SWMA MS4 Program

Post-Construction Stormwater Management
Technical Memorandum

Overview

In 1990, the U.S. Environmental Protection Agency (EPA) promulgated regulations establishing Phase I of the National Pollutant Discharge Elimination Systems (NPDES) stormwater program. The Phase I program for municipal separate storm sewer systems (MS4s) require operators of "medium" and "large" MS4s that generally serve populations of 100,000 or greater to implement a stormwater management program as a means to control to the maximum extent practicable (MEP) polluted discharges from certain municipal, industrial and construction activities into the MS4.

The Alabama Department of Environmental Management (ADEM) presently has primary jurisdiction over permitting and enforcement of the Stormwater Program for Alabama. The City of Vestavia Hills (City) was issued NPDES Permit Number ALS000017 on June 7, 2017. This NPDES Permit became effective on July 1, 2017 and will expire on June 30, 2022. The City is required to develop and implement a Stormwater Management Program (SWMP) in accordance with the NPDES Permit requirements.

In accordance with the NPDES Permit, the City is required to develop and implement a Post Construction Stormwater Program to address stormwater runoff from qualifying new development and re-development projects by July 1, 2018. This memorandum provides technical guidance regarding the City's updated post construction stormwater management requirements in accordance with the City's NPDES Permit.

Applicable Developments

The City's updated post construction stormwater management requirements are only applicable to "Qualifying New Development or Redevelopment" projects as defined below:

"Qualifying New Development and Redevelopment" means any site that results from the disturbance of one acre or more of land or the disturbance of less than one acre of land if part of a larger common plan of development or sale that is greater than one acre. Qualifying new development and redevelopment does not include land disturbances conducted by entities under the jurisdiction and supervision of the Alabama Public Service Commission.

Since stormwater detention and retention facilities are the primary Best Management Practices (BMPs) that have historically been used for post-construction stormwater management, this technical memorandum has been developed to primarily addresses stormwater detention and retention facilities. While these engineering practices are not precluded, such practices along may not achieve the level of post-construction stormwater control required. The intent of this technical memorandum is to evaluate options to manage stormwater runoff and best protect water quality for the community.

Implementation

Effective **July 1, 2018**, all qualifying new development and redevelopment projects shall be designed in accordance with this technical memorandum.

Waiver Request

The City recognizes that there are existing project sites that have been constructed or previously approved, prior to the effective date of this technical memorandum, that may qualify for a waiver from the updated post construction stormwater management requirements. As a result, the City has developed an Existing Development, Post Construction Stormwater Management Waiver Request Form (Figure 1) to address existing project sites. In order for an existing project site to be considered for a waiver, the waiver request form shall be completed and submitted to the City for review and approval. If a waiver has been submitted for a development that has not been completed and the density of the development is increased and/or modified, the developer shall resubmit a waiver request for this development.

The minimum requirements for stormwater management may be waived in whole or in part upon written request of the applicants, provided that at least one of the following conditions applies:

1. It can be demonstrated that the proposed development is not likely to impair attainment of the objectives of this ordinance.
2. Alternative minimum requirements for on-site management of stormwater discharges have been established in a stormwater management plan that has been approved by the City Engineer and the implementation of the plan is required by local ordinance.

3. Provisions are made to manage stormwater by an off-site facility. The off-site facility is required to be in place, to be designed and adequately sized to provide a level of stormwater control that is equal to or greater than that which would be afforded by on-site practices and there is a legally obligated entity responsible for long-term operation and maintenance of the stormwater practice.
4. The City Engineer finds that meeting the minimum on-site management requirements is not feasible due to the natural or existing physical characteristics of a site.

In instances where one of the conditions above applies, the City Engineer may grant a waiver from the strict compliance with these stormwater management provisions, as long as acceptable mitigation measures are provided. However, to be eligible for a variance, the applicant must demonstrate to the satisfaction of the City Engineer that the variance will not result in the following impacts to downstream waterways:

- Deterioration of existing culverts, bridges, dams, and other structures;
- Degradation of biological functions or habitats;
- Accelerated streambank or streambed erosion or siltation;
  Increased threat of flood damage to public health, life, or property.

Water Quality Requirements

Post-construction stormwater runoff quality is an important component of the City's SWMP. In order to meet the requirements of the City's NPDES Permit, a Water Quality Volume (WQ_v) must be accounted for on each project site and BMPs must be utilized to store and treat the WQ_v. The required WQ_v is based upon the first 1.1 inches of rainfall that occurs on the project site. The WQ_v can be estimated as described below.

WQ_v = 1.1 inches / acre of additional impervious area.

For example: An existing 12.5 acre site planned for re-development contains 3 acres of existing impervious area. The proposed development will contain 7 total acres of impervious area in the post-development condition. The required WQ_v shall be calculated as follows:

WQ_v = 1.1 inches * 4 acres of additional impervious area
= 1.1 inches * (1 foot / 12 inches) * 4 acres * (43,560 sq.ft. / 1 acre)
= 15,972 cubic feet of storage required

The WQ_v that is required for each project site may be provided in multiple ways to allow greater flexibility during design. There are a number of post-construction BMPs such as detention ponds, retention ponds, bioretention swales, rain gardens/bioretention features, permeable paving, proprietary stormwater quality treatment devices, sand filters, etc. that may be utilized by the Owner and their Engineer-of-Record to meet the water quality requirements.

