

COLUMBIA COUNTY BOARD OF COMMISSIONERS

GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT PROGRAM



**Columbia County
Engineering Services Division
Stormwater Compliance Department
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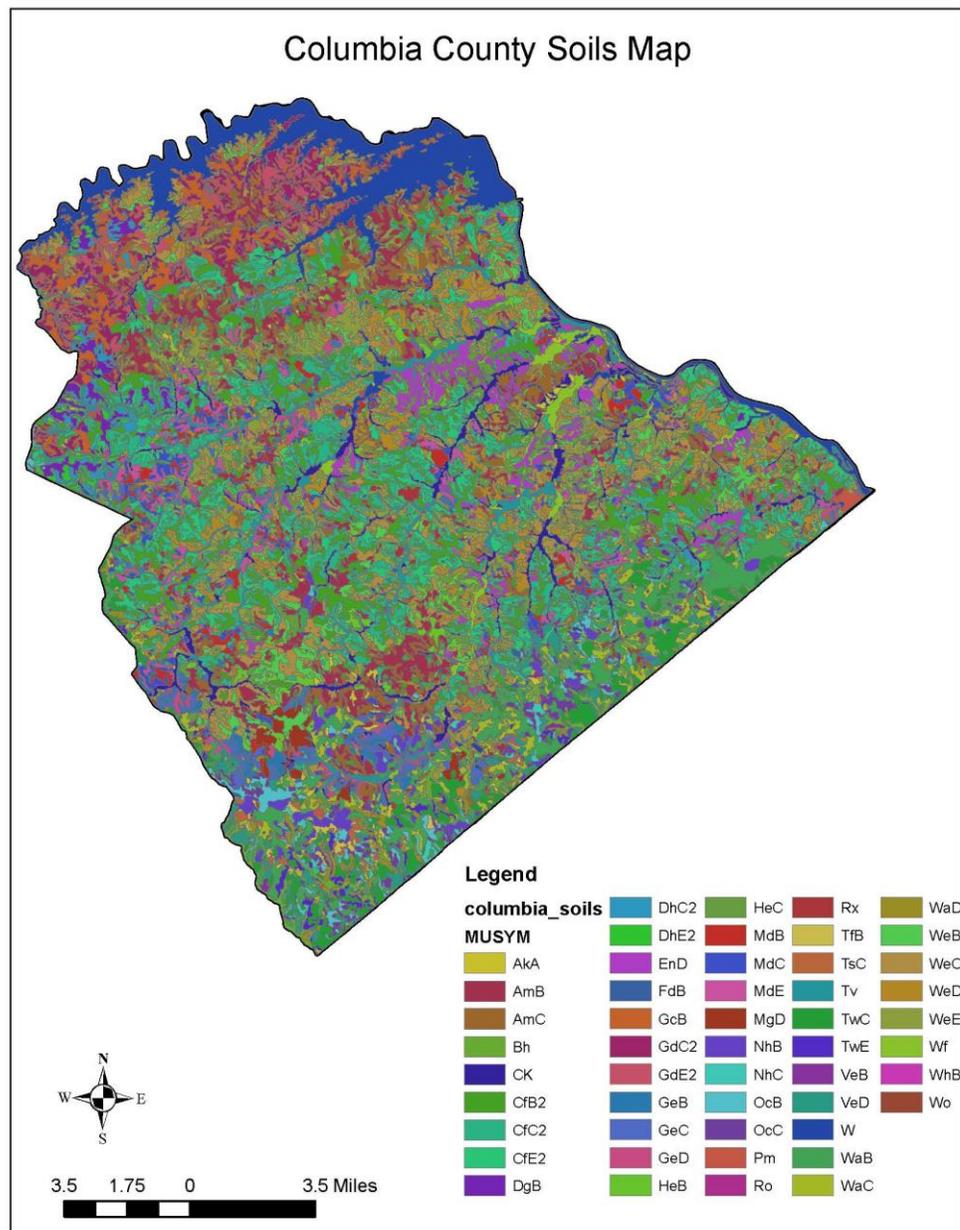
COLUMBIA COUNTY GREEN INFRASTRUCTURE AND LOW IMPACT DEVELOPMENT PROGRAM

