Forsyth County

Green Infrastructure/Low Impact Development Program Document

Prepared for

Forsyth County Department of Engineering

Updated November 2018

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Introduction

Green Infrastructure (GI) is an approach to managing stormwater that mimics natural systems. GI frequently uses vegetation, soils, and existing natural processes to manage stormwater and promote protection of green spaces, natural habitat and wildlife populations. At a regional scale, the term “green infrastructure” refers to the overall network of natural areas that provide habitat, flood protection, and the systems that clean our air and water. At a site or local scale, the term “green infrastructure” more typically refers to stormwater management systems that mimic natural land conditions by infiltrating and storing stormwater.

A related concept, Low Impact Development (LID) is an overall approach to land planning, engineering and design that works with natural systems to manage stormwater as close to its source as possible. LID employs site design priorities such as preserving and recreating natural landscape features, minimizing impervious surfaces, and incorporating stormwater as an on-site resource. Examples of LID include greenspace conservation, soil preservation and restoration, site reforestation/ vegetation, green roofs, vegetated filter strips and bioretention.

The Georgia Stormwater Management Manual (GSMM) is an excellent resource for communities who are implementing GI/LID programs. The “Blue Book” (as the GSMM is widely known) encourages communities to work together with federal, state and local policies, programs and regulations. Forsyth has adopted the GWMM and requires all new development in the County to follow the processes and requirements therein.

Some innovative techniques that can be found in this document include:

1. Using comprehensive land use planning and zoning to direct growth away from sensitive aquatic and terrestrial resources.
2. Using land acquisition and better site planning techniques to protect and conserve valuable natural resources.
3. Using better site design techniques to minimize land disturbance.
4. Using small-scale stormwater management practices, LID, to reduce post-construction stormwater runoff rates, volumes and pollutant loads.

Planning and design to implement a GI/LID program will help protect valuable terrestrial and aquatic resources from the direct impacts of land development and may also provide additional benefits such as reduced energy demand, urban heat island mitigation, improved air quality, and improved health for Forsyth County.

Background

This document details Forsyth County’s GI/LID program to further encourage, and track the use of, GI/LID stormwater best management practices (BMPs). This document identifies common GI/LID BMPs (practices and structures) in Georgia that best support the County’s overall stormwater management and land use planning objectives. It also identifies those features of the County’s current stormwater inventory that represent potential examples and assesses various approaches for integrating their use into the County’s current stormwater and development review programs. While Forsyth County currently allows GI/LID, as included in the GSMM and Forsyth County Addendum, the ultimate intent of establishing a County-specific GI/LID program is to ensure these structures and practices are designed, implemented and maintained by their respective owners for improved watershed protection.

Forsyth County's Stormwater Management Program (SWMP) documents a set of GI/LID requirements the County must implement as part of its NPDES MS4 stormwater permit, which includes review of existing ordinances, overview of a GI/LID program, development of a GI/LID structure inventory, and implementation of an inspection program. **Table 1** provides a summary of the County's actions to meet permit requirements related to GI/LID. Additionally, a follow-up item was added to the County's Short-Term Work Program (STWP) for 2015 – 2019 to expand water quality BMPs, including green infrastructure and low impact development, to protect water resources. The Program identifies opportunities to build on the existing use of GI/LID in the County through a suite of potential practices and structures that are best suited for local conditions. It then outlines how the selected GI/LID BMPs will be integrated into the County's existing SWMP, including the inspection and maintenance of structural BMPs.

GI/LID Service Area and Applicability

Forsyth County's MS4 service area covers all unincorporated lands within the County. The only incorporated area in the County is the City of Cumming, which is a Phase II community and manages its MS4 independently from Forsyth County. The County's service area is located north of Atlanta and within the Metropolitan North Georgia Water Planning District (District).

Location and Soils Information

A large portion of the County's service area is in the Chattahoochee River Basin, draining to Lake Lanier and a section of the River downstream of the lake. The northwest portion of the County, and its MS4, is within the Coosa River Basin and drains to the Etowah River. The service area is completely within the Piedmont physiographic province, which is characterized by predominantly Type B and C soils, rolling hills, and a moderately deep-water table.

