Implementing Green Infrastructure:

Atlanta's Post-Development Stormwater Management Ordinance

City of Atlanta
Department of Watershed Management

Cory Rayburn, *CPESC*

"It is my goal for Atlanta to become one of the top tier sustainable cities in the nation"

- Mayor Kasim Reed

Griffin STREAM 2013





Summary

- What is Green Infrastructure?
- Compelling reasons for change in Atlanta
- Stakeholder involvement & public outreach
- Summary of technical requirements and development of guidance documents
- Successes and challenges





What is Green Infrastructure?

Gray vs. Green

Slow, Infiltrate, and Clean Stormwater

What is Green Infrastructure?

- An interconnected natural or engineered system that mimics undeveloped hydrologic functions
- Capture the first 1.0” of rainfall
  - Infiltration
  - Evapotranspiration (uptake of water by plants)
  - Reuse through rainwater harvesting

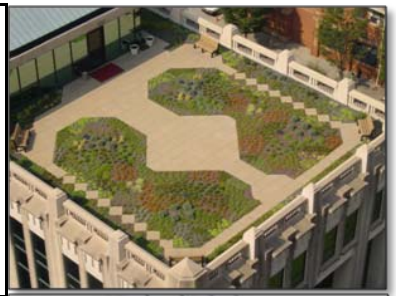




Green Infrastructure Practices

Green Roof

Atlanta City Hall



Rainwater Harvesting Cistern

Southface Energy Institute

Rain Garden

Adair Park

Pervious Paving

English Park

Bioswale

Fernbank Museum Parking Lot

Stormwater Planters

Juniper Street (planned)

Pervious Concrete

Felder Street

Stormwater Bump-outs

Whitehall Terrace

Why Green Infrastructure?

- **Addresses stormwater at its source**
- **Flood protection** - increases capacity in our Combined/Separate storm sewers and creeks
- **Promotes sustainability** - alleviates the impacts of urban heat islands, reduces energy demand, improves air quality, and increases carbon sequestration
- **Potential cost savings**
- **Enhances aesthetics of community**





Why use GI in Atlanta?

- Improves water quality in our surface waters





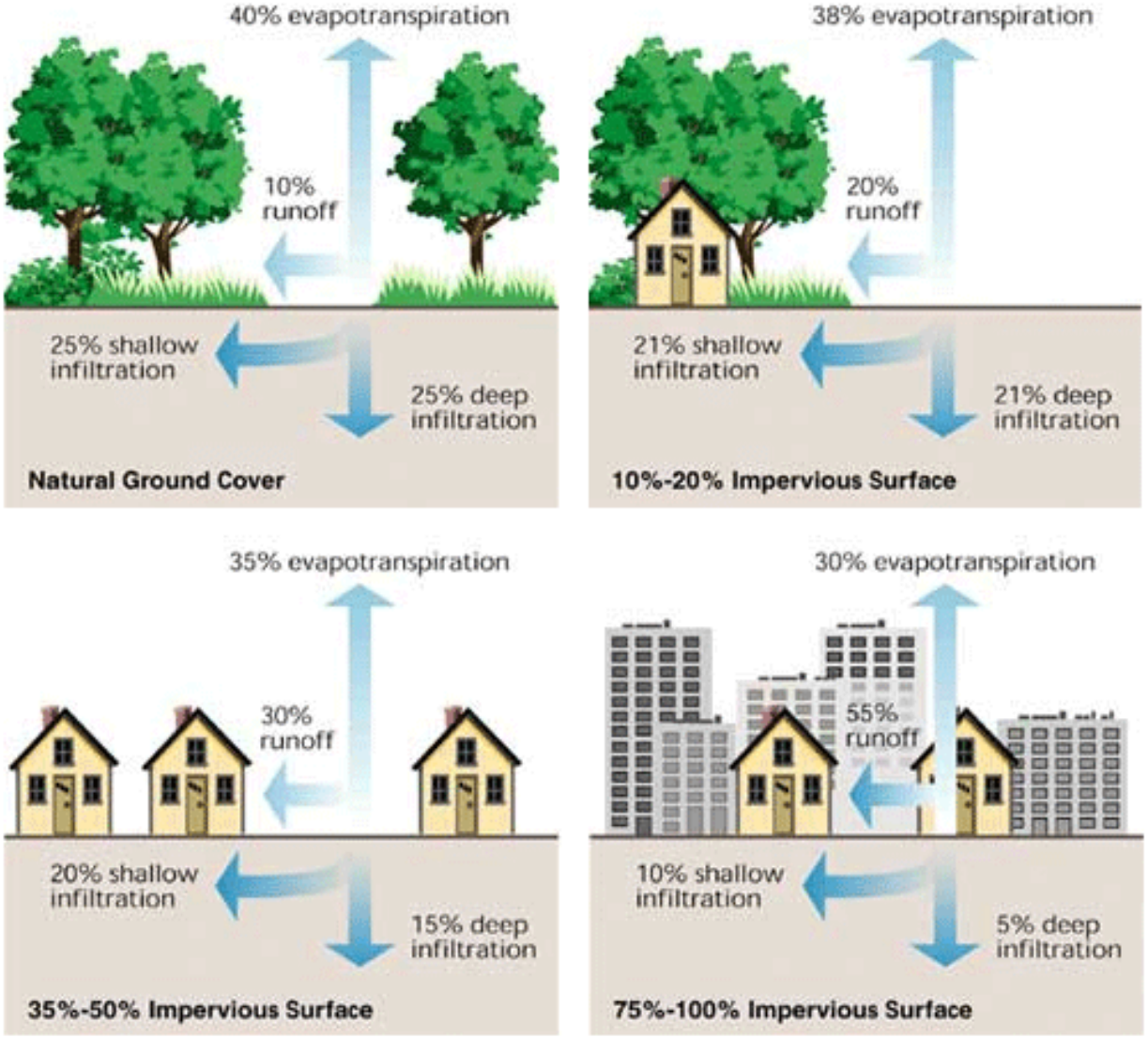
Impacts of Development

- Tree canopy and topsoil removal
- Compacted soils
- Impervious surfaces prevent infiltration
- Concentrated & polluted runoff
- Reduced base flow in streams
- ‘Flashy’ watersheds
- Increased flooding
- Degraded streams & lakes





