

1. POST-CONSTRUCTION BMPS

1.1. General Information

On January 3, 2012, the Environmental Protection Division of the Georgia Department of Natural Resources (EPD) issued the Department's first MS4 Permit, General NPDES Stormwater Permit No. GAR041000 (Permit). This Permit regulates new and existing point source discharges of stormwater from roadways and facilities owned and/or operated by GDOT to waters of the State of Georgia. These regulations apply to counties and cities currently designated by EPD as "MS4 Permitted Areas" (See Attachment A of this document). Specific projects or individual project discharge locations within MS4 Permitted Areas may be excluded where certain conditions defined in the Section of the Permit are met – Refer to Section 1.2 below.

All new highway infrastructure projects located in the MS4 Permitted Areas must meet the requirements of this Permit which includes inclusion of permanent water quality control and detention measures (MS4 BMPs), where appropriate. The following guidelines are meant to be used by design engineers to identify project conditions where post-construction BMPs are required, and to provide design criteria appropriate for design of these structures.

Below is a summary of Standard Design criteria which must be satisfied at each point discharge location where the Permit applies.

- **Stormwater runoff quality and reduction** – demonstrate 80% of the total suspended solids (TSS) from runoff generated by a 1.2-inch rainfall event.
- **Stream channel protection** – detain the 1-year 24-hour rainfall event for 24 hours.
- **Overbank protection** – calculated post-construction peak discharge rate that is less than or equal to pre-preconstruction rates, for the 25-year 24-hour rainfall event.
- **Extreme flood protection** – control the 100-year 24-hour flood such that flooding is not exacerbated

The GDOT MS4 Guidelines identifies the Georgia Stormwater Management Manual (Georgia Bluebook3) and the Coastal Supplement as primary design references. The below guidelines are provided to clarify, and in some cases, supplement Georgia Bluebook guidance for application to the highway environment. Where GDOT guidance differs from that provided in the Georgia Bluebook, the GDOT guidance will apply.

1.2. Conditions Where Post-Construction BMPs are Not Required

When designing facilities in MS4 areas designers should strive to limit the use of structural BMPs where possible. This can be accomplished by utilizing the following conditions:

- Road projects that disturb less than 1 acre or for site development projects that add less than less than 5000 ft² of impervious area.
- Roadways that are not owned or operated (maintained) by the Department may not require post construction BMPs. Coordination with the local government is necessary for determination.
- Projects that have their environmental documents approved or R/W plans submitted for approval on or before June 30th 2012 are not required to place post-construction BMPs.
- Maintenance projects and safety projects whereby the sites are not connected and the individual site disturbs less than one acre (see page 19 of the permit for more details).
- For outfalls whereby the net impervious surface area within that outfall's drainage area has been reduced or remains the same as pre-developed conditions.

- Sheet flow (non-point source discharges). Sheet flow should be checked to ensure that the flow will not cause instability, erosion, or flooding in its path. Where possible, the designer should consider rural shoulder typical sections instead of curb and gutter sections because rural shoulders allow a majority of the stormwater runoff to flow through a vegetated filter. Rural shoulders may also allow a significant portion of the runoff to leave the site as sheet flow. This reduces the amount of runoff to treat in a BMP and therefore reduces construction and maintenance costs of permanent BMPs.
- Flows that originate outside of GDOT's right of way or diverted flows from undisturbed areas. If feasible, it is often best to direct offsite water around the construction site to the cross drain or stream such that it does not combine with water from the projects impervious surfaces. This redirection allows the BMPs to only treat the stormwater that originates from GDOT's site, and water that originates off-site to pass through the right of way unimpeded.
- The detention of the 1 year 24 hour rainfall event can be waived for flows less than 2 cubic ft/sec

1.3. Structural BMPs

Because of their low cost-to-benefit ratio, the following are the preferred BMP's for GDOT application:

1. Grass channels
2. Enhanced swales, both dry and wet swales
3. Infiltration trenches
4. Stormwater wetlands
5. Stormwater ponds
6. Detention ponds
7. Filter strips

General guidelines for the design, construction, and maintenance for the above BMPs are provided in the Georgia Stormwater Management Manual, aka "The Bluebook". When GDOT specifications on these BMPs are more specific than the Bluebook then GDOT specifications will be used. Policies on BMP use are described below.