Table 1. MS4 Permit Language, Subsection 3.3.10 (b) (of Part 7- Post-Construction), Status

GI/LID Program Elements	Measurable Goals	Status
1. Legal Authority		
	1.a. The ordinance evaluation required by Part 3.3.10 (b) (1).	Completed in 2011, see 2011-2012 AR.
	1.b. Any necessary ordinance revisions must be completed and adopted ordinances submitted to EPD by April 13, 2014.	Completed in 2011, see 2011-2012 AR.
2. GI/LID Program		
	2.a. Develop a program describing the GI/LID techniques and practices to be implemented by the permittee. The program shall include procedures for evaluating the feasibility and site applicability of different GI/LID techniques and practices, and various structures and practices to be considered.	Completed in 2016, first submittal of GI/LID Technical Memo. Updated 2018.
3. GI/LID Structure Inventory		
	3.a. Develop an inventory of GI/LID structures located within the permittee's jurisdiction, including the total number of each type of structure.	Completed in 2016, first submittal of GI/LID Technical Memo. Updated 2018.
	3.b. Track the addition of new GI/LID structures through the plan review process and ensure the structures are added to the inventory.	Completed 2016. Procedures are in place to inventory new GI/LID structures designed or constructed after April 12, 2012.
4. Inspection Program		
	4.a. Conduct inspections on 100% of the total non-residential GI/LID structures within a 5-year period, beginning in April 2015. Provide the number and/or percentage of the total structures inspected during the reporting period in each Annual Report	Will be completed as part of routine SW Inventory Inspections.
	4.b. Conduct maintenance on the non-residential GI/LID structures owned by the County, as needed, beginning in April 2015. Provide the number and/or percentage of the total structures maintained during the reporting period in each Annual Report.	Maintenance of public GI/LID structures will be completed as part of routine SW maintenance.
	4.c. Develop procedures for ensuring privately-owned non-residential GI/LID structures are maintained as needed. Implement the procedures and provide documentation in each subsequent Annual Report.	Procedures for ensuring privately-owned non-residential GI/LID structures are maintained as needed will mirror those of other privately-owned infrastructure in the County.

Ordinances and Legal Authority

The MS4 permit requires a review of local building codes, ordinances, and other regulations to ensure that use of green infrastructure or low impact development (LID) techniques is not prohibited or impeded. The County conducted a review of current ordinances to identify, and (if necessary) remove barriers to GI and LID while also protecting the public health, safety, and welfare of the citizens. The County completed the review of current stormwater ordinances and found that these techniques are not prohibited or impeded as most recently listed in **Section 12.1** of the County's SWMP. However, as model ordinances are finalized and released by the District, the County will review and revise its ordinances as necessary.

Forsyth County currently encourages GI/LID through design standards and Chapter 19, Conservation Subdivisions, of the UDC. The ordinance allows for increased residential density when at least 40 percent of the gross tract area is preserved as open space, of which 2 acres must be contiguous. Active recreational facilities will not be located in the primary or secondary conservation areas; nor, will these areas count toward required open space. All public and private stormwater systems in the Forsyth County service area must be designed according to the GSMM and Forsyth County Addendum.

Several components outlined in these documents support LID objectives of:

- Managing stormwater close to the point of origin and minimizing collection and conveyance.
- Utilizing simple, nonstructural methods for stormwater management that are lower cost and lower maintenance.
- Preventing stormwater impacts rather than mitigating them, etc. The County started the GI/LID inventory for existing, newly developed, and redeveloped GI/LID structures at the beginning of the previous permit (April 12, 2012).

Evaluating Public Sites/Projects for GI/LID Installation

While Forsyth County's current level of service allows for inspection of projects across the County, maintenance and/or development of potential retrofits is allowed only on the County ROW and County-owned property. Historically, the County has assessed the potential for retrofit of flood reduction projects through its Watershed Improvement Planning (WIP) efforts. The WIPs included preliminary project costs, feasibility, and projected environmental benefits, including criteria of water quality, flood/channel protection, habitat/biological integrity, implementation constraints, and accessibility. The WIPs contained prioritized locations and opportunities to improve watershed conditions in impaired watersheds; and, the County's overwhelming focus has been finding areas of County-owned property for implementation. Potential projects were categorized as either:

- Stormwater BMP retrofits: projects aimed at improving structures to retain and treat stormwater; or,
- Stream channel restoration: projects that stabilize stream banks, restore aquatic habitat, and re-establish riparian corridors to improve water quality, promote ecological integrity, and reduce erosion and sedimentation.