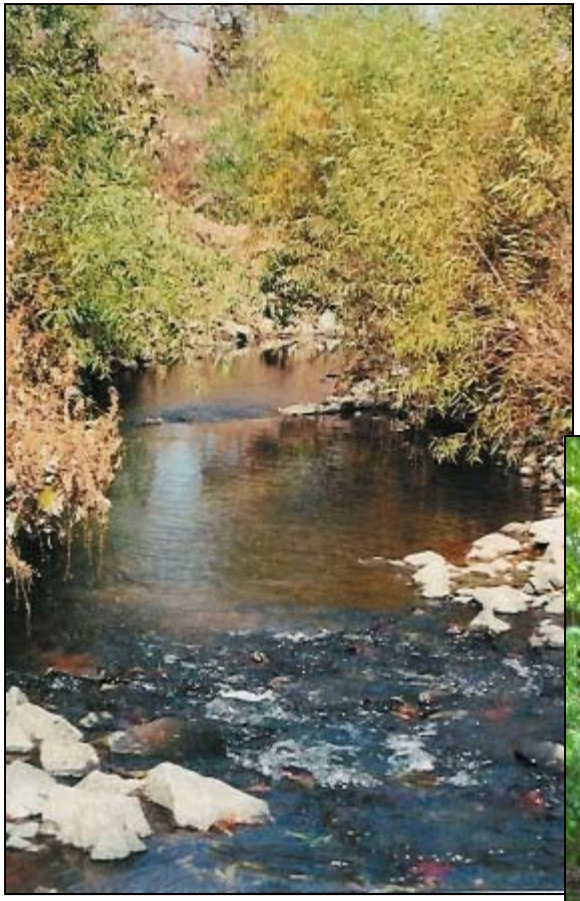
Problems of Urban Watersheds



Problems of Urban Watersheds

"Flashy" stream hydrology causes erosion and low base flow

Goal: Clean Healthy Streams



Why use GI in Atlanta?

- Increases water quality in our surface waters
- Maximizes infrastructure investments by further reducing combined sewer overflows and flooding





Why use GI in Atlanta?

Maximizes infrastructure investments by further reducing combined sewer overflows and flooding

- $3B plus investment in wastewater system
- Highest water rates in the nation
- No stormwater utility fee

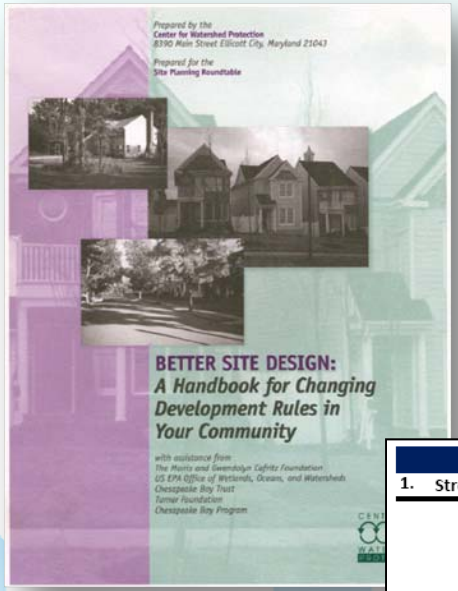




Why use GI in Atlanta?

- Increases water quality in our surface waters
- Maximizes infrastructure investments by further reducing combined sewer overflows and flooding
- Complies with NPDES permit – Removing Barriers

Why use GI in Atlanta?

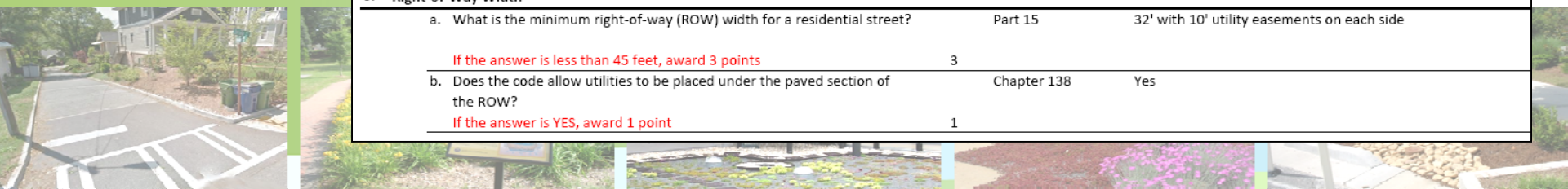


Remove Barriers

"…[R]eview and revise, where necessary, building codes, ordinances, and other regulations to ensure they do not prohibit or impede the use of green infrastructure practices…."

- 2009-2014 NPDES MS4 (Stormwater) Permit

		SCORE	Code Section	Justification/Explanation
1.	**Street Width**			
	a. What is the minimum pavement width allowed for streets in low density residential developments that have less than 500 average daily trips (ADT)?		Sec. 138-102.(a) Part 15-08.002 (g)	No. 28' minimum Chapter 138 - Streets, Sidewalks and Other Public Places and Part 15 - Land Subdivision Ordinance
	If the answer is between 18-22 feet, award 4 points	0		
	b. At higher densities are parking lanes allowed to also serve as traffic lanes (e.g., queuing streets)?		Sec. 150-92.	Existing examples cited (Piedmont, Mitchell, Juniper, Carroll); however, it is unclear in the ordinance
	If the answer is YES, award 3 points	1		
2.	**Street Length**			
	a. Do street standards promote the most efficient street layouts that reduce overall street length?		Part 15	Subdivision and most PDs - no PDCS - possibly Lack of affirmative requirements allow developers to maximize the number of lots to the detriment of mobility and connectivity
	If the answer is YES, award 1 point	0		
3.	**Right-of-Way Width**			
	a. What is the minimum right-of-way (ROW) width for a residential street?		Part 15	32' with 10' utility easements on each side
	If the answer is less than 45 feet, award 3 points	3		
	b. Does the code allow utilities to be placed under the paved section of the ROW?		Chapter 138	Yes
	If the answer is YES, award 1 point	1		



Why use GI in Atlanta?