A. BACKGROUND & GEOLOGY

Columbia County is in the northeastern part of Georgia, has 307 square miles and has a population of 154,291. The Columbia County Stormwater Utility (CCSWU) area covers over 54,000 acres. Columbia County is primarily composed of the Southern Piedmont Major Land Resource Area (MLRA) with the lower one-fourth of the county being composed of the Carolina and Georgia Sand Hills area. The county's drainage is principally provided by the Savannah River and its tributaries.

The Southern Piedmont MLRA is primarily underlain by Precambrian and Paleozoic metamorphic and igneous rock types. The river valleys exhibit recent alluvium and hardly any terraces. The shallow to very deep soils are generally well drained and are loamy to clayey in texture.

The Sand Hills MLRA is just below the fall line marking the boundary between the older crystalline Piedmont and the younger unconsolidated sediments composing the Coastal Plain. This area has some deposits of kaolin and high-silica sands and the crystalline rocks of the Southern Piedmont lie beneath the sands. These soils are generally very deep and well drained to excessively drain with loamy to sandy textures.



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Soil and physiographic information within Columbia County, GA was obtained by using the Soil Survey of Columbia, McDuffie, and Warren Counties, obtained via the National Cooperative Soil Survey Soil Characterization Database, available online. This information was accessed October 1, 2019.

Saturated Flow

Saturated Hydraulic Conductivity (k-Sat) refers to ability of soil pores in saturated conditions to transmit water. K-Sat values are commonly based on distinct observable soil characteristics such as porosity, texture and structure. Saturated Hydraulic Conductivity was chosen as a method of evaluating the suitability of soils to transmit water at a specific depth as bio-infiltration methods commonly used in Low Impact Development (LID) and Green Infrastructure (GI) projects amend native soils for maximum efficiency and rely on transmission of received water at depths of 48-72 inches.

The k-Sat values of Columbia county range between 0 inches per hour (iph), to 10.3 iph with 97.5% of soils exhibiting a K-Sat of 1.3 iph or greater at a depth of 121.9 centimeters (4 ft) to 182.8 centimeters (6 ft.)

Table 1. Hydraulic Conductivity (k-Sat) for Columbia County Soils

Soil Series	Mapunit Symbol	k-Sat 48-72 in (iph)*	% of Columbia County Soils*
Altavista	AkA	5.3	1.4
Appling	AmB, AmC	1.3	11.5
Bibb	Bh	1.3	1.5
Cecil	CfB2, CfC2, CfE2	1.3	13.2
Chewacla and Congaree	Ck	1.8	2.9
Davidson	DgB, DhC2, DhE2	1.3	1.2
Enon	EnD	1.3	0.9
Faceville	FdB	1.3	0.3
Georgeville	GcB, GdC2, GdE2	1.3	14.0
Grover	GeB, GeC, GeD, MgD	1.3	5.3
Helena	HeB, HeC	1.3	3.3
Madison	MdB, MdC, MdE	1.3	4.2
Norfolk	NhB, NhC	1.3	3.9
Orangeburg	OcB, OcC	1.3	1.7
Roanoke	Ro	5.9	0.3
Tifton	TfB, TsC	0.4	0.7
Toccoa	Tv	4.0	2.1
Troup	TwC, TwE	6.1	5.4
Vaucluse	VeB, VeD	0.6	1.2
Wagram	WaB, WaC, WaD	1.3	9.5
Wedowee	WeB, WeC, WeD, Wee	1.3	13.7
Wehadkee	Wf	10.3	0.8
Wickham	WhB	2.1	0.3
Worsham	Wo	0.4	0.5
Rock Outcrop	Rx	0.0	0.1

*Values rounded to the nearest tenth.

B. INFILTRATION

86.3% of soils in Columbia County are classified as Hydrologic Soil Group A and B. Soils in these hydrologic groups exhibit high to moderate infiltration rates under saturated flow. They are typically very deep to moderately deep and excessively drained to moderately well drained with sandy to moderately fine textures. Soils in these classes have high to moderate rates of water transmission.