In addition to the WIPs, the County evaluates existing, municipally owned structural flood control devices during each reporting period to determine if retrofitting the devices for additional pollutant removal is feasible. This could include the possibility of GI/LID structure or practice installation This process begins with the inspections at each of the County-owned **145** detention ponds (as of May 2018) annually, which is above and beyond the Permit requirement.

GI/LID Practices and Structures

GI/LID refers to a broad range of stormwater practices and structures defined historically by a variety of national sources such as the U.S. Environmental Protection Agency and the Center for Watershed Protection for a variety of purposes, including water quality improvement. GI/LID includes a diverse set of site planning techniques (i.e. protection of conservation areas), site design techniques (i.e. reducing impervious surface), and LID structures (i.e. bio-retention areas, enhanced swales, pervious pavement).

In addition to the GSMM, Georgia-based guidance on GI/LID BMPs can be found in the Georgia Coastal Stormwater Supplement (GA EPD, 2009). The Coastal supplement was referenced in the selection of practices and structures that would be appropriate for selection by Forsyth County. Forsyth County currently encourages the Better Site Planning and Better Site Design techniques as well as some of the LID practices; however, regional and national guidance was followed in the selection of practices and structures for the program. Forsyth County's program encourages the use of GI/LID techniques in new development, re-development, and through retrofitting of previously developed property.

GI/LID Practices

Forsyth County evaluated seven potential GI/LID practices that served as the starting point for identifying those already occurring in the County, those not occurring but are suitable, and those that are not suitable (for various reasons). These included soil restoration, site reforestation, undisturbed pervious area, simple downspout disconnection, infiltration practices, filtration practices, and rainwater harvesting. These GI/LID practices were reviewed in a March 2015 workshop with County Stormwater staff. Five practices, outlined in **Table 2**, were selected to be carried forward as part of the County's GI/LID program. GI/LID practices and structures are discussed separately in this program from other MS4 structures inventoried, inspected, and maintained by the County as part of its SWMP.

Table 2. Forsyth County GI/LID Program - Selected Practices

LID Practice	Description
Undisturbed Pervious Area	Can be used to "receive" the post-construction stormwater runoff generated elsewhere on a development site. If stormwater runoff can be evenly distributed over them as overland sheet flow, undisturbed pervious areas can provide significant reductions in post-construction stormwater runoff rates, volumes and pollutant loads on development sites.
Infiltration Practices	Primarily trenches and basins, these shallow excavations, typically filled with stone or an engineered soil mix, are designed to intercept and temporarily store post-construction stormwater runoff until it infiltrates into the underlying and surrounding soils.
Filtration Practices	Multi-chamber structures designed to treat post-construction stormwater runoff using the physical processes of screening and filtration. Sand is typically used as the filter media. Examples include surface or perimeter sand filters.
Simple Downspout Disconnection	Simple downspout disconnections can be used to spread rooftop runoff from individual downspouts across lawns and other pervious areas, where it is slowed, filtered and allowed to infiltrate into the native soils.
Rainwater Harvesting	Intercepting, diverting and storing rainfall for later use. In a typical rainwater harvesting system, rainfall is collected from a gutter and downspout system, screened and conveyed into an above- or below-ground storage tank or cistern. Once captured in the storage tank or cistern, it may be used for non-potable indoor or outdoor uses.

GI/LID Structures

Forsyth County considered 12 potential GI/LID BMP types for use in its program. These structures included bio-retention areas, enhanced wet swales, enhanced dry swales, vegetated filter strips,

grass channels, stormwater (pocket) wetland, submerged gravel wetlands, stormwater planters, dry wells, rain gardens, permeable pavement, and green roofs. These potential GI/LID structures were reviewed in the March 2015 workshop with County Stormwater staff, which resulted in five types of structures, outlined in **Table 3**, being carried forward as part of the County's GI/LID program. These structures are identified in the County's Stormwater (SW) Inventory, which is used to track inspections and maintenance activities.

The County's current municipally owned GI/LID Inventory includes **10** GI/LID structures that have been verified during routine SW inventory inspections. Note there are also **3** privately owned GI/LID structures in the County. The current inventory of these structures (May 2018) is included in **Appendix A**.

