Recommendations Regarding Agricultural Stormwater Management Practices
Prepared for the Chesapeake Bay Program Partnership's Agriculture Workgroup by the Agricultural Stormwater Management Practices Expert Panel Establishment Group
January 18, 2018

Background

Agricultural stormwater practices for impervious areas are not currently recognized by the Chesapeake Bay Program (CBP) partnership as an approved Best Management Practice (BMP) for reporting and crediting towards CBP water quality improvement goals. Due to increased implementation of agricultural stormwater practices as part of federal and state permitting requirements for agricultural facilities, the Agriculture Workgroup (AgWG) was asked to consider these practices for addition into the Phase 6 Watershed Model.

The Agricultural Stormwater Management Expert Panel Establishment Group (EPEG) was formed to:

- Determine if there is a need for an Agricultural Stormwater Management BMP Expert Panel (EP)
    - If an EP *is recommended*, then:
        - Identify priority tasks for the Phase 6.0 Agricultural Stormwater Management Expert Panel (EP),
        - Recommend areas of expertise that should be included on the Agricultural Stormwater Management EP, and
        - Draft the Agricultural Stormwater Management EP's charge for the review process
    - If an EP *is not recommended*, then:
        - Provide justification for not convening an EP
        - Provide an alternative recommendation to address agricultural stormwater management practices in lieu of an EP

From *September 11th, 2017* through *November 29th, 2017* the EPEG met three times by conference call and worked collaboratively to complete this charge for presentation to the AgWG on *January 18th, 2018*. Final approval of the enclosed recommendations was obtained by online polling of all EPEG members. Members of the EPEG are listed in Table 1.

Table 1. Agricultural Stormwater Management Practices EPEG membership and affiliations.

Member	Affiliation
Tom Schueler	Chesapeake Stormwater Network
Paul Bredwell	U.S. Poultry & Egg Association
David Mister	Maryland Department of Agriculture
Robert Palmer	Beacon Engineering, LLC
Jill Whitcomb	Pennsylvania DEP- Bureau of Clean Water
EPEG Support Staff	
Loretta Collins	University of Maryland
Mark Dubin	University of Maryland
Lindsey Gordon	Chesapeake Research Consortium
Jeremy Hanson	Virginia Tech

Definitions

Agricultural stormwater (AS) refers to runoff generated from structures and paved areas associated with confined animal production such as dairy facilities, poultry houses, hog raising facilities, and similar areas. *Agricultural Stormwater Management* (ASM) is required by many Bay states under NPDES stormwater construction, MS4, and CAFO permits and/or state stormwater regulations when disturbance for these facilities exceed a minimum area in order to capture and treat AS.

Agricultural stormwater practices (ASPs) refer to the management practices that are designed, constructed, and maintained to treat stormwater from these animal production facilities, such as ponds, constructed wetlands and grass swales, often configured in a treatment train. In most cases, ASPs are designed and constructed according to engineering criteria and specifications outlined in state urban stormwater design manuals, although some states allow employment of standardized plans to address AS for poultry houses and similar facilities. For CBP purposes, ASPs do not include any practices that fall under existing barnyard BMPs nor any practices applied to cropland or pasture sources.

Treatment Train: A best management practice (BMP) design and implementation approach in which stormwater management integrates two or more practices that minimize the sources of pollutants from leaching or runoff with additional practices that reduce the delivery of pollutants from a production site (e.g., capture, remediation structures, swales, riparian buffers and wetlands).

Method

The Agricultural Stormwater Management Practices EPEG developed its recommendations in accordance with the process specified by the AgWG (AgWG 2014). This process was informed by the strawman proposal presented at the December 11, 2014 AgWG meeting, the Water Quality Goal Implementation Team (WQGIT) Best Management Practice (BMP) protocol, input

from panelists and chairs, and the process undertaken by the AgWG to develop the charge for the Manure Treatment Technologies EP in 2014.

The collective knowledge and expertise of EPEG members formed the basis for the recommendations contained herein. Several of the EPEG members have had experience on BMP expert panels or subcommittees. EPEG members and the technical support team also have knowledge and/or expertise in state and federal programs, the Chesapeake Bay Program model, and ASPs within the Chesapeake Bay watershed. Communication among EPEG members was by conference call and email. All decisions were consensus-based.