The information regarding the Hydrologic Soil groups for the various soils of Columbia County have been summarized in the table below. Soils belonging to a dual hydrologic group exhibit characteristics of the first letter for drained areas and characteristics of the second area in undrained areas. Infiltration rate is the velocity or speed that water can enter into the soil. Surface runoff potential refers to the loss of water from a given area by overland flow. These classes are determined based on factors such as slope, climate and vegetative cover. These factors indicate a relative value for specific conditions.

Table 2. Hydrologic Soil information for Columbia County Soils

Hydrologic Group	Infiltration Rate	Surface Runoff Potential	% of Columbia County Soils*
A	High	Low	7.5
B	Moderate	Moderately Low	78.7
C	Slow	Moderately High	4.3
D	Very slow	High	3.8
B/D	Moderate to very slow	Moderately Low to High	2.4
C/D	Slow to very slow	Moderately High to Low	3.2
ROCK OUTCROP	N/A	N/A	0.1

*Values rounded to the nearest tenth.

While Columbia County soils exhibit desirable transmission values, the prominent subsurface water management ratings are somewhat limited (76.5% total area) to very limited (19.5% total area.) The subsurface water management ratings for outflow quality considers soil properties affecting the respective soils capacity to convey surface and subsurface water with additional consideration for properties that affect water quality. Somewhat limited ratings indicate that the limitations can be mitigated with special consideration of the project and site conditions and very limited ratings indicate that soils exhibit one or more features that are unfavorable for use. These limitations are generally severe enough that they cannot be overcome without major reclamation, special design, or expensive installation procedures.

C. MS4 PERMIT REQUIREMENTS

Columbia County is a small Phase II Municipal Separate Storm Sewer System (MS4) Community. Per the current Phase II MS4 Permit, implementation of the runoff reduction standard is required by December 6, 2020 on applicable projects. This plan will go into effect on December 6, 2020.

Land development activities meeting any of the following criteria will be required to comply with the stormwater management standards of the Phase II MS4 Permit, the Ordinance, the Georgia Stormwater Management Manual (GSMM), and this Supplement:

1. New development that creates or adds 5,000 square foot or greater of new impervious area, or that involves land disturbing activity of one (1) acre of land or greater.

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2. Redevelopment that creates, adds, or replaces 5,000 square feet or greater of new impervious surface area, or that involves land disturbing activity of one (1) acre or more, including projects less than 1 acre if they are part of a larger common plan of development or sale.

Following December 6, 2020 the MS4 Permit post-construction stormwater quality performance standard must be met using Permit No. GAG610000 Part 4.2.5.1(a) unless the applicant is able to illustrate that site conditions render such a practice infeasible.

According to Permit No. GAG610000 Part 4.2.5.1(a), “The stormwater management system shall be designed to retain the first 1.0 inch of rainfall on the site, to the maximum extent practicable. The determination by the MS4 that it is infeasible to apply the stormwater runoff quality/runoff reduction standard, on part or all of the project, must be documented in the site plan review documents. If the first 1.0 inch of rainfall can be retained onsite using runoff reduction methods, then additional water quality treatment is not required. If the 1.0 inch cannot be retained onsite, the remaining runoff from a 1.2 inch rainfall event must be treated to remove at least 80% of the calculated average annual post-development total suspended solids (TSS) load or equivalent as defined in the GSMM or in the equivalent manual.”

Columbia County’s GI and LID Program is based on the Atlanta Metro District Green Infrastructure Feasibility Program and the City of Riverdale, Georgia Green Infrastructure/ Low Impact Development Program Approach.

D. GI/LID BMPS IN COLUMBIA COUNTY

In the permit coverage area there are six bioretention facilities and one parking lot with pervious pavement.