Table 3. Forsyth County GI/LID Program - Selected Structures

LID Structure (Count)	Description
Bio-retention Area (7)	Shallow sunken areas that are filled with an engineered soil mix and are planted with trees, shrubs and other herbaceous vegetation. They are designed to capture and temporarily store stormwater runoff in the engineered soil mix, where it is subjected to the hydrologic processes of evaporation and transpiration, before being conveyed back into the storm drain system through an underdrain or allowed to infiltrate into the surrounding soils. Also known as bio-retention filters and bio filters. Feasibility and design criteria found in Section 4.2 of the GSMM.
Enhanced Swale (2)	Vegetated open channels that are explicitly designed and constructed to capture and treat stormwater runoff within dry or wet cells formed by check dams or other means. The two types of enhanced swales are dry swale and wet swale/ wetland channel. – A dry swale system consists of an open conveyance channel with a filter bed of permeable soils that overlays an underdrain system. – A wet swale or wetland channel consists of an open conveyance channel which has been excavated to the water table or to poorly drained soils. Check dams are used to create multiple wetland "cells," which act as miniature shallow marshes. Feasibility and design criteria found in Section 4.8 of the GSMM.
Green Roof (0)	Green roofs typically consist of underlying waterproofing and drainage materials and an overlying engineered growing media which captures and temporarily stores stormwater runoff where it is subjected to the hydrologic processes of evaporation and transpiration before being conveyed back into the storm drain system. Feasibility and design criteria found in Section 4.11 of the GSMM.
Permeable Pavement (0)	A permeable pavement system allows stormwater runoff to pass through an overlying permeable surface layer (i.e., pavement surface) into an underlying stone reservoir, where it is temporarily stored and allowed to infiltrate into the surrounding soils or conveyed back into the storm drain system through an underdrain. Feasibility and design criteria found in Section 4.15 of the GSMM.
Stormwater (Pocket) Wetland (1)	Constructed shallow marsh systems designed and placed to control stormwater volume and facilitate pollutant removal. Designed with three distinct zones: a forebay immediately after the inlet to receive stormwater, the wetland area, and a micropool immediately prior to the outfall. (WERF, 2015) Also known as constructed wetlands. Feasibility and design criteria found in Section 4.26 of the GSMM.

In addition to the five structure types listed in **Table 3**, the County may decide to include additional structure types in the future. These structures would be included on the inventory, and the updated inventory would be included with each Annual Report.

Implementing GI/LID for New Development and Redevelopment

Permit Requirement: "Develop a program describing the GI/LID techniques and practices to be implemented by the permittee. The program shall include procedures for evaluating the feasibility and site applicability of different GI/LID techniques and practices, and various structures and practices to be considered."

EPD requires local governments to encourage the use of green infrastructure structures and low impact development practices and approaches for new and redeveloped sites. This could include site planning (i.e. protection of conservation areas), site design (i.e. reducing impervious surface), and structures (i.e. bioretention areas, vegetated filter strips, pervious pavement). Forsyth County encourages the use of GI/LID in several ways.

The County has adopted the GSMM as the technical reference document related to post-construction stormwater management for new development and re-development. Specific design and engineering information on stormwater practices and designs can be found in the GSMM. All public and private stormwater systems in the Forsyth County service area must be designed according to the GSMM and Forsyth County Addendum, including the LID objectives of:

- Managing stormwater close to the point of origin and minimizing collection and conveyance.
- Utilizing simple, nonstructural methods for stormwater management that are lower cost and lower maintenance.
- Preventing stormwater impacts rather than mitigating them, etc.

Site locations are always considered when reviewing applications for new development or redevelopment. In addition to the GSMM and Addendum, Forsyth County uses the Coastal Georgia Stormwater Supplement to determine feasibility, site applicability, and documents these through comments during the Plan review process. The Department of Engineering and Planning and Community Development review new and re-developments and work with local developers to verify that the County's requirements for site design and stormwater management are met as new development occurs. The plan submittal and review process is detailed below.

Pre-submittal:

Forsyth County development guide documents provide a detailed description of the site plan review process and applicable checklists in the County. This information is available on the County website http://www.forsythco.com/Departments-Offices/Planning-Community-Development/Departmental-Checklists).

