

Recommendations for the Agricultural Stormwater ~~and Tailwater~~ Management Expert Panel

Prepared for the Chesapeake Bay Program Partnership's Agriculture Workgroup by the
Agricultural Stormwater and Tailwater Management Expert Panel Establishment Group
April 6, 2015

EPEG Report Edited by Mark Dubin, AgWG Coordinator
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Background

In the current version of the Chesapeake Bay Program (CBP) partnership's Watershed Model (version 5.3.2), irrigation water capture and reuse is recognized as an interim practice, used for planning purposes only. The practice is defined as involving: "the collection of runoff water from container nursery operations where runoff of irrigation water and leachate from plant containers grown on plastic or in greenhouses is routed to lined return ditches or piped to lined holding ponds. Ponds would be designed to retain all excess irrigation water runoff or leachate and capture the first one-half to one-inch of stormwater runoff. Water would be recirculated for irrigation in nursery and greenhouse operations or irrigated at the proper times of year on other vegetation capable of trapping nutrients at agronomic rates, such as cool season grasses."

Agricultural stormwater structures are not currently included in the Phase 5.3.2 Model due to the absence of an appropriate corresponding agricultural land use, and base nutrient and sediment loading values for farmstead areas. Due to increased implementation of these practices as part of federal and state permitting requirements for agricultural facilities, the Agriculture Workgroup has requested a review for the Phase 6.0 Model.

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

- Identify priority tasks for the Phase 6.0 (P6.0) Agricultural Stormwater ~~and Tailwater~~ Management Expert Panel (EP),
- Recommend areas of expertise that should be included on the Agricultural Stormwater ~~and Tailwater~~ Management EP, and
- Draft the Agricultural Stormwater ~~and Tailwater~~ Management EP's charge for the review process.

From March 2, 2015 through April 2, 2015 the EPEG met three times by conference call and worked collaboratively to complete this charge for presentation to the Agriculture Workgroup (AgWG) on April 16, 2015. Final approval of the charge was obtained by online polling of all members. Members of the EPEG are listed in Table 1.

Table 1. Agricultural Stormwater and Tailwater Management Expert Panel Establishment Group membership and affiliations.

| Member | Affiliation |
|---------------------------|------------------------------------|
| Jill Jefferson | University of Maryland |
| John D. Lea-Cox | University of Maryland |
| David Sample | Virginia Tech |
| Rachel Rhodes | Maryland Department of Agriculture |
| EPEG Support Staff | |
| Emma Giese | Chesapeake Research Consortium |
| Mark Dubin | University Maryland |
| Steve Dressing | Tetra Tech, Inc. |

Glossary of Terms

Agricultural Stormwater and Tailwater Management: For the purposes of this document, stormwater management is a management approach that uses a collection of practices and procedures to reduce the rate and/or volume and remove pollutants from stormwater runoff generated from impervious areas surrounding agricultural farmsteads. Tailwater management combines efficient irrigation practices with other practices such as nutrient management, capture, and reuse to reduce the runoff of irrigation water and associated pollutants from nurseries and greenhouses with impervious production areas.

Farmstead: Area on commodity and livestock operations that includes service buildings (e.g., headquarters), feed and commodity storage, and other pervious and impervious areas not already addressed by BMPs designed for production areas. This does not include barnyards, loafing lots, or other production areas which are represented separately.

Greenhouse: An intensive agricultural operation where plants are grown in containers of varying sizes at high densities, in permanently covered structures that are not open to rainfall. Operations are characterized by very high plant densities and very short production times (typically 3-4 months per cropping cycle), depending on plant species. Multiple crops are typically grown in the same production area during the year (3 to 4 crops per year).

Container Nursery: An agricultural ornamental operation where ornamental plants are grown in containers of varying sizes at high densities, and that receive irrigation or rainfall during the growing season from April through November. Operations are characterized by high plant densities and medium production times (typically 1-3 years), depending on species. Container-nursery production areas are often covered by plastic or fabric for overwintering from December through March.

Field Nursery: An extensive agricultural operation where ornamental trees and shrubs are grown in soil or in containers sunk below ground (pot-in-pot operations). Operations are characterized by low plant densities and long production times (typically 2-7 years), depending on species.

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

Method

The Agricultural Stormwater and Tailwater Management EPEG developed its recommendations in accordance with the process specified by the AgWG (AgWG 2014). This process is 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 existing panelists and chairs, and the process recently undertaken by the [AgWG](#) to develop the charge for the Manure Treatment Technologies EP.

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 model, and agricultural stormwater or nursery practices within the Chesapeake Bay watershed.

Communication among EPEG members was by conference call and email. All decisions were consensus-based.

Recommendations for Expert Panel Member Expertise

The AgWG expert panel organization process directs that each expert panel is to include eight members, including one non-voting representative each from the Watershed Technical Workgroup (WTWG) and Chesapeake Bay Program modeling team. Panels are also expected to include three recognized topic experts and three individuals with expertise in environmental and water quality-related issues. A representative of USDA who is familiar with the USDA-Natural Resources Conservation Service (NRCS) conservation practice standards should be included as one of the six individuals who have topic- or other expertise.