ASP Crediting

The six Chesapeake Bay watershed jurisdictions addressed in this memo vary in approach towards agricultural stormwater regulation (Table 2); the District of Columbia does not contain applicable animal production space for the practices considered here. Jurisdictions with regulations currently in place to address AS are informed by state urban stormwater design specifications.

Due to the similarity in technical specifications among urban and agricultural stormwater management practices, this EPEG's recommendation to the Agriculture Workgroup is to approach crediting of ASPs based on the stormwater treatment adjustor curves for TN, TP and TSS provided in the Urban Stormwater Workgroup Expert Panel Report on defining removal rates for new state stormwater performance standards (approved by the WQGIT in 2012, revised January 20, 2015), with modifications for the agriculture sector. These modifications include application of ASP's load reduction capacity to permitted and non-permitted livestock feeding space acres represented in the Phase 6 CBP modeling tools. Use of the Urban Stormwater Workgroup (USWG) recommendations negates the need for formation of a BMP Expert Panel to address agricultural stormwater management and falls within protocol approved by the WQGIT:

> *When a GIT or source sector Workgroup determines a request is sufficiently similar to a previously approved practice, they will document the basis for their recommendation and route it through the Watershed Technical Workgroup (WTWG) to the WQGIT for approval. Once approved, a letter to the requestor describing the resolution of their request will be sent by the GIT or source sector Workgroup Chair. Should the recommendation fail to be approved by the WQGIT or GIT, the request will be returned to the appropriate source sector Workgroup for reconsideration of an Expert Panel.*
>
> (Sourced from: WQGIT Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model, 13, Jul 2015, p. 2)

BMP Treatment Categories:
Constructed Wetlands
Filtering Practices
Wet Swale
Wet Pond

Table 2. A Bay-wide Comparison of how States Handle Agricultural Stormwater Practices*

STATE	Use Urban Regulations?	Min Area Regulated	Special PH Methods or Plans?	Review Authority
DE	Mostly Yes	>= 5000 ft^2 trigger SWM activity, >= 1 acre triggers NPDES permit	Allows for a standard PH plan to comply with no engineering calculations	SCD
MD	Yes		Standard SWM plan developed for PH or use State Design Manual	County or SCD
NY	Yes, Construction Stormwater SPDES Permit and the CAFO SPDES Permits	Ag construction activities shall not violate NYS water quality standards; Structural ag BMPs >1 to <=5 acres trigger ESC practices in conformance with NYSSESC in a SWPPP (CAFOs covered under CAFO permit) and > 5 acres triggers SWPPP and Stormwater Permit; Ag buildings >1 acre trigger SWPPP and Stormwater Permit	No, PH plans must be in compliance with NYSSESC, SWPPP, and Construction Stormwater SPDES Permit (www.dec.ny.gov/chemical/8694.html)	NYS DEC
PA	Yes, Construction NPDES Permit	<5000 ft^2 trigger ESC BMPs; >=5000 ft^2 trigger ESC plans and BMP implementation; >= 1 acre (due to construction activities) trigger NPDES and SWM requirements	No, Use State Design Manual	PADEP/delegated SCD
VA	Agriculture exempted from SWM	NR	NR	NR
WV	Agriculture exempted from SWM	NR	NR	NR

*Agricultural stormwater practices do not apply to the District of Columbia

CAFO= Confined Animal Operation
ESC= Erosion and Sediment Control
NPDES= National Pollutant Discharge Elimination System
NR=Not regulated
NYS= New York State
NYS DEC= New York State Department of Environmental Conservation
NYSSESC= New York Standards and Specifications for Erosion and Sediment Control
PADEP= Pennsylvania Department of Environmental Protection
PH=Poultry house
SPDES= State Pollutant Discharge Elimination System
SWPPP= Stormwater Pollution Protection Plan
SWM=Stormwater Management
SCD= Soil Conservation District or equivalent

Land Use: Permitted / Non-Permitted Feeding Space

Measurement Names to be submitted: acres; predominant type of livestock treated

Model Simulation: In recent years, the USWG developed performance curves for urban stormwater control basins. Stormwater treatment (ST) was calculated based upon a relationship between volume of water treated and nutrient and sediment concentrations monitored in dozens of control basins across the watershed. While agricultural stormwater basins may differ in technical specifications, it can be assumed that they trap and attenuate nutrient and sediment influent in a similar manner as urban stormwater basins.