Plan Submittal:

All plans and supporting documents for new developments and redevelopments are submitted to the Planning and Community Development Department except for initial submittals of final plats, which are submitted for review to the Engineering Department.

Plan Review/Feasibility Determination:

County departments review the plans and determine if developers have followed proper procedures and design standards for GI/LID as indicated in the GSMM and Forsyth requirements. Feasibility criteria such as infiltration rates, depth to bedrock, depth to the water table, available space, land use/site applicability, percent impervious area being treated, drainage area, and safety concerns are considered during the review process of potential GI/LID BMPs. Feasibility criteria that the County uses when considering GI/LID structures are summarized below and found in Table 4.1.3-1

of the GSMM. The GSMM section references for the feasibility and design criteria for each of the County's GI/LID BMPs is also provided in **Table 3** above. It is worth noting that the District is currently developing feasibility criteria as part of the update to the Post-Construction Stormwater Management Model Ordinance, so this document will be updated when those criteria are completed.

Feasibility criteria for GI/LID structures:

- Native soils must have a minimum soil infiltration rate of 0.5 inches/hour that must be supported by an adequate infiltration rate testing at the proposed depth of the practice.
- A separation distance of 2 feet is required between the bottom of structure and the elevation of the seasonally high-water table.
- Pretreatment measures should be used to prevent clogging of the basin bottom if runoff is expected to contain heavy sediment loads.
- A separation distance of 2 feet is required between the bottom of the structure and underlying confining layers such as bedrock and clay lenses.
- Minimum setback requirements for most GI/LID structures can include many of the following, depending on the structure type:
    - 10 feet from building foundations/property lines
    - 15 feet down-gradient from buildings
    - 50 feet from septic systems
    - 100 feet from private wells
    - 200 feet from public water supply reservoirs
    - 1,200 feet from public wells
    - 5 miles from airports

Considering the criteria described above, site characteristics can limit the application of GI/LID and require design modifications or alternative practices to maximize runoff reduction and water quality benefits to reduce the effective impervious area. During the plan review process, the County will consider the following conditions when determining GI/LID practices are not feasible for a specific site:

- Minimum soil infiltration rate cannot be achieved.
- Minimum clearance of the seasonally high-water table cannot be achieved.
- Minimum land area requirements for the proposed structure cannot be achieved.
- Minimum setbacks to property lines, building foundations, wells, septic systems, or surface waters cannot be achieved.
- Minimum space requirements for necessary pretreatment measures cannot be achieved.
- Minimum separation between infiltration practice and confining layers cannot be achieved.
- Utility conflicts cannot be resolved.
- Contaminants that cannot be remediated are present.

Plan Review Meeting:

The Developer has the option to attend a plan review meeting held by the Planning and Community Development Department with a representative of each reviewing department in attendance. The reviewers discuss the plans and distribute comments back to the developer and/or their agents for corrections, if necessary. This meeting is a chance to encourage additional GI/LID structures, if appropriate.

Walk Through:

After the departmental comments have been addressed, and the corrections to the plans are made, the developer and/or their agent returns to each reviewing department to provide evidence that the required changes have been made. If the changes are satisfactory to the reviewing department, then said department may sign-off on the Application for Plan Approval and affix their departmental stamp to the plans.

Plan Approval:

The developer and/or their agent will deliver to the Planning and Development Department the plans approved by the other reviewing departments, and upon verification, the Director sign off and the final plats may be recorded. For additional detail, see Section 5.2.1 of the SWMP.

Pre-Construction Conference:

Land disturbance permits will be issued after approvals have been granted by the appropriate reviewing departments. The permit is issued at a pre-construction conference with the Engineering Department, the department responsible for inspection of the development site.

As-built Policy*:*

An as-built is a civil drawing depicting completed commercial development and construction, as it exists in the field. As-builts are required to be submitted to the Planning and Community Development Department on all commercial and industrial sites. The as-built should be submitted at around 90 percent completion of the site, sometime between the rough plumbing inspection and the final building inspection. Upon approval of the as-built, the applicant may schedule the final building inspection. The Engineering Department, Water and Sewer Department, and Planning and Community Development Department (including County Arborist) are responsible for reviewing the as-built application. This is a critical step when installing GI/LID structures, to ensure they have been installed correctly, and have not been unduly impacted by construction process.