- Increases water quality in our surface waters
- Maximizes infrastructure investments by further reducing combined sewer overflows and flooding
- Complies with NPDES permit – Removing Barriers
- Supports Mayor Reed's sustainability initiatives
- Prepares the City for potential changes in federal stormwater rules
- Addresses drainage issues in historic neighborhoods that are being redeveloped
- Refocuses design criteria from peak flow reduction of the rare storms to volume reduction of the more frequent storms





Strategy for Successful Adoption

Nov 2010 - Dec 2010

- met with several engineering groups to discuss potential changes

Jan 2011 - Feb 2012

- Developed First Draft

Mar 2012 - May 2012

- Technical Stakeholder Group
- Revisions made





Technical Stakeholder Group

- Consisted primarily of engineers with first-hand knowledge of the City's processes
  - Also included representative from the Chattahoochee Riverkeeper
- 2 roundtable meetings
  - Provided valuable feedback and suggestions





Technical Stakeholder Concerns

- Parking lots
- CSO area
- Double jeopardy
- Concept Plan meeting requirement
- Perceived cost
- Lack of incentives





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May 2012 - Dec 2012

- Stakeholder Outreach
- Additional revisions made





Stakeholder Outreach

- Presented proposed changes to 100+ organizations
  - Development community
  - Non-profits
  - Environmental Agencies
  - Neighborhood Planning Units (NPUs)





Strategy for Successful Adoption

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May 2012 - Dec 2012

- Stakeholder Outreach
- Additional revisions made

Dec 2012 - Jan 2013

- Council Review & Unanimous approval

Feb 2013

- Official Adoption





Once Adopted…

- Presented at 25+ meetings, conferences, & workshops (over 1,300 participants)
- Developed a **Stormwater Workshop Series**
  - **General** Sessions (developers, builders, plan reviewers, inspectors, engineers, LAs, etc.)
  - **Homebuilders** Session (SFR guidance document)
  - **Design Professionals** Sessions (engineers, landscape architects, architects, etc.)





Upcoming Workshops

Stormwater Workshop Series

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Workshop Reference Material

Homebuilder's Workorkshop 3-26-13

General Session Workshop 5-21-13

Post Development Stormwater Management Workshop - Part 1

Post Development Stormwater Management Workshop - Part 2

Upcoming Workshops

Stormwater Management for Design Professionals

Friday, November 8, 9 am – 12 pm
Southface Training Center
241 Pine Street NE, Atlanta, GA 30308

Hosted by

CITY OF ATLANTA
DEPARTMENT OF WATERSHED MANAGEMENT

Southface

This technical workshop is a repeat of the August 16 workshop and part of a series of training events supporting the Post-Development Stormwater Management Ordinance.

Ryan Winston, P.E., from North Carolina State University, will discuss design criteria, installation case studies, maintenance, and performance through modeling for:

- Pervious Pavement
- Bioretention Systems

Winston will also present the results of ongoing research conducted at NC State on these Green Infrastructure practices.

Please **RSVP** to Audrey Powe, apowe@atlantaga.gov, 404-546-1258.

For more information on the new stormwater management requirements and upcoming workshops, contact Cory Rayburn, crayburn@atlantaga.gov, 404-546-1334, or visit www.atlantawatershed.org/greeninfrastructure.

- Sept 16: Rainwater Harvesting
- Nov 8: Pervious Pavement & Bioretention
- Dec 11-12: 2-Day Bioretention Summit
- More to come…

Administrative Updates

- Created website
- Internal Staff - Permitting, Planning, Arborists, Parks Design, Public Works, Engineering Services, etc.
- Commercial & SFR Checklists
- Runoff Reduction Alternative Form
- Accela Tracking System
- Guidance Documents – SFR & Small Commercial





Stormwater for Designers 11-8-13
Upcoming Workshops
Stormwater Workshop Series

Green Infrastructure

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Office of Watershed Protection
Implementing Green Infrastructure:
Atlanta's Post-Development Stormwater Management Ordinance

The Department of Watershed Management has recently updated the **Post-Development Stormwater Management Ordinance** to promote the use of Green Infrastructure on new and redevelopment projects in the City. Green infrastructure uses natural hydrologic features to manage water and provide environmental and community benefits. On development sites, Green Infrastructure includes engineered practices that are designed to mimic natural hydrology by infiltrating stormwater runoff into the ground, evapotranspiration (uptake of water by plants) in landscaped areas, or capturing and reusing the runoff through rainwater harvesting techniques. For more information on green infrastructure or the revised stormwater management requirements, see the resources below.

Stormwater Workshop Series:

StormCon Workshop 8-20-13
Homebuilder's Workshop 3-26-13
General Session Workshop 5-21-13
Post Development Stormwater Management Workshop - Part 1
Post Development Stormwater Management Workshop - Part 2
Post Development Stormwater Management Workshop - Part 3
Pervious Pavement and Bioretention 8-16-13
- Bioretention (PDF)
- Pervious Pavement (PDF)

General Information

Summary of Revisions
Post Development Stormwater Management Ordinance (PDF)

Summary of Changes

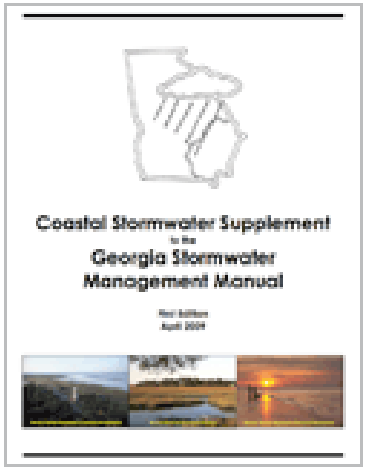
- Added Runoff Reduction volume requirement (**Green Infrastructure**)
- Revised **Rate Reduction** requirements
- Revised stormwater requirements for **Single Family Residences**
- Strengthened **maintenance** requirements for existing stormwater facilities
- Promote better site design by requiring Stormwater **Concept Plan and Consultation meeting**





Runoff Reduction Volume (RR_v)

- 1.0” Runoff Reduction = Green Infrastructure
- Adopted Coastal Stormwater Supplement
- Reduces volume of runoff **AND** removes pollutants
- Design Requirements based on underlying soil types (A&B vs C&D)
- ‘Credits’ given to reduce size of detention facilities
- Replaces the 1.2” Water Quality (80% TSS removal) requirement
  - Can fall back on WQ_v standards if RR_v is unattainable due to site constraints







Runoff Reduction Volume (RR_v)

- Commercial Applicability
  - New commercial developments
  - Commercial redevelopment that adds or replaces more than **500 ft²** of impervious surface
  - Relatively low threshold compared to Blue Book standard





Commercial Redevelopment

< 500 ft^2 Impervious Surface	500 ft^2 - 5,000 ft^2 Impervious Surface	> 5,000 ft^2 Impervious Surface
• No Stormwater Management required	• 1.0” RR_v ONLY • Small Commercial Guidance Document (near completion)	• Full Blown Stormwater Management Plan required • Channel Protection • Rate Reduction • Extreme Flood Protection • Hydrology Study





Runoff Reduction Volume (RR_v)

- Residential Applicability
  - Construction of a **new** Single Family Residential house
  - Large Additions (**>1,000 ft²** of impervious surface)
- Does not apply to:
  - Second story additions
  - Renovations
  - Replacing driveways





Why use GI on SFR lots?