CCSWU will allow the use of all GI/LID structures, better site planning techniques, and better site design techniques that are included in the current GSMM. The structures include, but are not limited to, the following:

Table 3. GI/LID Structures and Feasibility

BMP	Drainage Area (ac)	Construction Cost	Maintenance Burden	Runoff Reduction (%)	WQv/TSS (%)
Bioretention Basins	5 max	Med-High	Med	50-100	85
Enhanced Dry/Wet Swales	5 max	Med	Low	0-100	80
Grass Channels	5 max	Low	Low	10-25	50
Pervious Concrete	N/A	High	High	50-100	80
Porous Asphalt	N/A	Med	Med	50-100	80
Rainwater Harvesting	No restrictions	Med	High	Based on Demand	Varies
Stormwater Planters/Tree Boxes	2,500 ft ²	High	Med	50	80
Vegetated Filter Strips	5 max	Low	Low	25-50	60

E. EVALUATION PROCESS

CCSWU is a Local Issuing Authority responsible for processing Land Disturbance Permit (LDP) applications, maintaining a list of active LDP's, conducting inspections/maintenance reports, and enforcing local protective ordinances and the Georgia Erosion and Sedimentation Control Act (Official Code of Georgia Annotated [OCGA] 12-7-8(a)).

CCSWU performs plan reviews for compliance with floodplain management/flood damage protection and post-development stormwater management ordinances. In August 2014 CCSWU adopted the GSMM. In July 2016 CCSWU created and adopted the Columbia County Supplement to the GSMM. The Supplement was recently revised in 2018 and will continue to be updated as needed. CCSWU will evaluate each best management practice (BMP) according to the GSMM and the Supplement.

FEASIBILITY ANALYSIS FOR RUNOFF REDUCTION

A. INTRODUCTION

Runoff reduction practices are stormwater Best Management Practices (BMPs) used to disconnect impervious and disturbed pervious surfaces from the storm drainage system, thereby reducing post-construction stormwater runoff rates, volumes and pollutant loads. Runoff reduction means more than simple infiltration. The Runoff Reduction Volume (RRV) is the retention volume calculated to infiltrate, evapotranspire, or otherwise remove runoff from a post-developed condition to more closely mimic the natural hydrologic conditions.

Runoff reduction practices provide important water quality benefits, but certain conditions, such as, soils with very low infiltration rates, high groundwater, or shallow bedrock, may lead Columbia County to waive or reduce the runoff reduction requirement. This policy document was developed to provide guidance about the conditions and supporting documentation that could justify a runoff reduction "Determination of Infeasibility." This document is designed to help administrators implement a process for granting a Determination of Infeasibility that supports efficient plan review and protects water quality to the maximum extent practicable. It is based on the following principles:

- This section applies to new development and redevelopment projects for public and private post-construction stormwater BMPs. It is referenced in the current Columbia County Supplement to GSMM.
- This section was prepared to align with requirements for runoff reduction in the Georgia

Environmental Protection Division's permit to discharge from the MS4 permit. The MS4 permit states that the stormwater management system shall be designed to retain the first 1.0 inch of rainfall on the site to the maximum extent practicable. Most GSMM BMPs include a runoff reduction component.

- This section does not address infeasibility for linear transportation projects being constructed by Columbia County, other local governments, or authorities.
- A pre-submittal meeting will be required when pursuing a Determination of

Infeasibility to ensure all attempts to provide 100% RRv on site have been exhausted.

B. CONDITIONS THAT MAY WARRANT A DETERMINATION OF INFEASIBILITY

The GSMM provides broad guidance about conditions that may lead Columbia County to waive or reduce the runoff reduction requirement. Table 1 provides additional detail about the conditions, benchmarks, testing and documentation to support a Determination of Infeasibility.