Some BMPs can meet both the water quality requirement and the detention requirement of the permit. They are called Dual-purpose BMPs and are preferred by GDOT since they reduce construction and maintenance costs. In other cases, two or more BMPs combined in a treatment train must be used to meet both the water quality and/or detention requirements of the permit. See the Blue book on how to develop a treatment train.

Detention can be achieved with BMPs 4, 5, and 6. The last three standard design criteria listed in section 1.1 require detention however, it is not always appropriate. Although peak flow reduction at the outlet control of a detention structure can always be achieved, the downstream flow rate may actually increase due to the upstream detention. This is because of the timing of the combined hydrographs at the downstream confluence. Special consideration should be given where the site is close to channels serving large drainage areas. As a policy, detention will not be required where the outfall is discharging directly in a channel that has a drainage area of 5 square miles or more. This policy does **not** relieve the designer from ensuring that post development flows do not exceed pre-development flows for areas where there is a risk of life or property due to flooding. For streams with smaller drainage areas, please use the downstream analysis method prescribed by The Georgia Stormwater Management Manual. A study point is analyzed downstream where the drainage area is 10 times that of the project site to determine if there are any adverse effects of increased flows. If not then the detention requirement can be waived (Ga Stormwater Management Manual page 4-21 Volume 1).

Structural BMPs other than those listed above may be utilized if found in the Blue Book or their performance has been documented and approved by the GDOT Office of Design Policy and Support. Because of maintenance concerns and the possibility of safety issues proprietary devices will not be considered by the Department. Similarly underground detention will not be considered in context of MS4 for the same reasons, but will remain available to the designer when life and or property are threatened by increases in flows due to the Department's facilities. The Department's Drainage Manual is scheduled to be updated by December 2013. This update will include a chapter concerning MS4.

1.4. Infeasibility Criteria

In certain cases the use of structural BMPs can be omitted because their use is deemed infeasible. The specific reasons for infeasibility are the following and should be applied to each outfall individually:

- The cost of construction and maintenance of the BMP equals or exceeds ten percent of the combined cost for right of way, construction, and utilities (the cost will only be the cost of the project draining to the outfall in question, in other words if the outfall is draining 0.25 miles of a 2 mile project then the cost will be only the cost for the 0.25 miles of the project in the outfall's drainage area not the total project cost for the 2 miles).
- The project is delayed by 90 days or greater due to the implementation of post-construction BMPs. Examples of this is when a project could be built without a right of way phase, but the inclusion of post construction BMPs means that a right of way phase is necessary then the delay criteria can be used.
- The use of BMPs will impact threatened or endangered species habitat.
- The use of BMPs will significantly damage a community resource such as a historical area, a park, a wildlife refuge, a nature trail, or school facilities.
- The BMP implementation would result in the violation of a Federal or State law
- The project has shallow bedrock, contaminated soils, high groundwater, utilities, or underground facilities and avoidance or relocation cost of the utility equals the cost of the BMP.
- The soil hydraulic conductivity (K) is less than 10^{-4} cm/second can be considered infeasible (while 10^{-5} cm/second is the absolute lower limit) when considering infiltration BMPs.
- The site is too small to infiltrate the necessary volume.
- The site does not allow for gravity flow to the appropriate BMP.

Infeasibility is to be determined individually for each of the four standard design criteria listed in section 1.1. When documenting the reason for infeasibility it should be applied to the BMP with the least amount of impacts such that all other BMPs would also be considered infeasible. For example if an enhanced swale and a stormwater quality pond are both sufficient BMPs then the swale should be studied because it has the least amount of impacts. When one or more of the standards are found to be infeasible for a given outfall then a letter written by the designer of record shall be drafted detailing the site-specific reason for the infeasibility.

The infeasibility letter must be signed by the Chief Engineer at or before proceeding to the Preliminary Field Plan Review. The letter should contain the location of the outfall, the standard that is not being met, and the site specific reason for the infeasibility (meaning list one or more of the bulleted criteria above and give some detail relative to the site on how it meets that criteria). It is the policy of GDOT to consider the limits of the environmental study to be the limits of study for locating post construction MS4 structures. Post construction MS4 structures will be considered outside of these limits only in special cases.

Although certain conditions as noted above may relieve GDOT of the obligation to follow certain sections of the MS4 permit, the risk to life, property, and infrastructure must be considered. Other rules and regulations must be considered as well. Drainage design should never be an afterthought in the design process. Instead, it should be done to complement good roadway design.