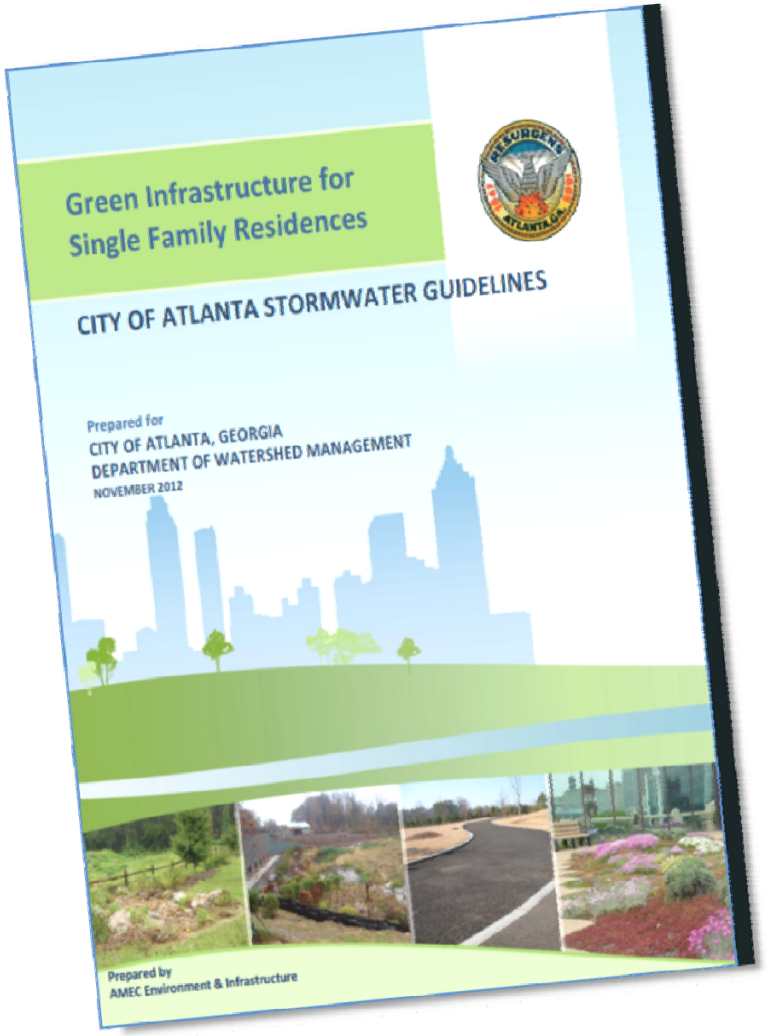
- Existing drainage problems in older neighborhoods
- Redevelopment often maximizes building footprints
- No stormwater management required previously
- Compounded effects on downstream property owners
  - Increased flooding potential
  - Increased erosion & sedimentation
  - Incised streams






of Atlanta

SFR Guidance Document



- Provides a list of acceptable GI Practices
- Reduces the need for complicated calculations
- Provides tear-off details and construction specification for each practice
- Simplifies the review and approval process

SFR Guidance Document

RAIN GARDENS

SINGLE FAMILY RESIDENTIAL GUIDE
CITY OF ATLANTA, GEORGIA
DEPARTMENT OF WATERSHED MANAGEMENT

Rain gardens are small, landscaped depressions that are filled with a mix of native soil and compost, and are planted with trees, shrubs and other garden-like vegetation. They are designed to temporarily store stormwater runoff from rooftops, driveways, patios and other areas around your home while reducing runoff rates and pollutant loads in your local watershed. A rain garden can be a beautiful and functional addition to your landscape.

Location

- Rain gardens should be located to receive the maximum amount of stormwater runoff from impervious surfaces, and where downspouts or driveway runoff can enter garden flowing away from the home.
- Swales, berms, or downspout extensions may be helpful to route runoff to the rain garden.
- Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge. Call 811 before you dig to locate the utility lines on your property.
- Rain gardens on steep slopes (>10%) may require an alternative design with terracing.

Design

- The size of the rain garden will vary depending on the impervious surface draining to it and the depth of the amended soils. Use the table to determine the required surface area.
- A maximum ponding depth of 6 inches is allowed within rain gardens. On average, rain gardens drain within a day which will not create a mosquito problem.
- Design rain garden entrance to immediately intercept inflow and reduce its velocity with stones, dense hardy vegetation or by other means.
- If sides are to be mowed rain gardens should be designed with side slopes of 3:1 (H:V) or flatter.
- For best results, it is suggested to test your soil characteristics as you would for a garden, or contact your local County Extension Service for help www.caes.uga.edu/extension/fulton.
- Soils for rain gardens should be amended native soils containing: 2/3 native soils and 1/3 compost.

Contributing Drainage Area (square feet)	Depth of Amended Soil (inches)			
	18	24	30	36
	Area of Rain Garden (square feet)			
100	6.6	5.7	5.1	4.6
500	35	30	25	23
1000	65	60	50	45
2000	135	115	100	90
3000	200	170	150	140
4000	260	230	200	185
5000	330	290	255	230

DRY WELL

SINGLE FAMILY RESIDENTIAL GUIDE
CITY OF ATLANTA, GEORGIA
DEPARTMENT OF WATERSHED MANAGEMENT

Dry wells are comprised of seepage tanks set in the ground and, in Atlanta's tight soils, surrounded with stone that are designed to intercept and temporarily store stormwater runoff until it infiltrates into the soil. Alternately the pit can be filled with stone with water entering via a perforated pipe with a perforated standpipe in place of the tank.

Dry wells are particularly well suited to receive rooftop runoff entering the tank via an inlet grate (shown right) or direct downspout connection (below right). When property sized and laid out dry wells can provide significant reductions in stormwater runoff and pollutant loads.