A default credit calculation for a performance standard of one inch will be applied to acres reported. A one inch performance standard would reduce nitrogen, phosphorus, and sediment runoff from confined livestock production by 35%, 55%, 70%, respectively (Figures 1-3). States can request an alternate average performance standard for their state, through an approval process within the AgWG. This alternate performance standard would then be used to represent default credit for agricultural stormwater management systems in that state. ASPs are likely to be used in conjunction with other CBP-approved BMPs to reduce loads from feeding space acres. In such a scenario, load reductions to be credited to ASPs would be taken from the nutrient load remaining after reductions are taken for associated BMPs (e.g., animal waste management systems, barnyard runoff control, loafing lot management).

Acres reported on an annual basis will be associated with default pounds of N and P in the Phase 6.0 Model for representative livestock types. The Agricultural Modeling Subcommittee (AMS) has defined the pounds of N and P per acre of agricultural livestock production area based on available literature values. The AMS recommendations have been reviewed and approved by the Agriculture Workgroup (AgWG) for use in the Phase 6.0 modeling tools.

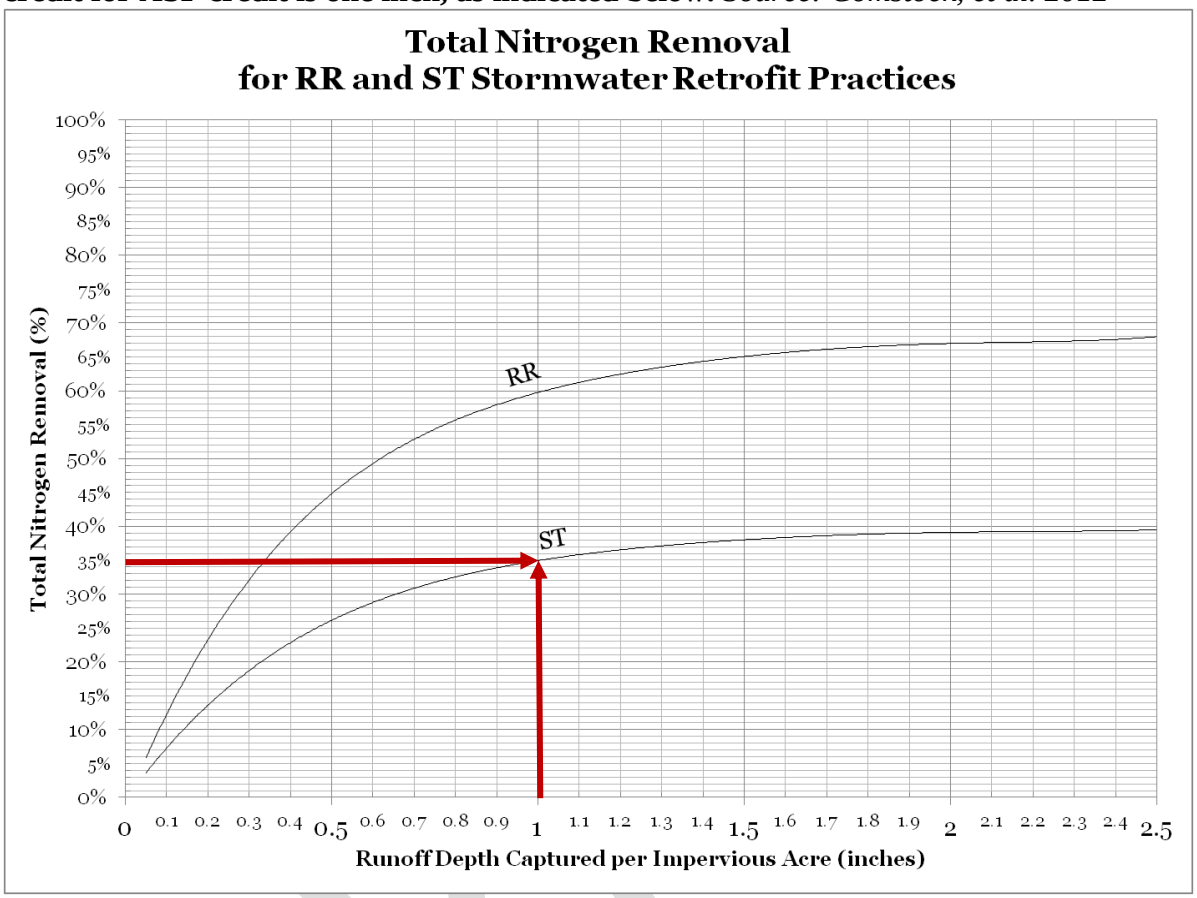
Reporting and Verification

Summary of Recommendations:

- 10-year credit duration for ASP BMPs
- Verification by multi-year visual assessment, per approved AgWG BMP verification guidance
- Field inspections to be conducted at least every 5 years to maintain credit, with acknowledgement of individual state discretion regarding how inspections are implemented
- States may use urban stormwater regulatory agencies to determine appropriate reporting, tracking, and verification procedures for ASP BMPs

There exist many differences in the management of stormwater across urban and agricultural land uses regarding construction, inspection, maintenance and verification at individual sites in the Chesapeake Bay watershed. Additionally, across the six jurisdictions there are differences in regulatory requirements and which organizational entity (e.g. soil conservation district, state,

Figure 1. ST performance curve for nitrogen removal, as calculated by the USWG. Default credit for ASP credit is one inch, as indicated below. *Source: Comstock, et al. 2012*



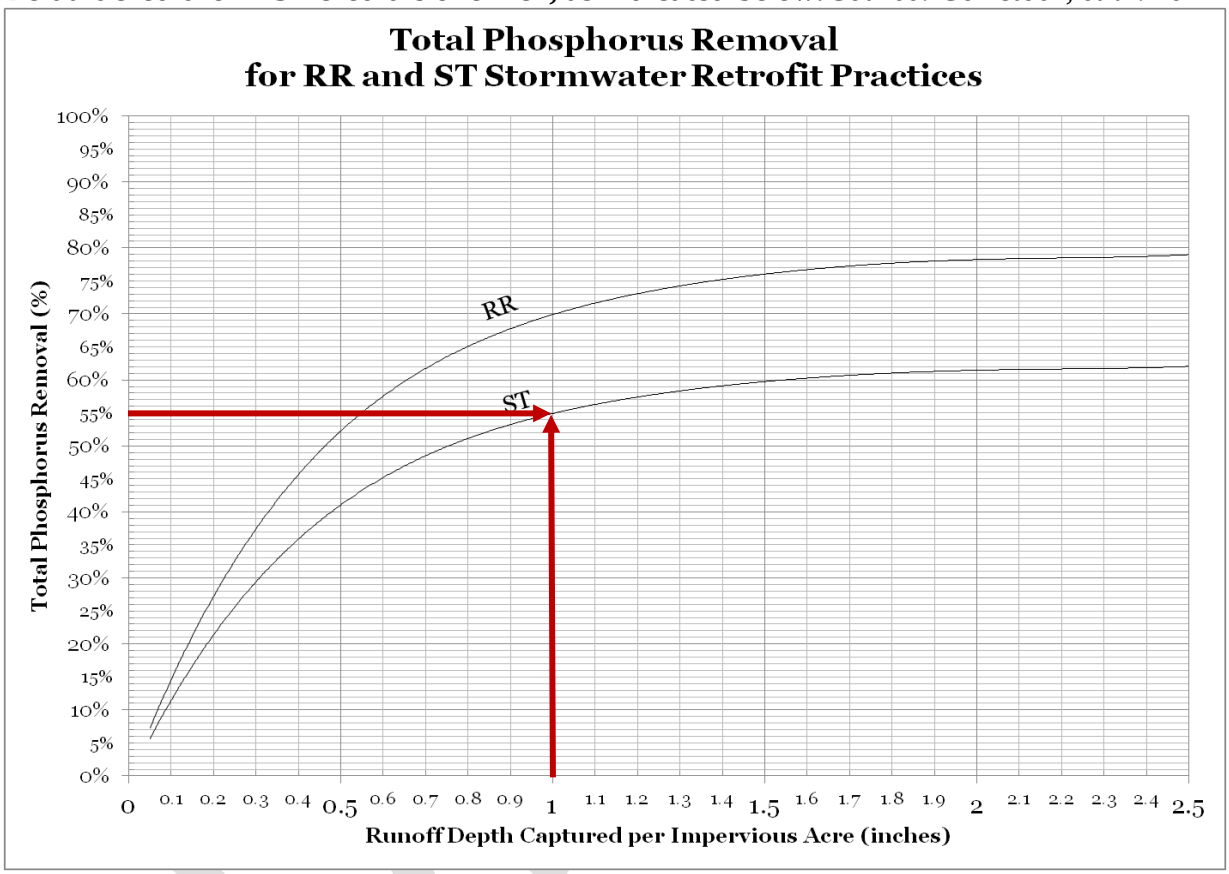
federal) are responsible for oversight of ASPs. For this reason, discretion is provided to each state in regards to the chosen reporting, tracking, and verification process used for ASPs.