1.5. Green Infrastructure/Low Impact Design Practices

According to the Permit the Department shall consider the use of various Green Infrastructure practices and Low Impact Design. Below are some practices to consider on the Department's projects:

- Reduced roadway footprint (reduced shoulders or travel lanes)
- Porous pavements (OGFC, PEM)
- Changing urban shoulder to rural
- Landscaping outside of clear-zone with trees
- Structural BMPs that use infiltration (infiltration trench, bio-retention, and bio-cells)

Other green infrastructure practices already in use by GDOT are:

- Recycled materials such as asphalt and concrete
- Environmental Planning (avoid impacting wetlands for example)
- Incorporating water quality early in the planning process

1.6. Effective Dates for This Policy

This policy is in effect immediately. If this policy were to change in the future then it shall be effective at the time of issuance for projects that have not started preliminary design (projects that do not have an approved concept). Projects that have started preliminary design will use this policy or the policy in effect during the concept phase.

Project Milestone Requirements for Concept, PFPR, FFPR, Final Plans, and Use on Construction Revisions:

Concept:

A new check box to indicate whether the project is in an MS4 area

For projects within a designated MS4 (Municipal Separate Storm Sewer Systems) area, at a minimum, the conceptual project cost estimate (PE, ROW, UTIL, CST, ENV MIT, etc.) shall include preliminary, estimated costs related to the impacts that MS4 post construction structures may have. When sufficient topography and drainage information is available, a preliminary sizing of structures should be performed to better define any additional right of way requirements and develop an updated overall project cost estimate.

PFPR:

1. A review of the Concept Hydrology Study
2. Hydrology and Hydraulic Study shall be prepared including the design of the detention and water quality structures
3. Detailed Design of each of the structures including:
 - a. Percent impervious
 - b. Drainage area
 - c. Existing and post construction coefficient of runoff (C)
 - d. Curve Number used (CN)
 - e. Average slope of site
 - f. Site soil conditions
 - g. Stage storage relationships and flow stage relationships existing conditions and post construction
 - h. Outlet structure and pipe dimensions
 - i. Hydraulic conductivity (K) for infiltration structures
 - j. Grading plan of any ponds (proposed contours bold and existing contours faded)
 - k. Checklist detailing location of outfalls, BMP used or determination of infeasibility, and basic design values necessary (C existing and C post-construction for instance).
 - l. Checklist of Green Infrastructure/Low Impact Design Practices implemented
4. Documentation of infeasibility for those outfalls determined to be infeasible (including a letter addressed to the Chief Engineer documenting the reason or reasons for the infeasible determination)

FFPR, Final Plans, and Use on Construction Revisions:

1. A Review of the PFPR Hydrology and Hydraulics Study
2. Necessary changes made to the Study due to changes since the last update
3. Detailed Design of structures changed or not included since last update

Appendix A
Permitted Areas

Phase I MS4s

Acworth	Doraville	Morrow
Alpharetta	Duluth	Norcross
Atlanta	East Point	Palmetto
Augusta-Richmond	Fairburn	Pine Lake
Austell	Forest Park	Pooler
Avondale Estates	Forsyth County	Port Wentworth
Berkeley Lake	Fulton County	Powder Springs
Bibb County	Garden City	Riverdale
Bloomington	Grayson	Roswell
Buford	Gwinnett County	Savannah
Chamblee	Hapeville	Smyrna
Chatham County	Jonesboro	Snellville
Clarkston	Kennesaw	Stone Mountain
Clayton County	Lake City	Sugar Hill
Cobb County	Lawrenceville	Suwanee
College Park	Lilburn	Thunderbolt
Columbus	Lithonia	Tybee Island
Dacula	Lovejoy	Union City
Decatur	Macon	
DeKalb County	Marietta	

Phase II MS4s

Counties

Athens-Clarke	Floyd	Newton
Barrow	Glynn	Oconee
Bartow	Hall	Paulding
Catoosa	Henry	Peach
Cherokee	Houston	Rockdale
Columbia	Jones	Spalding
Coweta	Lee	Walker
Dougherty	Liberty	Walton
Douglas	Long	Whitfield
Fayette	Lowndes	