GI/LID Structure Inventory

Permit Requirement: "Develop an inventory of GI/LID structures located within the permittee's jurisdiction, including the total number of each type of structure. Track the addition of new GI/LID practices and structures through the plan review process and ensure the structures are added to the inventory. Provide an updated inventory in each Annual Report."

The County's inventory of existing GI/LID structures was initially generated by reviewing the SW Inventory and reclassifying existing structures as GI/LID, as appropriate. As with the overall SW Inventory, the GI/LID subset will track attributes for structures that allow inspection and maintenance teams to locate individual structures, record inspection results, prioritize maintenance needs, and issue maintenance work orders, as well as to track record drawings and reviews. The County started the GI/LID inventory for existing, newly developed, and redeveloped GI/LID structures at the beginning of the 2012 permit cycle.

Moving forward, the Forsyth County Stormwater Division of the Engineering Department and the GIS Department will continue to work together to frequently update the Comprehensive Inventory Database (CID) based on the Development Review Process outlined in Section 2.2.1 of the County's SWMP. The County will capture additional information regarding GI/LID structures through a tracking spreadsheet compiled monthly. Upon completion of the final building inspection, the approved as-built plans will be used to add these features to the CID. The County will maintain

the inventory of GI/LID structures as a subset of the SW Inventory and submit it as part of the Annual Report. The current inventory of these structures (May 2018) is included in **Appendix A**.

GI/LID Structure Inspection and Maintenance Program

Forsyth County's inspection and maintenance of GI/LID structures will follow that of other structural stormwater controls as outlined in the SWMP sections related to Structural Stormwater Controls Inspection and Maintenance (Section 2.2.1) and Inspection and Maintenance for Privately-Owned Facilities (Section 2.2.2). As described further below, the County is responsible for inspecting stormwater structures located on both public and private property and for ensuring maintenance of public structures. Maintenance for privately owned infrastructure is carried out by the private land owner.

GI/LID Structure Inspection

Permit Requirement "Conduct inspections on 100% of the total non-residential GI/LID structures within a 5-year period, beginning in April 2015. Provide the number and/or percentage of the total structures inspected during the reporting period in each Annual Report. Conduct maintenance on the non-residential GI/LID structures owned by the permittee as needed. Provide the number and/or percentage of the total structures maintained during the reporting period in each Annual Report. Develop procedures for ensuring privately-owned non-residential GI/LID structures are maintained as needed. Upon EPD approval, implement the procedures and provide documentation in each subsequent Annual Report."

Forsyth County will use the inspection form included in **Appendix B** to inspect the GI/LID structures and will include the results of the inspections in the GI/LID Inventory Database. As directed by GAEPD, the County will inspect 100 percent of its public and private non-residential GI/LID structures over a 5-year period, beginning in April 2015. It will provide the number and/or percentage of the total structures inspected during the reporting period in each Annual Report. The Forsyth County Engineering Department is responsible for inspections.

As discussed further in Section 2.2.1 of the SWMP, the County utilizes a holistic inspection approach such that when stormwater structures are inspected, the County also inspects other adjacent stormwater infrastructure, including culverts, conveyance channels, drop inlets, pipe discharges, weir walls, stand pipes, and junction boxes. This approach now includes the 5 GI/LID structure types listed in **Table 3** in the rotation of stormwater control structure inspections. If an issue is found or complaint filed, it is tracked as a work order by the Engineering Department. Emergency situations are addressed immediately; others generally are addressed chronologically. During each inspection, conditions are documented on an inspection form (**Appendix B**), and maintenance work orders are prepared if necessary.

At a minimum, inspectors attempt to identify the following information:

- Adequate access to structures via drainage easements and berms.
- Stormwater facilities that require sediment removal, grassing, outlet control structure repair, and erosion control.
- Accumulation of sediment or debris at the discharge of outfall structures.
- Stormwater collection and conveyance structures that are not properly maintained or damaged.