In regards to post-construction ASPs, most are likely to occur on animal housing operations as part of the permitting process and are dependent on the amount of land area disturbed (See Table 2). Currently, not all states in the Chesapeake Bay watershed require management of AS. Due to the significant expense that may be incurred by an operator considering ASPs, they are generally installed during the permitted construction process as required by law, rather than as retrofits. Required inspections and maintenance practices also differ dependent on state and method of tracking ASPs, or lack-there-of.

As with all BMPs reported to CBP in the future, the jurisdictions will document their verification protocols and procedures in their Quality Assurance Project Plan (QAPP) for practices that are reported in their annual progress runs. The jurisdictions' existing BMP verification plans that were approved by the EPA in 2016 describe their BMP priorities and procedures to verify practices using the CBP partnership's BMP Verification Framework, which includes the Agriculture Workgroup's BMP Verification guidance. The full BMP Verification Framework

and the jurisdictions' BMP verification plans are available online.[1] The full implementation of CBP BMP verification requirements in 2018-2019 will necessitate the tracking and reporting of practice implementation data for future reduction credits.

Figure 2. ST performance curve for phosphorus removal, as calculated by the USWG. Default credit for ASP credit is one inch, as indicated below. *Source: Comstock, et al. 2012*



The AgWG's verification guidance[2] breaks BMPs into three general categories: Visual Assessment BMPs (Single Year), Visual Assessment BMPs (Multi-Year), and Non-Visual Assessment BMPs. Given the nature of ASPs, the most relevant part of the AgWG's existing verification guidance is for Visual Assessment BMPs (Multi-Year).

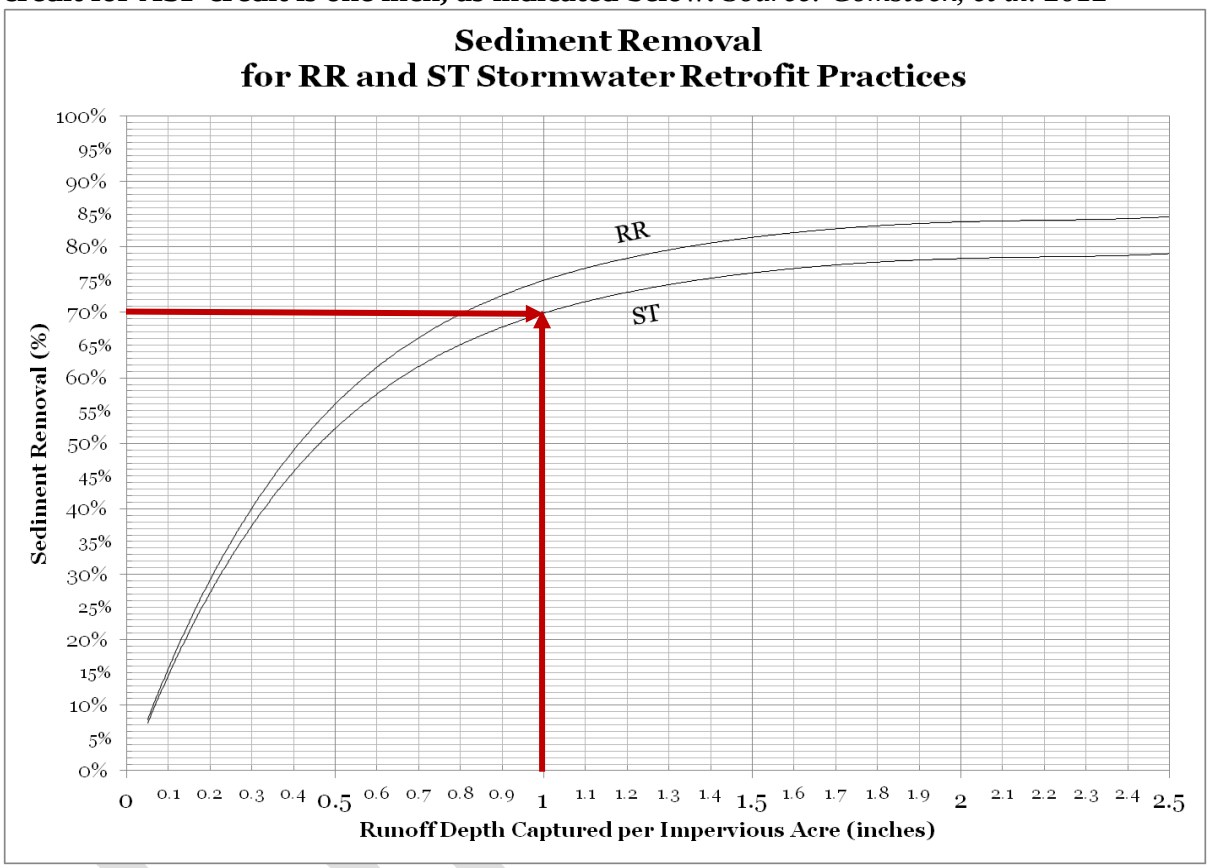
Each state determines the most appropriate methods for verifying BMP implementation given their specific priorities, programs, needs, and capacity. Ideally, states will leverage multiple existing and perhaps new avenues to verify that practices are sufficient to meet applicable BMP design and performance criteria. As noted in the AgWG guidance, a Visual Assessment (multi-year) practice "has a protracted physical presence on the landscape, i.e., of more than one year