Source: www.earthcontactproducts.com/

Location

- Dry wells must be located at least 10 feet from building foundations and 10 feet from property lines.
- To reduce the chance of clogging, dry wells should drain only impervious areas, and runoff should be pretreated with at least one of the leaf removal options to remove debris and larger particles.
- The height of the tank should not exceed 45 inches unless infiltration testing has been done to insure a drain time of 72 hours or less.
- Dry wells should be located in a lawn or other pervious (unpaved) area and should be designed so that the top of the dry well is located as close to the surface as possible.
- Dry wells should not be located: (1) beneath an impervious (paved) surface; (2) above an area with a water table or bedrock less than two feet below the trench bottom; (3) over other utility lines; or, (4) above a septic field. Always call 811 to locate utility lines before you dig.

Construction

- Consider the drainage area size and the soil infiltration rate when determining the size of the dry well, (see table on next page).
- The sides of the excavation should be trimmed of all large roots that will hamper the installation of the permeable drainage fabric used to line the sides and top of the dry well.
- The dry well hole should be excavated 1 foot deeper and two feet larger in diameter than the well to allow for a 12 inch stone fill jacket.

General Sizing Tables

Design Options

Impervious Area Treated

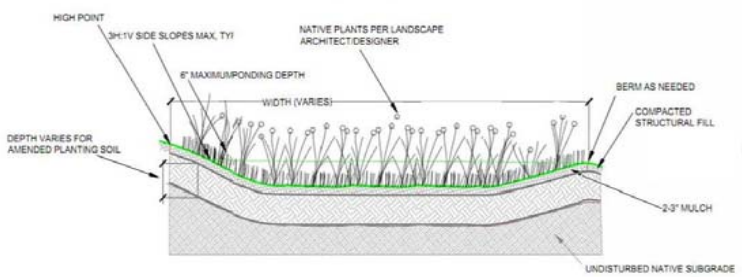
Rooftop Area (square feet)	Depth of Gravel From Top of Pipe (inches)			
	18	24	30	36
	Required Linear Feet of MFD			
100	6	5	4	3
500	30	25	20	15
1000	60	45	40	35
2000	120	95	75	65
3000	185	140	115	100
4000	245	190	155	130
5000	305	235	195	165

Practice Size

- Options within practical range
- Accommodate actual rainfall and runoff data
- Allows for median infiltration duration
- Assumes 0.25-0.50 in/hr infiltration rate

Modified French Drain Example

Tear Off Detail Sheets



CONSTRUCTION STEPS:

1. Locate rain garden(s) where downspouts or driveway runoff can enter garden flowing away from the home. Locate at least 10 feet from foundations, not within the public right of way, away from utility lines, not over septic fields, and not near a steep bluff edge.
2. Measure the area draining to the planned garden and determine required rain garden surface area from the table on the next page and your planned excavation depth.
3. Optionally, perform infiltration test according to Appendix A. If the rate is less than 0.25 in/hr an underdrain will be necessary. If the rate is more than 0.50 in/hr the size of the garden may be decreased 10% for every 0.50 in/hr infiltration rate increase above 0.50 in/hr.
4. Measure elevations and stake out the garden to the required dimensions insuring positive flow into garden, the overflow elevation allows for six inches of ponding, and the perimeter of the garden is higher than the overflow point. If the garden is on a gentle slope a berm at least two feet wide can be constructed on the downhill side and/or the garden can be dug into the hillside taking greater care for erosion control at the garden inlet(s).
5. Remove turf or other vegetation in the area of the rain garden. Excavate garden being careful not to compact soils in the bottom of the garden. Level bottom of garden as much as possible to maximize infiltration area.
6. Mix compost, topsoil, and some of the excavated subsoil together to make the 'amended soil'. The soil mix should be 1/3 compost, 2/3 native soil (topsoil and subsoil combined).
7. Fill rain garden with the amended soil, leaving the surface eight inches below your highest surrounding surface. Eight inches allows for 6 inches ponding and 2" of mulch. The surface of the rain garden should be as close to level as possible.
8. Build a berm at the downhill edge and sides of the rain garden with the remaining subsoil. The top of the berm needs to be level, and set at the maximum ponding elevation.
9. Plant the rain garden using a selection of plants from elsewhere in this manual.
10. Mulch the surface of the rain garden with two to three inches of non-floating organic mulch. The best choice is finely shredded hardwood mulch. Pinestraw is also an option.
11. Water all plants thoroughly. As in any new garden or flower bed, regular watering will likely be needed to establish plants during the first growing season.
12. During construction build the inlet feature as a pipe directly connected to a downspout or use a rock lined swale with a gentle slope. Use of an impermeable liner under the rocks at the end of the swale near the house is recommended to keep water from soaking in at that point. Test the drainage of water from the source to the garden prior to finishing.
13. Create an overflow at least 10 feet from your property edge and insure it is protected from erosion.

CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT	NAME/ADDRESS:	RAIN GARDEN SPECIFICATIONS PAGE 1 OF 2

November 2012

SKETCH LAYOUT

PROVIDE PLAN VIEWS OF RAIN GARDEN AND HOUSE SHOWING DRAINAGE AREA DIRECTED TO RAIN GARDEN AND KEY DIMENSIONS AND OVERFLOW AREA RELATIVE TO PROPERTY LINE.

SIZING CALCULATION:

Contributing Drainage Area (square feet)	Depth of Amended Soil (inches)			
	18	24	30	36
	Area of Rain Garden (square feet)			
100	6.6	5.7	5.1	4.6
500	35	30	25	23
1000	65	60	50	45
2000	135	115	100	90
3000	200	170	150	140
4000	260	230	200	185
5000	330	290	255	230

MEASURE CONTRIBUTING DRAINAGE AREA AND READ AREA FOR GIVEN MEDIA DEPTH.