Low Impact Development (LID) and Green Infrastructure (GI)

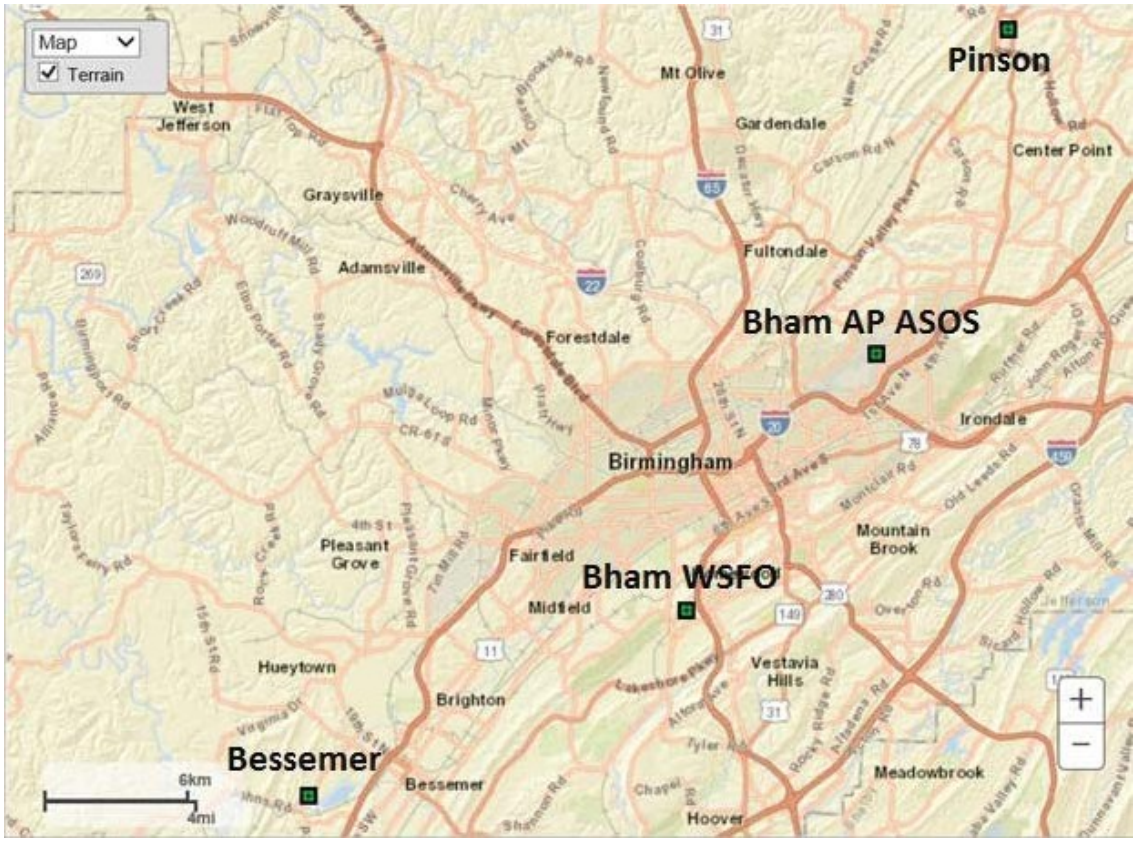
As an option for meeting the updated post-construction stormwater management requirements, the City encourages Owners and Developers to incorporate the use of low impact development (LID) and green infrastructure (GI) practices into qualifying development and redevelopment projects. The latest version of the Alabama Low Impact Development Handbook is incorporated into this technical memorandum by reference.

Design Standards

For detention and retention ponds, the calculation methodology shall utilize the National Resource Conservation Resources (NRCS) Urban Hydrology for Small Watersheds Technical Release 55 (TR-55) or equivalent. For the determination of pre-construction and post-construction stormwater runoff hydrology, the 24-hour rainfall depths from National Oceanic and Atmospheric Administration (NOAA) Atlas14, Volume 9, Version 2 included in Table 1 shall be used:

Table 1. Design Storms

Storm Event (24 hour)	Rainfall (inches) (Bessemer)	Rainfall (inches) (Bham WSFO)	Rainfall (inches) (Bham AP ASOS)	Rainfall (inches) (Pinson)
2-year	4.09	4.1	4.12	4.11
5-year	4.97	4.99	5.02	4.99
10-Year	5.82	5.83	5.85	5.8
25-Year	7.18	7.15	7.13	7.02
100-Year	9.71	9.56	9.39	9.15



As a part of the City's requirements for post-construction stormwater runoff management, all project sites shall be responsible for ensuring, to the MEP, that post- development runoff mimics pre-development hydrology for the 2-year, 5-year, 10- year, and 25-year rainfall depths listed in Table 1. All stormwater detention or retention facilities must be able to convey the peak flow rate associated with a 100- year, 24-hour storm event. The Owner and/or Developer shall ensure, to the MEP, that installation of post-construction BMPs shall not adversely impact and/or cause flooding of properties and/or stream channel erosion located upstream and downstream of post-construction BMPs.