In accordance with the [WQGIT BMP protocol](#), panel members should not represent entities with potential conflicts of interest, such as entities that could receive a financial benefit from Panel recommendations or where there is a conflict between the private interests and the official responsibilities of those entities. All Panelists are required to identify any potential financial or other conflicts of interest prior to serving on the Panel. These conditions will minimize the risk that Expert Panels are biased toward particular interests or regions.

The Agricultural Stormwater and Tailwater Management EPEG recommends that the P6.0 Agricultural Stormwater ~~and Tailwater~~ Management EP should include members with the following areas of expertise:

- Expertise in design/engineering/implementation of agricultural stormwater and tailwater management and remediation.
- Experience with carrying out scientific research projects relating to design and management of agricultural stormwater and tailwater recapture and remediation.
- Expertise in fate and transport of sediment, N, and P from farmsteads, container and field nurseries and greenhouses.
- Knowledge of effectiveness of agricultural stormwater and tailwater management practices implemented in the Bay jurisdiction(s).
- Knowledge of how BMPs are tracked and reported, and the Chesapeake Bay Program partnership's modeling tools.
- Experience with verification of agricultural stormwater and tailwater management practices used at farmsteads, container nurseries, and greenhouses.
- Knowledge of and experience with urban stormwater management systems that may overlap with agricultural stormwater and tailwater management practices addressed by this EP.
- Knowledge of, and experience with relevant USDA-NRCS conservation practice standards and codes.

Expert Panel Scope of Work

The general scope of work for the Agricultural Stormwater ~~and Tailwater~~ Management P6.0 EP will be to define and configure the Agricultural Stormwater ~~and Tailwater~~ Management BMPs in the P6.0 model. Specifically, the Agricultural Stormwater and Tailwater Management EPEG recommends the following charges with associated tasks for the P6.0 Agricultural Stormwater ~~and Tailwater~~ Management EP:

1. Define load reduction BMPs for agricultural farmsteads.
 - Consider reuse of stormwater for irrigation.
 - Consider separation of clean runoff water from runoff contaminated by production areas (e.g., roof runoff).
 - Consider separation of tailwater ("first-flush") recovery from stormwater runoff.
 - Consider a treatment train approach that begins with source management and concludes with practices such as riparian buffers or wetland treatment systems to achieve target load reductions.
 - Determine how the selected practices can be applied to the P6.0 agricultural land uses (e.g., farmstead).
 - Collaboration with the Nutrient Management and Agricultural Waste Management Systems EP Reports will be critical to ensure that recommendations are complementary, as well as to avoid double-counting and ensure effective reporting of practices.
2. Define load reduction BMPs for field, container, and greenhouse operations.
 - Consider load reduction strategies such as slow-release fertilizer, precision irrigation management, riparian buffers, and/or other large-scale load reduction strategies.
 - Consider separation of tailwater (e.g., containment structures) from stormwater.

- Consider capture and reuse of stormwater (e.g., roof runoff).
- Consider a treatment train approach that begins with source management and concludes with practices such as riparian buffers or wetland treatment systems to achieve target load reductions.
- Determine how the selected practices can be applied to the P6.0 agricultural land uses (e.g., high-input specialty crops, low-input specialty crops).
- Collaboration with the Nutrient Management [EP Report](#) and Cropland Irrigation [EPs](#) will be critical to ensure that recommendations are complementary as well as to avoid double-counting and ensure effective reporting of practices.

This scope of work addresses load reduction efficiencies for sediment, N and P.

Consider incorporating relevant USDA-NRCS conservation practice standards and codes and other established practices (e.g., urban stormwater management BMPs) in recommending BMPs for agricultural stormwater and tailwater management.

The following resources should also be considered by the EP as part of developing its recommendations:

File Resources accessible from:

<https://www.dropbox.com/sh/wkc7sp29cak3ucc/AABkAsxNu0VRejt1mhE0Pii5a?dl=0>

1. Nursery and Greenhouse Industry Background
2. SNA (Eastern Region) BMP Manual
3. California (Western Region) BMP Resources
4. Constructed Wetlands Guide for Nurseries
5. EPA Non-Point Source Management Chapters (online link below)

Online Resources:

1. **National Management Measures to Control Non-Point Source Pollution from Agriculture** http://water.epa.gov/polwaste/nps/agriculture/agmm_index.cfm
EPA 841-B-03-004 (2003)
2. **Green Industry Knowledge Center for Water, Nutrient and Plant Health Management (2008)** <http://waternut.org/moodle> (USDA-406 NWQ Program Funded)

25 learning modules, including

- Capture and Recycling of Irrigation Water:
<http://www.waternut.org/moodle/course/view.php?id=21>
- Basics of Surface Water Management:
<http://www.waternut.org/moodle/course/view.php?id=23>
- Management Practices for Surface Runoff:
<http://www.waternut.org/moodle/course/view.php?id=28>
- Containment Basin Design: <http://www.waternut.org/moodle/course/view.php?id=29>