Table 4: Conditions that may warrant a Determination of Infeasibility

Condition	Benchmark	Testing	Documentation
Soil Infiltration Rate	0.5 inch per hour (within zero to two feet of the bottom of an infiltration practice)	<ol style="list-style-type: none"> 1. Infiltration testing in a saturated condition 2. Soil test using a hand auger, test pit, or drilling equipment. On average, at least one test for every two acres should be completed, but in no case less than two locations per developed site. 	Infiltration test(s), Soil Boring Log(s), and Report of results as interpreted by a Professional Engineer, Professional Geologist, or Soil Scientist licensed in Georgia
Water Table	Seasonal High-Water Table (within zero to two feet of the bottom of an infiltration practice)	<ol style="list-style-type: none"> 1. Groundwater depth at an average of at least one location for every two acres, but in no case less than two locations per developed site. 	Soil Boring Log(s) and Report with results of the seasonal high-water table assessment as interpreted by a Professional Engineer, Professional Geologist, or Soil Scientist licensed in Georgia
Bedrock: Material which cannot be excavated except by drilling or blasting	Shallow Bedrock (within zero to two feet of the bottom of an infiltration practice)	<ol style="list-style-type: none"> 1. Bedrock depth at an average of at least one location for every two acres, but in no case less than two locations per developed site. 	Soil Boring Log(s) and Report with results of the shallow bedrock assessment as interpreted by a Professional Engineer, Professional Geologist, or Soil Scientist licensed in Georgia
Extreme Topography	Anything steeper than 3:1 slope for more than 50% of the site	<ol style="list-style-type: none"> 1. Site survey 	Site survey showing 50% of the site is steeper than 3:1 slope s interpreted by a Professional Engineer or Land Surveyor licensed in Georgia

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Table 4: Conditions that may warrant a Determination of Infeasibility Continued...

Karst Topography	Any of the existing condition is karst	1. Geologic Survey Map and/or Evidence of Ground Subsidence	Report developed by a Professional Engineer, Professional Geologist, or Soil Scientist licensed in Georgia
Hotspots/ Contamination	Reasonable suspicion that previous uses of the site have resulted in soil contamination	1. Phase II Environmental Assessment	Phase II Environmental Assessment Report

C. Obtaining a Determination of Infeasibility

The following process is recommended to identify conditions early, provide flexibility, support efficient plan review, and protect water quality to the maximum extent practicable. A determination of Infeasibility is not an all or nothing proposition. Designers are required to explore all avenues to first meet the runoff reduction standard. If this is determined to be infeasible, they must attempt to provide the maximum percentage of RRv on site as possible. Only after all attempts to provide any RRv on site are exhausted will Columbia County consider a plan for a Determination of Infeasibility.

Prior to Plan Submittal

- 1) The design engineer identifies conditions that limit using runoff reduction methods to retain 100% of the first 1.0 inch of rainfall onsite and initiates a pre-submittal meeting with the Stormwater Plan Reviewer prior to submittal of the Stormwater Site Plan. During the meeting, the following information will be reviewed:
 - Infeasibility Report to initiate the request and provide basic project information, confirmation that supporting documentation was submitted, and documentation of pre-consultation meeting outcomes.
 - Stormwater Concept Plan that has been developed based on site analysis, and natural resources inventory (including impracticability) in accordance with Section 2.2.1 of the current Supplement to GSMM
- 2) The plan reviewer will evaluate the pre-submittal information on a case-by-case basis; coordinate with the design engineer to understand site-specific issues; and (if possible) explore potential design strategies to achieve 100% RRv in compliance with the standards and specifications in GSMM and the current Columbia County Supplement to GSMM.
- 3) Based on the pre-consultation information and meeting, the plan reviewer will provide one of the following determinations to the design engineer:
 - Acceptance – preliminary Determination of Infeasibility issued
 - Rejection with conditions – preliminary Determination of Infeasibility issued with conditions to incorporate plan reviewer comments into the Stormwater Concept Plan
 - Rejection- revise the Stormwater Concept Plan to obtain 100% RRv
- 4) Design engineer may either:
 - Submit the Permit application with the Final Stormwater Site Plan and preliminary Determination of Infeasibility (as applicable)
 - Appeal the “rejection” or “rejection with conditions” following the appeals process outlined in Columbia County regulations.
- 5) Approval of the Permit will constitute final approval of the Determination of Infeasibility

D. GI/LID Structure Inspection and Maintenance Program

Per the Phase II MS4 permit requirements, permittees must:

Conduct inspections and/or ensure that inspections are conducted on 100% of the total privately owned non-residential and publicly owned GI/LID structures within a 5-year period, beginning in 2020. Provide the number and/or percentage of the total structures inspected during the reporting period in each annual report.