CONTRIBUTING DRAINAGE AREA= _____ SQ FT
DEPTH OF SOIL MEDIA= _____ INCHES
AREA OF RAIN GARDEN= _____ SQ FT

MAINTENANCE:

1. IRRIGATE VEGETATION AS NEEDED IN FIRST SEASON
2. REMOVE WEEDS
3. REPLACE UNSUCCESSFUL PLANTINGS
4. REPLENISH MULCH
5. REPAIR ERODED AREAS
6. RAKE CLOGGED SURFACE TO RESTORE INFILTRATION
7. MONITOR RAIN GARDEN FOR APPROPRIATE DRAINAGE TIMES IF GARDEN DOES NOT DRAIN AN UNDERDRAIN MAY BE NECESSARY

CITY OF ATLANTA DEPARTMENT OF WATERSHED MANAGEMENT	ATTACH THIS TWO-PAGE SPECIFICATION TO HOUSE PLAN SUBMITTAL	RAIN GARDEN SPECIFICATIONS PAGE 2 OF 2

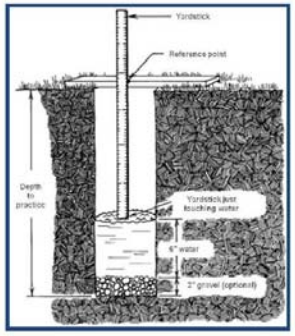
November 2012

Appendices

APPENDIX A

Testing Infiltration: the Simple Approach

It is assumed that an infiltration rate of 0.25 to 0.50 inches per hour exists on residential sites. The sizing criteria are set for this rate. However, if the soils have a higher infiltration rate the size of the features could be reduced. At the discretion of the property owner the following infiltration test can be conducted, and if it returns a higher infiltration ate than 0.50 inches per hour suitable reductions in the size of the infiltration-based facilities can be made. See each practice for the adjustment procedure.



Source: modified from www.ag.ndsu

Infiltration features (rain gardens, dry wells, permeable paver gravel layers) should reliably drain within the recommended time limit. Here is how to test if your soils can handle this type of feature.

1. Locate the approximate center of the area where you expect to build your feature.
2. Dig an access pit down to the bottom of the amended soils or gravel layer in the feature.
3. At that elevation dig a narrow test hole at least eight inches deep. You can optionally place 2" of course gravel in the bottom. The test hole can be excavated with small excavation equipment or by hand using a spade shovel or post-hole digger.
4. If you run into a hard layer that cannot be penetrated with a shovel or, you come across water in the whole, stop. Infiltration features should not be sited over impenetrable rock surfaces or over high water tables, so your site is inappropriate.
5. Place a flat board across the hole to serve as a measuring point (see figure).
6. Fill the hole with water to a depth of six inches. Measure from the flat board to the water surface. Record the exact time you stop filling the hole and the height of the water every 10 minutes for fast draining soils for a minimum of one hour or every 30 minutes for slow draining soils for a minimum of two hours.
7. Refill the hole again and repeat step 5 twice more. The third test will give you the best measure of how quickly your soil absorbs water when it is fully saturated.
8. If on the third test the water is dropping at least ½" per hour the soil will work for the infiltration features.

Source: www.learntogrow.com

APPENDIX B

Recommended Plants

Plants for rain gardens and other vegetated stormwater practices must be able to tolerate both wet and dry conditions. This list, while not exhaustive, includes many plants that will tolerate conditions in rain gardens. The plants in this list do have different preferences for both moisture and light, as shown in the columns labeled 'Moisture' and 'Sun'. Additionally, the majority of these plants are native to Georgia and thus contribute the added benefit of providing habitat and food for native pollinators and wildlife. Those plants that are not native to Georgia are marked with an asterisk (*).

Key

Height: Typical height range for mature plants

Moisture: The amount of soil moisture that plants will tolerate is defined as follows:

- **W** (Wet) —Frequently saturated soils
- **M** (Moist) —Moist soils that are periodically inundated.
- **D** (Dry) — Areas not flooded after rains and frequently dry between rains. Plants designated 'D' will tolerate drought conditions

Sun: the amount of sunlight that plants require is defined as follows:

- **F** (Full) Direct sunlight for at least 6 hours per day
- **P** (Partial shade)—Direct sunlight for 3-6 hours per day, or lightly filtered light all day
- **S** (Shade)—Less than 3 hours of direct sunlight per day, or heavily filtered light all day

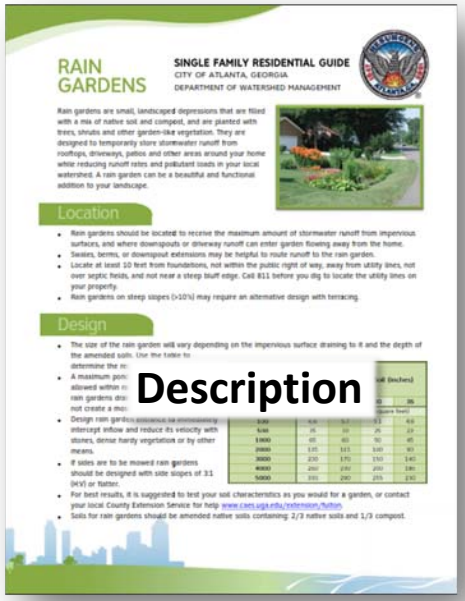
	Botanical Name	Common Name	Height	Moisture	Sun
Small Trees	Acer floridanum	Southern Sugar Maple	20'-25'	M	F/P/S
	Amelanchier arboria	Serviceberry	15'-25'	WM/D	F/P
	Cercis canadensis	Redbud	20'-30'	M	F/P
	Chionanthus virginicus	Fringe Tree	12'-20'	M	F/P
	Cornus florida	Flowering Dogwood	15'-30'	M/D	F/P
	Hamamelis virginiana	Witchhazel	15'-30'	WM	P/S
	Ilex decidua	Possumhaw	15'-25'	M/D	F/P
	Ilex vomitoria	Yaupon Holly	20'-25'	M/D	F/P
	Lagerstroemia indica *	Crape Myrtle *	15'-50'	M/D	F/P
	Magnolia virginiana	Sweetbay Magnolia	10'-30'	WM	F/P
	Magnolia x soulangeana *	Saucer Magnolia *	15'-25'	M	F/P
	Vitex agnus-castus *	Chaste Tree *	15'-20'	M/D	F/P

