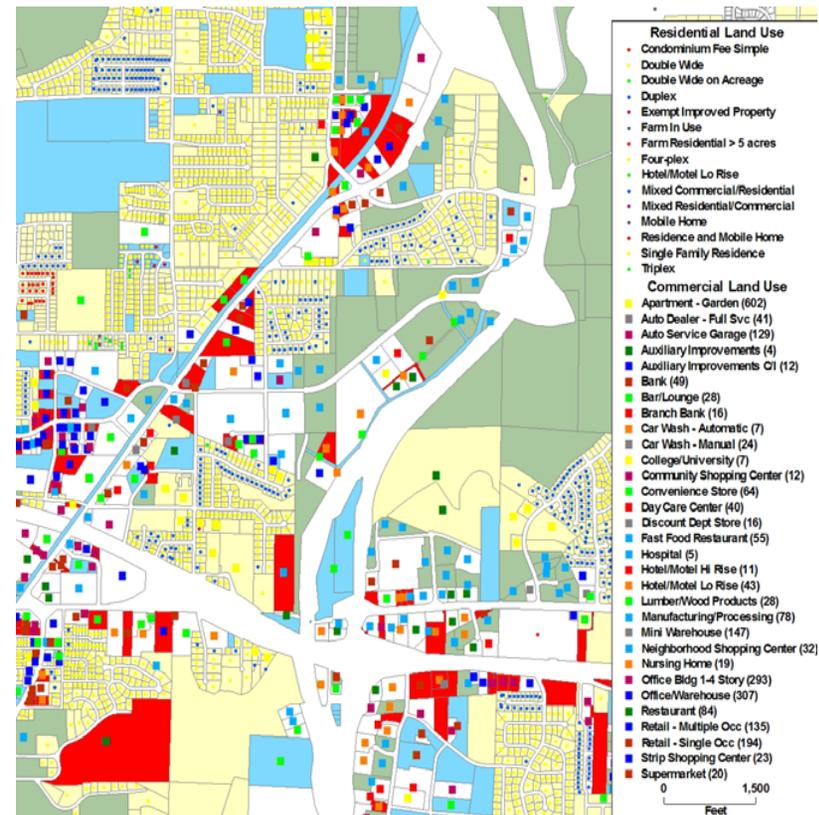


*Calculated from sewer, slope, flood plain*

# Land Use



- Land development patterns
- Type of land uses: number and area:
  - Single family (du)
  - Duplex (du)
  - Apartment (du)
  - Retail (sq ft)
  - Office (sp ft)
  - Industrial (sq ft)
  - Other non-residential (including exempt)



# Stormwater Management



- Stormwater buffer
- Floodplains and floodways
- Tree canopy benefits:

- Carbon sequestration
- Air pollution reduction
- Stormwater management

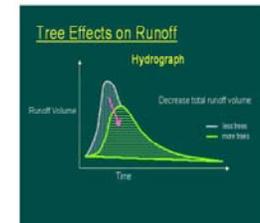


## Stormwater

Trees decrease total stormwater volume and slows peak flow; both help cities to manage their stormwater and decrease detention costs. CITYgreen assesses how land cover, soil type, slope, and precipitation affect stormwater runoff volume, time of runoff concentration, and runoff peak flows. It calculates the volume of runoff in a 2-year 24-hour storm event that would need to be contained by stormwater facilities if the vegetation were removed. This volume multiplied by local construction costs calculate the dollars saved by the tree canopy. CITYgreen uses the TR-55 model developed by the Natural Resource Conservation Service (NRCS) which is very effective in evaluating the effects of land cover/land use changes and conservation practices on stormwater runoff. The infiltration percentage in the report estimates the decrease in ground water recharge when the vegetation is replaced by impervious surface.

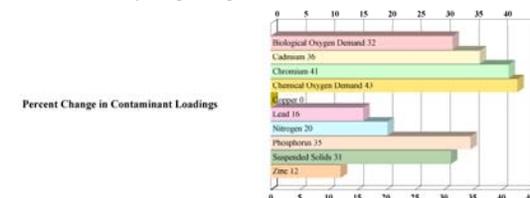
### Water Quantity (Runoff)

2-yr, 24-hr Rainfall:	3.25 in.	
Rainfall Distribution Type:	II	
Average Slope:	3.0%	
Current Curve Number:	88	
...and if you pave it all:	98	
		% change
Runoff:		48
Time of Concentration:		-38
Peak Flow:		143
Potential for Infiltration:		-79
Additional Storage volume needed (to mitigate the change in peak flow):	5,700,961 cu. ft.	
Construction cost per cu. ft.:	\$2.00	
<b>Total Stormwater Savings:</b>	<b>\$11,401,922</b>	
<b>Annual costs based on payments over 20 years at 6% interest:</b>	<b>\$994,072</b>	per year



### Water Quality (Contaminant Loading)

Cities must comply with Federal clean water regulations and develop plans to improve the quality of their streams and rivers. Trees filter surface water and prevent erosion, both of which maintain or improve water quality. Using values from the US Environmental Protection Agency (EPA) and Purdue University's L-theta spreadsheet water quality model, The Natural Resources Conservation Service (NRCS) developed the CITYgreen water quality model. This model determines the effect of land cover type (curve number) on the concentration of the pollutants in runoff during a typical storm event (Event Mean Concentrations) of [Nitrogen, Phosphorus, Suspended Solids, Zinc, Lead, Copper, Cadmium, Chromium, COD, and BOD]. Pollutant values are shown as a percentage of change.



# NRI Completion & Applications



- The draft NRI document will contain detailed background material, the inventory results and will include resources map. Anticipated release date October 2009;
- The draft NRI document will be peer reviewed by a variety of outside agencies, stakeholders, City Commissions, and the public prior to being sent to the City Council;
- All the data and mapping products will be available through the development of an on-line GIS based web mapping applications to provide convenient public access; and
- NRI data will Immediately support applications for land preservation policy analysis, land acquisition, development policies, trails, urban forestry plan, and work on the City's comprehensive plan.