Maintenance of Public GI/LID Structures

The County is responsible for the maintenance, as needed, of public (owned by the County) non-residential GI/LID structures beginning in April 2015 as well as having procedures in place ensuring

privately-owned non-residential GI/LID structures are also maintained as needed. Maintenance on properties managed and/or owned by the Parks and Recreation Department or the Board of Education on their property is handled within those departments. Maintenance activities follow the same pattern as the inspections. Once maintenance is conducted, information is documented in the GIS inventory regarding the inspection, final condition, and follow-up needs of the structure. The County will provide the number and/or percentage of public GI/LID structures maintained during the reporting period in each Annual Report.

Maintenance and repair of stormwater structures may include such actions as cleaning or replacing drains, replacing catch basin lids, unclogging pipes, maintaining the right-of-way, and removing litter where needed. Because stormwater infrastructure in Forsyth County was primarily built in the last 20 years, the County can address all maintenance issues on public infrastructure as they arise, with priority for areas draining to 303(d) listed stream segments and citizen/staff complaints.

Maintenance of Private GI/LID Structures

Privately owned GI/LID structures, like all other stormwater BMPs, are maintained by the individual property owners in Forsyth County. New developments, residential as well as commercial, are required to sign a Stormwater Management/BMP Facilities Covenant before approval of the final or as-built plat, prior to the issuance of the Certificate of Occupancy (CO). The Covenant facilitates the identification of a responsible party if any maintenance issue occurs. A copy of the Covenant will accompany any transfer of property and Forsyth County will be notified in writing of the change in responsible party. Stormwater Management/BMP Facilities Covenant requires annual inspection and maintenance reports for new (since 2005), privately owned structures be submitted by the responsible party to the Engineering Department. The report must meet the minimum recommended inspection and maintenance requirements found in Chapter 3 of the GSMM. Failure to meet the requirements of the Covenant constitutes a violation of Chapter 34 Article V. of the Forsyth County Code of Ordinances and may be punishable under Section 7.1.7.2 of said code.

Private, non-residential GI/LID structure owners will be required to initiate the necessary repair process to deficient stormwater structures within 30 days of receiving the inspection report, unless the County deems the deficiency to be an emergency or waters of the State are being adversely affected. For these situations, the County will issue a time limit for repairs. A re-inspection will be conducted to verify the maintenance activities were performed.

References

Atlanta Regional Commission. BMP Checklists, http://atlantaregional.com/environment/georgia-stormwater-manual, Accessed March 17, 2015.

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CWP. Codes and Ordinances Worksheet.

GA EPD, Georgia Coastal Stormwater Supplement, April 2009. https://epd.georgia.gov/georgia-epd-coastal-stormwater-supplement-stormwater-management-manual

WERF, Stormwater "Pocket" Wetlands definition, http://www.werf.org/liveablecommunities/toolbox/pocket.htm, Accessed March 18, 2015.

Appendix A

Forsyth County GI/LID Inventory (May 2018)

OBJECT	ASSET	INSTALLDAT	RECEIVINGWATER	ADDRESS	LOCDESC	GITYPE	swADMINISTRATIVEARE	INSPECTIONDAT
1	GI4	2017-03-09	Settingdown Creek		Matt Community Park	Enhanced Swale (dry)	FC Municipal	
2	GI5	2017-03-09	Settingdown Creek		Matt Community Park	Enhanced Swale (dry)	FC Municipal	
3	GI8	2015-07-15	Bentley Creek	5995 Post Rd	Big Creek Animal Hospital	Bio-Retention Area	Not In ROW	
4	GI9	2015-07-15	Bentley Creek	5995 Post Rd	Big Creek Animal Hospital	Enhanced Swale (dry)	Not In ROW	
5	GI10	2017-02-01	Big Creek	425 Winkler Dr	Horizon MC West	Bio-Retention Area	Not In ROW	
6	GI14	2012-06-25	Caney Creek	2755 Caney Rd	Caney Creek Preserve	Bio-Retention Area	FC Municipal	
7	GI15	2012-06-25	Caney Creek	2970 Saddlebrook Glen Dr	Caney Creek Preserve	Bio-Retention Area	FC Municipal	
8	GI20	2012-06-22	Kelly Mill Branch	1080 Kelly Mill Rd	Kelly Mill Elementary	Bio-Retention Area	FC Municipal	
9	GI21	2012-06-22	Kelly Mill Branch	1080 Kelly Mill Rd	Kelly Mill Elementary	Bio-Retention Area	FC Municipal	
10	GI22	2012-06-22	Kelly Mill Branch	1180 Chamblee Gap Rd	Kelly Mil Elementary	Bio-Retention Area	FC Municipal	
11	GI23	2012-06-22	Kelly Mill Branch	1080 Kelly Mill Rd	Kelly Mill Elementary	Bio-Retention Area	FC Municipal	
12	GI24	2012-06-22	Kelly Mill Branch	1080 Kelly Mill Rd	Kelly Mill Elementary	Bio-Retention Area	FC Municipal	
13	GI16	2012-06-25	Settingdown Creek	5345 Settingdown Rd	Hampton Park Library	SW Wetland	FC Municipal	2017-08-28 14:34