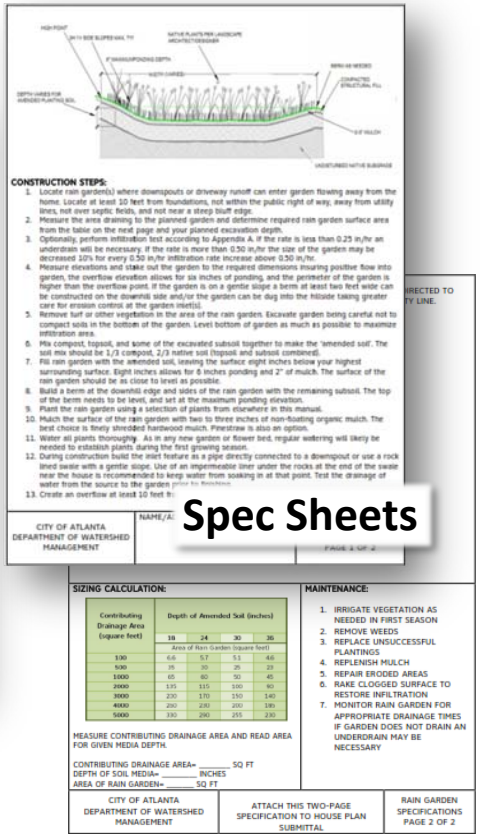
	Botanical Name	Common Name	Height	Moisture	Sun
Med.- LargeTrees	Acer rubrum	Red Maple	60'-90'	WM/D	F/P
	Betula nigra	River Birch	40'-70'	WM	F/P
	Carpinus caroliniana	Musclewood	30'-50'	WM	F/P
	Crataegus phaenopyrum	Washington Hawthorne	25'-30'	WM/D	F/P
	Fraxinuxpennsylvanica	Green Ash	50'-70'	WM/D	F
	Ilex opaca	American Holly	30'-60'	M/D	F/P
	Magnolia grandiflora	Southern Magnolia	40'-80'	M/D	F/P
	Magnolia macrophylla	Bigleaf Magnolia	30'-40'	M	F/P
	Nyssa sylvatica	Black Gum	35'-70'	WM/D	F/P
	Platanus occidentalis	American Sycamore	75'-100'	WM	F
	Quecus lyrata	Overcup Oak	35'-50'	M/D	F
	Quercus bicolor	Swamp White Oak	50'-60'	WM/D	F/P
	Quercus phellos	Willow Oak	60'-80'	WM/D	F/P
	Salix babylonica *	Weeping Willow *	30'-50'	WM	F
	Taxodium distichum	Bald Cypress	50'-100'	WM/D	F/P

* denotes plants not native to Georgia

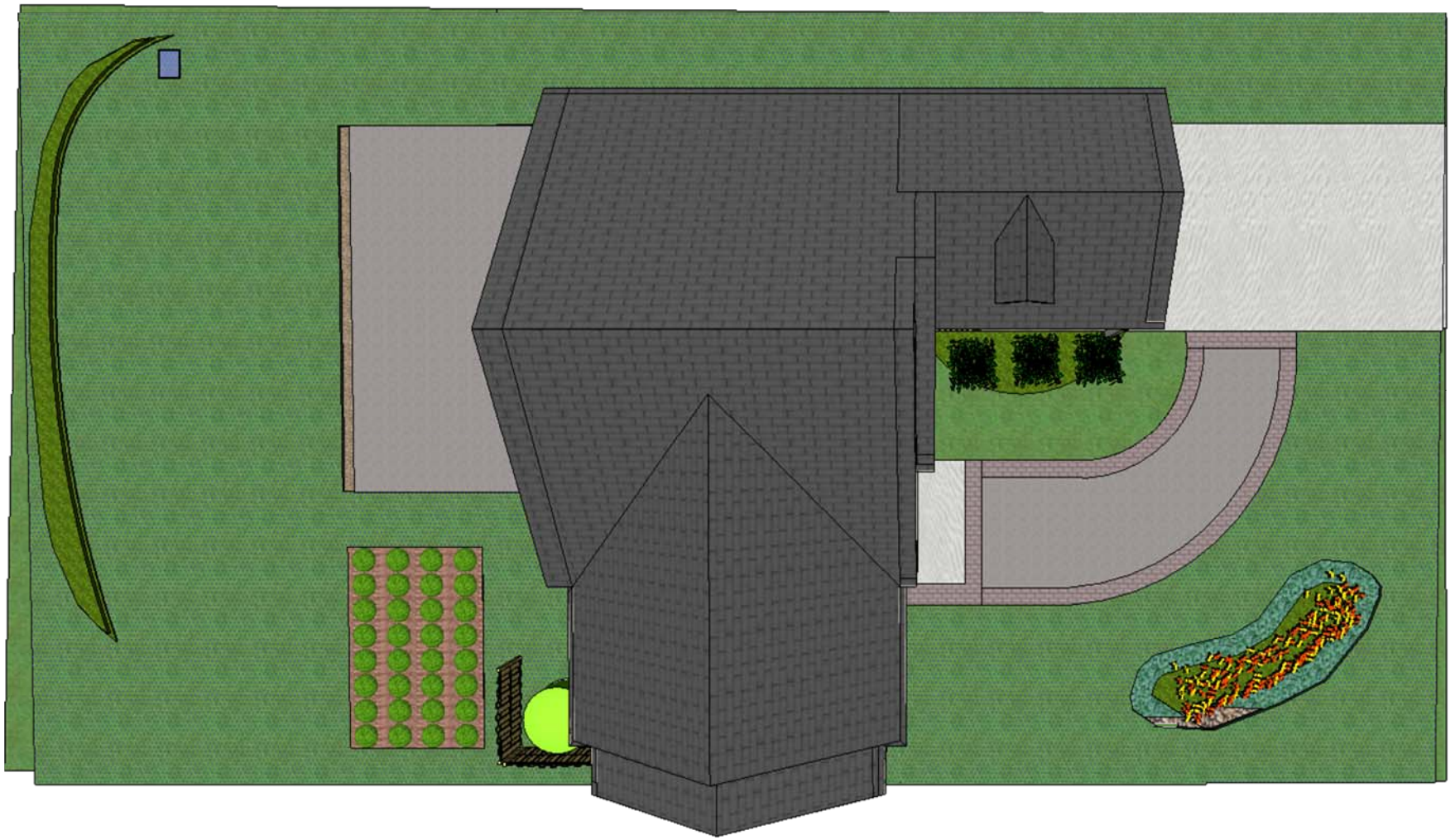
Types of Practices

- Cisterns
- Dry Well
- Vegetated Filter Strips
- Modified French Drain
- Permeable Pavers
- Rain Garden





Before & After



Rate Reduction (Detention)

- Previous Ordinance - 30% reduction in peak rate of discharge of all major storm events (up to 100-yr storm)
  - Problem: Size of detention ponds/vaults increases substantially when reducing the discharge rate of the 100-yr storm event
- Revised Requirement
  - **New Development** (Greenfield) cannot increase pre-development peak rate, up to the 100-yr storm event.
  - **Redevelopment** must reduce peak rate (up to 50%) based on the pre-development impervious cover, up to the 25 year storm.