Cities

Albany (Dougherty Co.)	Holly Springs (Cherokee Co.)
Allenhurst (Liberty Co.)	Johns Creek (Fulton Co.)
Auburn (Barrow Co.)	Leesburg (Lee Co.)
Bogart (Oconee Co.)	Loganville (Walton Co.)
Brunswick (Glynn Co.)	Lookout Mountain (Walker Co.)
Byron (Peach Co.)	McDonough (Henry Co.)
Canton (Cherokee Co.)	Milton (Fulton Co.)
Centerville (Houston Co.)	Mountain Park (Fulton Co.)
Chickamauga (Walker Co.)	Newnan (Coweta Co.)
Conyers (Rockdale Co.)	Oakwood (Hall Co.)
Cordele (Crisp Co.)	Oxford (Newton Co.)
Covington (Newton Co.)	Payne City (Bibb Co.)
Cumming (Forsyth Co.)	Peachtree City (Fayette Co.)
Dallas (Paulding Co.)	Porterdale (Newton Co.)
Dalton (Whitfield Co.)	Remerton (Lowndes Co.)
Douglasville (Douglas Co.)	Ringgold (Catoosa Co.)
Dunwoody (DeKalb Co.)	Rome (Floyd Co.)
Emerson (Bartow Co.)	Rossville (Walker Co.)
Fayetteville (Fayette Co.)	Sandy Springs (Fulton Co.)
Flemington (Liberty Co.)	Stockbridge (Henry Co.)

Flowery Branch (Hall Co.)

Fort Oglethorpe (Catoosa Co.)

Gainesville (Hall Co.)

Griffin (Spalding Co.)

Grovetown (Columbia Co.)

Hampton (Henry Co.)

Hephzibah (Richmond Co.)

Hinesville (Liberty Co.)

Hiram (Paulding Co.)

Tunnel Hill (Whitfield Co.)

Tyrone (Fayette Co.)

Valdosta (Lowndes Co.)

Varnell (Whitfield Co.)

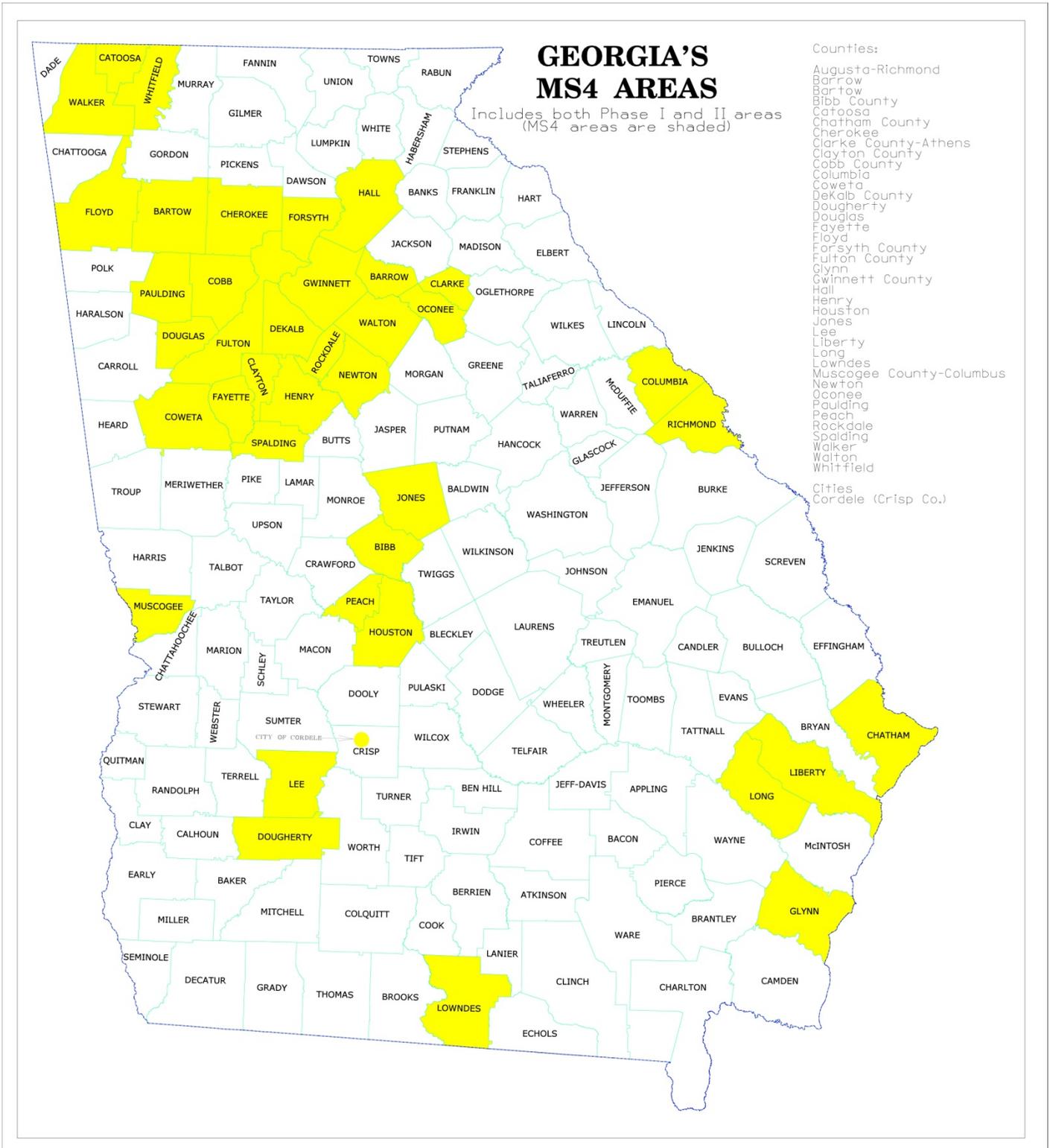
Walthourville (Liberty Co.)