Appendix B

Forsyth County GI/LID Inspection Form

MS4 GREEN INFRASTRUCTURE INSPECTION FORM
FORSYTH COUNTY, GEORGIA

Date:_____ Facility/Subdivision Name: _____
Inspector:_____ GIS I.D. _____ Parcel: _____
Watershed_____ Receiving Stream: _____
Address: _____

Field Verification: Does this feature qualify as Green Infrastructure? (circle one): Yes No
Reason for Inspection (circle one): Routine Complaint
Responsibility for Maintenance (circle one): Public Private
Private Maintenance Agreement on File? (circle one): Yes No

Which category of Green Infrastructure is present?

☐ 1. Bio-retention Area	☐ 3. Enhanced Swale (Dry)	☐ 5. Permeable Pavement
☐ 2. Green Roof	☐ 4. Enhanced Swale (Wet)	☐ 6. Stormwater (Pocket) Wetland

Inspection Scoring – For each feature item, insert one of the following scores:
0 = No deficiencies identified
1 = Monitor (potential for future problem)
2 = Routine maintenance required
3 = Immediate repair necessary
N/A = Not applicable

1. Bio-retention Area
____Ponding present? (Should drain entirely within 48 hours)
____Vegetation in healthy condition?
____Vegetation maintained properly?
____Vegetation replacement needed?
____Erosion present?
____Litter/trash present?
____Sediment deposits present?
____Adequate mulch / organic matter (3-4 inches thick)?

2. Green Roof
____Does waterproof membrane have leaks?
____Sediment or accumulation in the outflow and overflow areas?
____Vegetation in healthy condition?
____Vegetation maintained properly?
____Vegetation replacement needed?

3. Enhanced Dry Swale
____Vegetation in healthy condition?
____Vegetation maintained properly (4-6 inches in height)?
____ Evidence of erosion or the formation of rills or gullies along side slopes?
____Litter/trash present in inflow forebay?
____Evidence of clogging of pea gravel diaphragm?
____Has greater than 25% of the original design volume of the bottom of the swale been lost to sedimentation?

4. Enhanced Wet Swale
____Ponding present? (Should drain entirely within 48 hours)
____Vegetation in healthy condition?
____Contributing drainage area free of sediment / debris?
____Drainage area activities contributing sediment / oil / grease?
____ Evidence of erosion or the formation of rills or gullies along side slopes?
____Litter/trash present in inflow forebay?
____Evidence of clogging of pea gravel diaphragm?
____Has greater than 25% of the original design volume of the bottom been lost to sedimentation?

5. Permeable Pavement
____Is there evidence of ponding present? (Should drain entirely)
____Is surface of porous paver free of trash, debris, and sediment?
____Is paved area free of vegetation (unless concrete pavers are used)?
____Are adjacent and contributing drainage areas stabilized and the vegetation maintained?

6. Stormwater (Pocket) Wetland
____Vegetation in healthy condition (side slopes and wetlands)?
____Vegetation replacement needed to maintain at least 75% surface area coverage?
____Invasive vegetation present?
____Erosion present?
____Litter/trash present?
____Sediment deposits present in inlet / outlet structures?
____Level spreader maintenance needed?

Inspection Summary/Additional Comments: _____

OVERALL RATING (circle one)

0 = No Deficiencies

1 = Monitor (potential for future problem exists)

2 = Routine Maintenance Required

3 = Immediate Repair Necessary

☐ Maintenance Required

☐ No Maintenance Needed

Follow-Up Activities Conducted? (circle one)

Letter sent to private land owner / HOA

Letter sent to public entity / department