$$\frac{\%PIC}{2} = \%PDR$$

PIC = Pre-development Impervious Cover
PDR = Peak Discharge Rate reduction





Stormwater Concept Plan & Consultation Meeting

- Prior to full design, concept plan must be discussed with Plan Review staff
  - Ideally during planning or rezoning process
  - Ensures that the engineer, developer, and owner are aware of the stormwater regulations prior to a full blown design
  - Results in a quicker review process and prevents redesigning site plans and stormwater facilities





June, 2013

Eberly & Associates has expertise applying requirements of new City of Atlanta Post-Development Stormwater Management Ordinance

Eberly & Associates

Engineered Solutions for the Built Environment

Land Planning
Civil Engineering
Landscape Architecture

www.eberly.net

The newly adopted City of Atlanta's Post-Development Stormwater Management Ordinance impacts new commercial projects and redevelopments that are over 1,000 square feet. The goal is to create a development that naturally serves the City's watershed by incorporating Green Infrastructure into site developments.

The most crucial component of the ordinance is the Stormwater Concept Plan and subsequent Consultation Meeting. This meeting with the Site Development Review Department is required prior to submitting a building permit. If the Stormwater Management Plan isn't to specifications the permitting process will be delayed.

Eberly & Associates has prepared plans and consulted in the concept plan meetings for a number of projects including:

- *Ponce City Market - the redevelopment of City Hall East into a Mixed Use complex*
- *The Somerset Apartments - new 228 unit apartment community wrapped around a multi-level parking garage*
- *Georgia State University Humanities Building and Pilot Graduate Student Housing Complex*
- *North Atlanta High School redevelopment*
- *Glenn & Towers Residence Halls, 930 Spring Street Student Apartments at Georgia Tech*
- *One 12 Courtland Student Housing for Georgia State University*

For more information or questions about this new

Successes

- Unanimous City Council Approval
- Coordinating with the development community for a balanced approach
- Adopting the ordinance with no direct financial incentives
- Outreach Campaigns – both pre- and post-adoption
- Partnerships
- Concept Plan & Consultation Meeting
- Leading by Example





South East Atlanta Stormwater Improvements

Combined Sewer Capacity Relief

Historic Fourth Ward Park

Opened 2011. Combined Sewer Capacity relief

City Hall Green Roof

Built 2003. Demonstration Project

Fire Station #16 Rain Garden

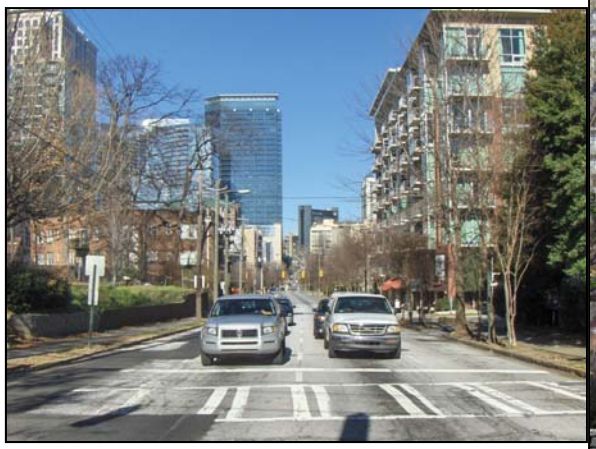
Built 2012. Demonstration. EPA, EPD, COA, UGA, WAWA

McDaniel Branch

- Stream Restoration and Constructed Wetlands

Water Quality Project. US Corps of Engineers and EPA 319 Funding.

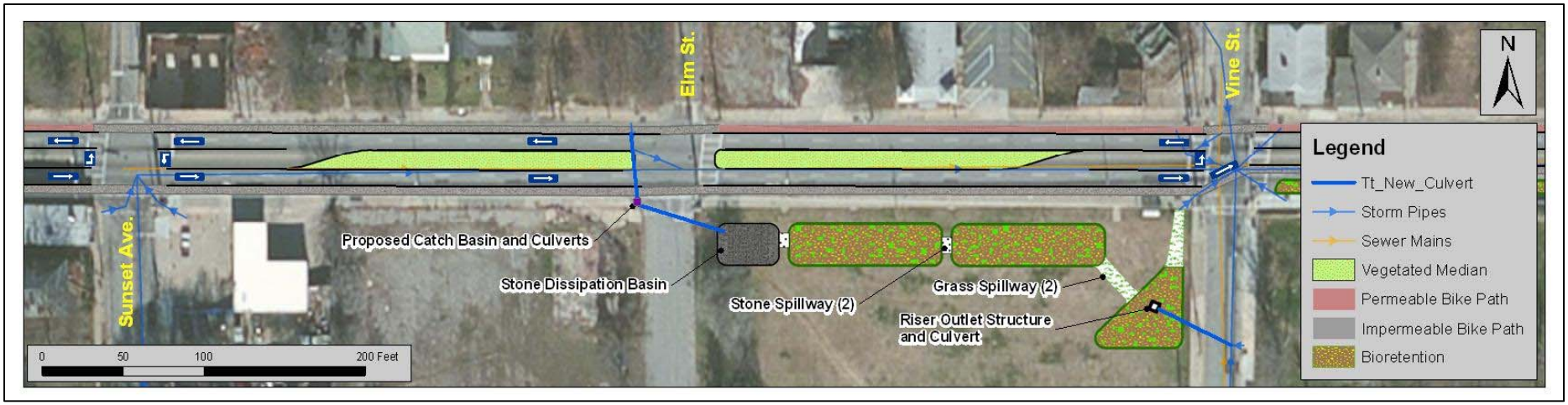
Juniper St. ‘Green Street’ Improvements



In Permitting. Included in Streetscape Improvements. Midtown Alliance funded

Boone Blvd

‘Green Street’



Demonstration Project: EPA Technical Assistant Grant





Challenges

- Urban Redevelopment
  - Tight sites (maximize footprint)
  - Highly impervious
  - Utilities
  - Compacted Soils
- Must shift away from GI as an afterthought when laying out site
- Lack of Urban GI Design Manual
- Plan Review and Inspections consistency
- Highly restrictive tree ordinance
- Tracking





In Conclusion...

- Successes have outweighed the challenges
- ‘Green Infrastructure’ is becoming common terminology in Atlanta
- If federal stormwater regulations change, Atlanta will have the knowledge and experience to comply





Questions?

www.AtlantaWatershed.org/GreenInfrastructure

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