Detention and Retention Ponds

As a part of this technical memorandum, two structural BMPs (detention and retention ponds) have been highlighted as design options to assist in meeting the post- construction stormwater management requirements of the City's NPDES permit. Both detention ponds and retention ponds are fairly simple to design, construct and maintain. However, other structural BMPs may be selected by the Owner and Engineer-of-Record for review and approval by the City and are welcomed to be incorporated into the overall stormwater management plan for each project site.

A Design Form, Detention / Retention Ponds (Figure 2) has been developed by the City to aid in the design, review, and approval of detention and retention facilities. The design form provides a standard format for the Engineer-of-Record to provide information concerning pre-development conditions, post-development conditions, pond outlet configurations, pond storage, and pond peak flow discharges. For a project that contains multiple detention facilities, the Engineer-of-Record may simply provide a Design Form for each facility. While a detention pond can be utilized to meet the stormwater management requirements, some type of filtration system is also needed for a detention pond to meet the stormwater quality requirements. The filtration system must allow the volume of water associated with the WQ_v to drain slowly out of the pond, but should drain within a forty-eight (48) hour period. Figure 3 provides some basic examples of filtering systems that may be applicable to detention ponds.

The Engineer-of-Record is encouraged to utilize Low Impact Development (LID) and/or Green Infrastructure (GI) practices as cost-effective options to meet both the water rate/volume and water quality requirements.

As-Built Certification

As a part of the NPDES permit, the City must insure the BMPs that have been designed and approved are constructed and operated in accordance with their original design and intent. In an effort to confirm that the constructed BMPs

meet the designer's intent, an As-Built Evaluation and Certification form (Figure 4) has been developed. It shall be the Owner's responsibility to have as-built information, such as pond volume, embankment size and elevations, invert size and elevations, and spillway elevations, field surveyed by a Professional Land Surveyor. It shall be the Engineer-of-Record's responsibility to utilize the field surveyed information to fill out the As-Built Evaluation and Certification Form. The Owner has two options for completing the As-Built Evaluation and Certification:

Option 1 The As-Built Evaluation and Certification form shall be submitted and approved by the City prior to the issuance of a Certificate of Occupancy (CO) and/or prior to the recording of the final subdivision plat.

Option 2 If the Owner would like to obtain a CO and/or record the final subdivision plat prior to the City's approval of the As-Built Evaluation and Certification form, the Owner may post a bond or other forms of surety acceptable to the City in the amount of 100% of the construction cost associated with post-construction stormwater management BMPs and the cost associated with the effort required to complete the As-Built Evaluation and Certification. The As-Built Evaluation and Certification form shall be submitted to the City within 120 days of receipt of a CO and/or recording of the final subdivision plat.

Annual Inspections

In order for post-construction BMPs to continue to function in accordance with their original design and installation, annual inspections are required by the City's NPDES permit. The Owner of the project is required to have these annual inspections performed and must then submit the required Annual Inspection Form (Figure 5) to the City. The Annual Inspection Form shall provide documentation concerning adherence to the BMP Operation and Maintenance Plan and the condition of each facility in terms of vegetative cover, erosion that may be occurring, the condition of inlets into the pond and the pond outlet, embankment conditions and any maintenance required and/or performed. The City shall evaluate the documentation submitted to confirm that the stormwater management facilities are continuing to function as designed.

The Annual Inspection Form shall be submitted to the City each year by 30 September.

Operation and Maintenance

It is the responsibility of the Owner to operate and maintain the stormwater management facility and/or BMPs in accordance with the original design intent and approval. A long-term Operation and Maintenance Plan shall be part of the As-Built Evaluation and Certification Form submittal and approval process. The plan shall identify the necessary reoccurring maintenance and operation activities and schedule of those activities necessary to ensure that the BMPs continue to meet the standards of the ordinance. The Operation and Maintenance Plan shall also designate the entity that is responsible and funding mechanism necessary to carry out the Plan.

If the original Owner or Developer has sold the project or passed ownership on to a Homeowner's Association, then it is the new Owner or HOA's responsibility to maintain the facility in accordance with the Operation and Maintenance Plan and provide any required inspection and maintenance.

Should maintenance be needed at a facility as a result of the Annual Inspection, the Owner shall provide the City documentation of the maintenance required and a schedule for completing all maintenance activities. Once all maintenance activities are completed, the Owner shall provide documentation to the City of the maintenance performed and that the BMP operates as it was designed.

A summary of maintenance activities shall be submitted to the City each year by 30 September. The summary shall cover the previous fiscal year beginning 1 October through 30 September.

List of Figures

Figure 1 – Existing Development Post Construction Stormwater Management Waiver Request Form

Figure 2 – Design Form, Detention / Retention Ponds

Figure 3 – Detention Pond Outlet Structure Example

Figure 4 – As-Built Evaluation and Certification Form

Figure 5 – Annual Inspection Form