3. **Managing Irrigation and Nutrition via Distributed Sensing Knowledge Center:**
<http://smart-farms.org> (USDA-SCRI Program Funded)

12 learning modules, including

- Basic Irrigation Concepts: <https://myelms.umd.edu/courses/969642>
- Irrigation System Design: <https://myelms.umd.edu/courses/969635>
- Irrigation System Audits: <https://myelms.umd.edu/courses/969638>

Timeline and Deliverables

The Expert Panel project timeline for the development of the panel recommendations is based on the Phase 6.0 model development schedule. This timeline includes the development of a provisional recommendation for this BMP prior to the finalization of a fully documented recommendation report with effectiveness values. Provisional panel recommendations will be used only for initial Phase 6 model development and calibration, and not for future implementation progress reporting by the jurisdictions.

- ~~May 2015-Fall 2017~~ - Panel stakeholder kickoff meeting
- ~~Fall 2015~~Spring 2018 – Provisional BMP Paper
- Based on their written EPEG charge, the panel will develop a proposed scope of work including BMP structure and type, draft BMP definition(s), and initial elements of the BMPs such as associated components and conservation practices, and USDA-NRCS associated conservation practice standard codes. Initially identified literature citations will be included to provide a range of potential effectiveness values that the panel will consider and supplement with further evaluation. The panel will present their provisional BMP paper to the AgWG, WTWG, and WQGIT for informational purposes, and for initial partnership comments on the proposed direction of the panel's evaluation. The paper will not represent a full recommendation report, and the partnership will not be asked for formal approval at this time.
- ~~May 2016-Fall 2018~~ – **Target date** for panel to release full recommendations and final report for approval by the AgWG, WTWG, and WQGIT. This process is expected to take three to six months.
- ~~August 2016-Fall –Winter 2018~~ – If approved by the partnership, panel recommendations are final and will be represented in the ~~final~~ Phase 6 modeling tools in 2019 as part of the model updates.

Phase 6.0 BMP Verification Recommendations:

The panel will utilize the Partnership approved *Agricultural BMP Verification Guidance*¹, as the basis for developing BMP verification guidance recommendations that are specific to the BMP(s) being evaluated. The panel's verification guidance will provide relevant supplemental details and specific examples to provide the Partnership with recommended potential options for how jurisdictions and partners can verify agricultural stormwater and tailwater practices in accordance with the Partnership's approved guidance.

References

¹ <http://www.chesapeakebay.net/documents/Appendix%20B%20-Ag%20BMP%20Verification%20Guidance%20Final.pdf>

Attachment 1: Outline for Final Expert Panel Reports

- Identity and expertise of Panel members
- Practice name/title
- Detailed definition of the practice
- Recommended nitrogen, phosphorus, and sediment loading or effectiveness estimates
 - Discussion may include alternative modeling approaches if appropriate
- Justification for the selected effectiveness estimates, including
 - List of references used (peer-reviewed, unpublished, etc.)
 - Detailed discussion of how each reference was considered, or if another source was investigated, but not considered.
- Description of how best professional judgment was used, if applicable
- Land uses to which the BMP is applied
- Load sources that the BMP will address and potential interactions with other practices
- Description of pre-BMP and post-BMP circumstances, including the baseline conditions for individual practices
- Conditions under which the BMP works:
 - Should include conditions where the BMP will not work, or will be less effective. An example is large storms that overwhelm the design.
 - Any variations in BMP effectiveness across the watershed due to climate, hydrogeomorphic region, or other measureable factors.
- Temporal performance of the BMP including lag times between establishment and full functioning (if applicable)
- Unit of measure (e.g., feet, acres)
- Locations within the Chesapeake Bay watershed where this practice is applicable
- Useful life; effectiveness of practice over time
- Cumulative or annual practice
- Description of how the BMP will be tracked, reported, and verified:
 - Include a clear indication that this BMP will be used and reported by jurisdictions
- Suggestion for a review timeline; when will additional information be available that may warrant a re-evaluation of the estimate
- Outstanding issues that need to be resolved in the future and a list of ongoing studies, if any
- Documentation of any dissenting opinion(s) if consensus cannot be reached
- Operation and Maintenance requirements and how neglect alters performance

Additional Guidelines

- Identify ancillary benefits and unintended consequences
- Include negative results
 - Where studies with negative pollution reduction data are found (i.e. the BMP acted as a source of pollutants), they should be considered the same as all other data.

- Include results where the practice relocated pollutants to a different location. An example is where a practice eliminates a pollutant from surface transport but moves the pollutant into groundwater.

In addition, the Expert Panel will follow the “data applicability” guidelines outlined Table 1 of the Water Quality Goal Implementation Team Protocol for the Development, Review, and Approval of Loading and Effectiveness Estimates for Nutrient and Sediment Controls in the Chesapeake Bay Watershed Model¹.