Richmond City’s Green Infrastructure Assessment

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Presented by
The Green Infrastructure Center Inc. and Skeo Solutions
www.gicinc.org

Richmond Regional Planning District Commission
www.richmondregional.org
Green Infrastructure Definition and Benefits

Richmond Green Infrastructure Assessment (GIA)

City Opportunities to Re-green.
Infrastructure (n): the **substructure** or underlying **foundation** on which the continuance and growth of a community or state **depends**.
What is Green Infrastructure?

A planimetric map of a Washington DC shows a neighborhood’s gray infrastructure including buildings and roads (left). Classified high-resolution satellite imagery adds a green infrastructure data layer (trees and other vegetation) (right).

Source: American Forests
“An interconnected network of a wide range of landscape elements that support native species, maintain natural ecological processes, sustain air and water resources, and contribute to the health and quality of life for communities and people.”

Source: Green Infrastructure: Linking Landscapes and Communities, Benedict and McMahon (2006)
Dividing a Large Forest Into Two Smaller Forests ...

- Removes interior habitat
- Reduces interior species population
- Reduces diversity of interior species

- So whenever we can – we should keep forests intact!

Brown headed cow birds like edges! They put their eggs in other birds' nests!

A green infrastructure network is made up of connected core habitats and connecting corridors that help animals, seeds, and people move across the landscape.
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<th><strong>Traditional Development</strong></th>
<th><strong>Green Infrastructure Based-Development</strong></th>
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<td>Plan for grey infrastructure first (roads, stormwater pipes)</td>
<td>First, assess natural features and functions and protect them.</td>
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<td>Green spaces in leftover lands (e.g. steep slopes and floodplains)</td>
<td>Plan for parks, trails, habitat connections before siting buildings.</td>
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<td>Work within confines of parcel = pocket parks, inner trails, gated systems</td>
<td>Connect land and water habitats to region and across ownerships</td>
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Benefits of GI ...

- Combats global warming (carbon sequestration) and improving air quality.
- Protects and preserves water quality and supply.
- Provides stormwater management, hazard mitigation.
- Preserves biodiversity and wildlife habitat.
- Improves quality of life and fitness by access to recreation.
Mayor’s Climate Change Agreement = Impetus for GI since trees sequester carbon and cool urban areas

“We urge the federal government and state governments to enact policies and programs to meet or beat the target of reducing global warming pollution levels to 7 percent below 1990 levels by 2012, including efforts to: reduce the United States’ dependence on fossil fuels and accelerate the development of clean, economical energy resources and fuel-efficient technologies such as conservation, methane recovery for energy generation, waste to energy, wind and solar energy, fuel cells, efficient motor vehicles, and biofuels.”

1026 mayors signed on to date and 11 Virginia localities including Richmond

http://www.usmayors.org/climateprotection/ClimateChange.asp
Thermal (top) and vegetation (bottom) infrared satellite data measured by NASA’s Landsat7 Enhanced Thematic Mapper Plus shows where vegetation is dense, temperatures are cooler.

NY City determined that highest cooling potential per area =

- Street Trees
- Living (green) roofs
- Light colored surfaces and
- Open space planting

Aug. 14, 2002, a very hot NY City Day
Tree Canopy Values

Provide more attractive areas for development, historic districts, commercial areas and opportunities for people to interact with nature.

A study by the University of Washington found that people shopped longer and more often in tree-lined retail areas and *spent about 12 percent more* money.

National Association of Realtors study showed 57% of voters are more likely to purchase a home near green space and 50% will pay 10% more!
Small companies, especially those that are have well paid and skilled workforce place a strong importance on the “green” of the local environment. Crompton Love and Moore, 1997

The creative class: artists, media, lawyers, analysts, make up 30 percent of the U.S. workforce and they place a premium on outdoor recreation and access to nature. Florida, 2002
Project Background

Richmond Region green infrastructure assets and opportunities identification (2009)
Scaling down to the city ...
Richmond City Green Infrastructure Assessment
The Green Infrastructure Assessment

Thank you to the funders:

- Altria
- Virginia Department of Forestry
- National Oceanic and Atmospheric Administration
- Virginia Coastal Zone Management Program
- **Goals:**
  I. Map green assets
  II. Show benefits
  III. Identify areas to re-green

- **Partners:**
The Green Infrastructure Assessment

First: PDC maps city green assets = city green print
What Are the Green Infrastructure Assets?

- Water Resources
- Conservation Lands
- Sustainable Features
- Parks & Recreation
- Transportation
- Heritage & Culture Resources
Connectivity is Key

• Removal of existing green space can have a detrimental impact on the ecological, aesthetic, and economic benefits of the network.

• With green infrastructure, more connections are always better. It maximizes a community’s resources.

• Aggregation of smaller natural areas can yield greater economic and ecological benefits for humans and wildlife populations.
Selection of a Study Area

- Amount of viable intact habitat
- Amount of vacant/underutilized parcels
- Amount of existing park land
- Highest watershed priority area

Neighborhoods of Manchester, Blackwell, Oak Grove, Maury, Bellemeade, Hillside Court and Ancarows Landing
Identify Existing Conditions

Land Cover Analysis:

20% Tree Canopy
31% Non-Tree Vegetation
34% Non-Building Impervious
15% Building Impervious

Source: Virginia Department of Forestry
Urban Tree Canopy (UTC) analysis
CITYgreen© Analysis

Models for Testing Alternative Future Scenarios for Development or Redevelopment

general neighborhood scale to site specific...