Conduct maintenance on the publicly owned GI/LID structures, as needed, beginning in 2020. Provide a spreadsheet 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.

- **GI/LID Inspection and Maintenance Program**

Table 5 summarizes the GI/LID inspection and maintenance responsibilities that are incorporated into the Columbia County SWMP, by nature of approval of this document.

Table 5.

GI/LID Inspection and Maintenance Responsibilities
Green Infrastructure / Low Impact Development Program Approach TM

Location	Inspection Responsibility	Maintenance Responsibility
Within MS4 and public right-of-way	CCSWU	CCSWU
Private non-residential	CCSWU	Property Owner (County ensures that maintenance has been completed by owner)
Private residential	Property Owner	Property Owner
Board of Education Facilities	Board of Education (County ensures that inspections have been completed by owner)	Board of Education (County ensures that maintenance has been completed by owner)

Note: The GI/LID inspection and maintenance program includes all GI/LID structures that are included in Columbia County’s inventory. The inventory must include, at a minimum, GI/LID structures built after December 6, 2012. Inventory of private residential structures is not required by the MS4 permit.

- **GI/LID Inspection Program**

As directed by GAEPD, 100 percent of the total privately owned non-residential and publicly owned GI/LID BMPs are inspected within the 5-year permit term. Columbia County performs inspections of all GI/LID BMPs in the inventory.

Privately owned non-residential structures are required to be maintained by individual property owners. Private non-residential property owners are required to complete a signed and notarized maintenance agreement with CCSWU (Appendix 2). The maintenance agreement requires the property owner to keep records of inspection and maintenance activities and make those records

available to the County upon request. The maintenance agreement also contains penalty for violating the agreement. If enforcement action is warranted, it will proceed according to the maintenance agreement.

For publicly owned GI/LID structures, inspections are completed by trained staff, and during each inspection, conditions are documented on an inspection form in Cityworks.

Inspections of applicable GI/LID BMPs are documented on the inspection form and, at a minimum, attempt to identify the following information:

- adequate access to GI/LID BMPs 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 transfer structures that are not properly maintained or damaged.

See Appendix 1 for complete details and checklists on GI/LID structure specific inspection and maintenance.

If an issue is found or a complaint filed, a work order is initiated electronically in Cityworks. Emergency situations are addressed immediately while routine inspections are prioritized based upon the assessed conditions recorded in the inventory.

- **GI/LID Maintenance Program**

As directed by GAEPD, Columbia County conducts maintenance on publicly-owned GI/LID structures on an as-needed basis. Columbia County ensures maintenance of privately-owned non-residential GI/LID structures. With regard to responsibility:

- County-owned structures: CCSWU maintains GI/LID structures located on County property.
- Publicly-owned structures: the Board of Education (BOE) is responsible for maintenance associated with GI/LID structures at their facilities (e.g., administration buildings, schools, etc.). Columbia County is responsible for ensuring that the BOE is conducting needed maintenance.
- Privately-owned non-residential structures: The property owner is responsible for maintenance of the GI/LID structures. CCSWU ensures that proper maintenance is performed by the owner through a notarized maintenance agreement signed by the private property owner. When issues arise from a County inspection of such structures, a copy of the inspection report and a letter will be sent to the property owner. Any further action by the County will proceed according to the penalties stated in the maintenance agreement.

Maintenance needs vary for each of the GI/LID BMPs and may include such actions as proper drainage, replacing mulch and plants, removing sediment, sweeping/vacuuming, dewatering, invasive species removal, planting, and removing trash/debris. Columbia County utilizes the GSM to identify maintenance needs for structures included in the inventory.

All maintenance activities will be documented in Cityworks.

References

CH2M. City of Riverdale, Georgia. Green Infrastructure/ Low Impact Development Program Approach TM. Revised March 12, 2019.

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