Warner Robins (Houston Co.)

Watkinsville (Oconee Co.)

Winterville (Clarke Co.)

Woodstock (Cherokee Co.)



Appendix B
Sample infeasibility letter

Glen Behrend, P.E., Program Manager
 Georgia Environmental Protection Division
 Watershed Protection Branch
 Nonpoint Source Program, Stormwater Unit
 4220 International Parkway, Suite 101
 Atlanta, Georgia 30354

RE: MS4 permit, Post Construction Infeasibility for GDOT Project PI # 1234567, Adams County

Dear Mr. Hedges:

A thorough investigation by qualified engineers designing post construction BMPs in compliance with GDOT's GAR041000 was completed on the above referenced project. Each of the following design criteria was examined:

1. Stormwater Runoff Quality/Reduction
2. Stream Channel Aquatic Resource Protection
3. Overbank Protection
4. Extreme Flood Protection

It was determined that the placement of BMPs to address one or more of the above criteria at the following outfalls is infeasible. A summary of these outfalls is listed below.

Station	Offset (left or right)	Reason for Infeasibility	Criteria found infeasible	reference page
299+99	129' left	Additional cost	1,2,3*,4*	2-3
320+23	105' right	Displacement of a residence	2,3,4	4-6

*Note: downstream study found criteria 3 and 4 unnecessary ((Ga Stormwater Management Manual page 4-21 Volume 1).

Please see the reference pages listed for supporting documentation, specific information, and further explanation of why post construction BMP's were determined infeasible.

Sincerely,

Chief Engineer

Outfall location:
Station: 299+99
Offset: 129 left

BMP studied: Dry Swale

Criteria determined infeasible to meet: 1,2, (3 and 4 were not necessary based on downstream analysis, see hydrology calculations in project file).

Other BMPs not selected for study: Stormwater pond, for selection: Criteria: 1 (water quality)

The structure with the least impacts and lowest cost is an enhanced dry swale.

Reason for infeasibility: Cost is higher than 10% of the roadway cost

Item	Roadway Cost	Enhanced Dry Swale Cost
Right of way	\$ 400,000.00	\$ 180,000.00
Utilities	\$ 23,000.00	\$ 5,000.00
Clearing and Grubbing	\$ 100,000.00	\$ 1,800.00
Grading	\$ 300,000.00	\$ 4,300.00
Base and Paving	\$ 400,000.00	
Drainage (not including BMP)	\$ 200,000.00	\$ 4,500.00
Signing and Marking	\$ 60,000.00	
Total	\$ 1,483,000.00	\$ 195,600.00

Percent of Swale to Total **13%**

Attached are a site photograph, plan sheets, enhanced swale typical sections, and sizing information(drainage calculations, water volumes, data from computer models if used).

Outfall location:

Station: 320+23
Offset: 105 right

BMP studied: Detention pond Criteria determined infeasible to meet: 2, 3, and 4

Other BMPs not selected for study: Stormwater pond (same size as detention pond) Note: an enhanced dry swale was used for criteria 1.

The structure with the least impacts and lowest cost studied is a detention pond.

Reason for infeasibility: displacement of a residence (included below should be a layout of the pond with the residence shown, attach calculations supporting the sizing of the pond).