• Land use & density changes
• Increasing tree canopy
• Low Impact Development
  ✓ rain gardens
  ✓ green roofs
  ✓ porous pavement
  ✓ vegetated buffers & swales
An increase of existing tree canopy in the study area to City-wide levels would result in benefits:

- **$500,000 annual savings** in reduced stormwater treatment loads
- **10% reduction in nitrogen** and **17% reduction in phosphorous** from stormwater runoff
- **99% increase in air pollution removal**
- **Additional 18,000 tons of carbon stored**
Richmond’s Tree Canopy is 42 percent

Land Cover Citywide:

42% Tree Canopy
23% Non-Tree Vegetation
24% Non-Building Impervious
11% Building Impervious
Richmond Green Infrastructure Assessment
Produced by the Green Infrastructure Center and E² Inc. for the City of Richmond, Virginia
December 2010
Next, what are green opportunities?

- The 2009 regional green infrastructure assessment revealed a significant decline of green infrastructure over the last decade due to sprawling development outside the city.

- The City of Richmond includes over 9,000 vacant parcels.

- Many of these sites can become a resource for expanding the green infrastructure network and enhancing neighborhoods.
Approach Planning Across Scales

**City:** Develop citywide green infrastructure network based on suitability of vacant parcels.

**Planning District:** Create interactive database to evaluate suitability of vacant parcels for various goals.

**Neighborhood:** Develop concept plans and prototypes to connect neighborhoods to the city’s green infrastructure network.

**Project:** Provide case studies and strategies that can be implemented to enhance Richmond’s green infrastructure network.
Citywide vacant parcel inventory, grouped by:

- vacant lots
- vacant structures
- vacant properties (parcels that have unknown status)
Potential citywide green infrastructure network based on ecological suitability of vacant parcels through the city.

These parcels met criteria that supports the following goals:

- Protect Priority Conservation Areas
- Improve water quality
- Increase park access
- Support greenway development
- Identify network opportunities
Richmond Tree Planting Plan

- Richmond has to remove about 1000 trees per year due to storm damage, age, building.

- The Mayor has an initiative to increase trees in the city and in this first year of the planting program, the city will be planting 1,988 trees.

- Anytime we can find ways to reduce tree clearing helps the city to maintain its canopy.
Broad Rock and Old South Planning Districts selected based on analysis of vacant parcel inventory and input of city staff.
District Programmatic Suitability

- Vacant lands inventory analysis
- Parcel suitability evaluation for green infrastructure programming
- Parcel ranking capabilities
- Vacant lands database

Hypothetical Suitability Ranking Map
District Suitability: Watershed Health

Vacant parcels with increased potential to mitigate stormwater runoff, based on their location within a Resource Protection Area or within 100 feet of a stream.

Watershed Health Suitability Map

Vacant parcels within 100' of a Stream
Vacant Parcels intersecting RPA

Watersheds in Broad Rock and Old South

1. James River Park
2. Westover Hills
3. Sessums Avenue
4. Bainbridge
5. Backwell
6. Brander Street
7. Sewage Treatment Plant
8. McGuire Hospital
9. Broad Rock Creek
10. Glendall Creek
11. Falling Creek
12. Pocahontas Creek
13. Pocahock Creek

Other Urban Features
- Primary Road
- Interstate Highway
- Parcels

RPAs are designated under the Chesapeake Bay Protection Act to protect environmentally sensitive lands alongside waterways. Only a portion of the city is covered by the Bay Act.
District Suitability: Access to Public Parks

Identifies vacant parcels that may be suitable candidates for increasing access to public parks for city residents.
District Suitability: Connecting Conserved Lands

Identifies vacant parcels adjacent to conserved lands that have a strong potential to contribute to the existing conservation network due to their high ecological value.
District A Connected Network Strategy

- Use vacant lands to connect existing and proposed greenways.
- Reconnect neighborhoods to the James River.
- Increase access to recreation opportunities and James River Trail System.
Neighborhood Concept Plans

Blackwell Green Links: a green infrastructure strategy for a dense urban neighborhood in transition.

Bellemeade Creek Corridor: a green infrastructure strategy for improving water quality in neighborhood.
Neighborhood Blackwell Green Links

Vacant Parcels with Ecological Value

Vacant Parcels with Urban Tree Canopy
Neighborhood  Blackwell Green Links

Cultural Assets and Anticipated Development  Green Links Street Menu
Neighborhood  Bellemeade Creek Corridor

Vacant Parcels with Ecological Value

Vacant Parcels with Urban Tree Canopy
Neighborhood Trail Treatments

Option D: Greenway

Option E: Trail/Footpath
Project Green Infrastructure Toolkit

Urban Water
- Vegetated swales/bioswales
- Rain gardens/bioretention areas
- Vegetated filter strips
- Stormwater wetland

Site Planning
- Green street design
- Reducing impervious surfaces
- Vegetated landscaping
- Urban forestry
- Urban stream restoration
- Riparian buffers

Community Spaces
- Pocket park
- Informal recreation
- Meadow/native habitat
- Outdoor classroom
- Community garden

Community Stewardship
- Green space grant programs
- Land banking
- Mow-to-own
- Adopt-a-block
Project Case Studies

**Housing**
High Point Development, Seattle, WA

**Sustainable Stormwater Management**
The Dell, Charlottesville, VA

**Tree Planting Program**
Tree Baltimore, Baltimore, MD

**Green Streets Program**
Portland, OR

**Neighborhood Stream Restoration**
Nine Mile Run, Pittsburgh, PA

**Stormwater Infrastructure Retrofit**
Fairfax County, VA

**Land Bridge Projects**
Vancouver, WA | Trenton, NJ | Duluth, MN
• Bellemeade neighborhood

• Water quality improvement at small watershed scale

• Replicable, scalable strategies for mitigating polluted stormwater runoff
More Green in the City =
A Cleaner James River!
Questions?