[1] https://www.chesapeakebay.net/about/programs/bmp/additional_resources

[2] https://www.chesapeakebay.net/documents/Appendix%20B%20-Ag%20BMP%20Verification%20Guidance%20Final.pdf

when properly maintained and operated. This type of BMP often requires increased technical and financial resources to implement compared with a single year practice." These BMPs are reported as a cumulative practice, as opposed to an annually reported practice such as cover

Figure 3. ST performance curve for sediment removal, as calculated by the USWG. Default credit for ASP credit is one inch, as indicated below. *Source: Comstock, et al. 2012*



crops. A credit duration of ten years for ASPs is recommended by this EPEG. This provides the jurisdictions increased flexibility and opportunities to verify these practices over the course of their designed lifespan or credit duration in the modeling tools. It is expected that all reported practices are initially certified or inspected on-site by someone with appropriate credentials or training based on the practice, and associated with the federal, state or local program through which the practice is funded, enrolled, tracked and/or reported.

Given the association between ASPs and other CBP-approved BMPs (e.g., animal waste management systems, barnyard runoff control. loafing lot management), the responsible state agency can potentially use relevant data or associated verification methods for other reported BMPs to verify the presence and continued performance of stormwater practices. Additionally, verification methods such as spot checks or site visits associated with the installation or future verification of ASPs provide opportunities to identify other BMPs that were previously un-

reported or to verify other Visual Single Year practices or Visual Multi-Year practices that have been reported (e.g., animal waste management systems, roof runoff controls, etc.).

References

Comstock, S., S. Crafton, R. Greer, P. Hill, D. Hirschman, S. Karimpour, K. Murin, J. Orr, F. Rose, S. Wilkins, 2012. Recommendations of the Expert Panel to Define Removal Rates for New State Stormwater Performance Standards. Prepared by T. Schueler and C. Lane for EPA Chesapeake Bay Program. Urban Stormwater Workgroup.

List of Acronyms Used Throughout Text

AgWG	Agriculture Workgroup
AS	Agricultural Stormwater
ASP	Agricultural Stormwater Practice
AMS	Agricultural Modeling Subcommittee
BMP	Best Management Practice
CAFO	Confined Animal Feeding Operation
CBP	Chesapeake Bay Program
EP	Expert Panel
EPA	Environmental Protection Agency
GIT	Goal Implementation Team
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
QAPP	Quality Assurance Project Plan
USWG	Urban Stormwater Workgroup
WQGIT	Water Quality Goal Implementation Team
WTWG	Watershed Technical Workgroup