TECHNICAL MEMORANDUM #10

TO: Applicants and Designers for State and Federal Projects

FROM: Plan Review Division - Sediment, Stormwater, and Dam Safety Program
Water and Science Administration

DATE: July 17, 2018

SUBJECT: **Stormwater Management Overview for State and Federal Projects**

Every local approval authority has its own process on how to implement the requirements set forth by the *2000 Maryland Stormwater Design Manual* (Design Manual). As the approval authority for State and federal projects, the Plan Review Division (Division) of the Sediment, Stormwater, and Dam Safety (SSDS) Program has developed the process outlined below for use on State and federal projects. Designers for private or local government projects should contact the respective local approval authority for their design guidance.

This document is a supplement to the *Maryland Stormwater Management and Erosion & Sediment Control Guidelines for State and Federal Projects* (Guidelines). The reader should be familiar with the Guidelines before reading this guidance. The purpose of the "SWM Overview" is to establish a systematic process for calculating the stormwater management (SWM) requirements for a project and to clarify the Division's position on multiple points of investigation (POIs), linear development, and reconstruction mixed with demolition and new construction. This document outlines the required evaluation by sequential steps. It explains and distinguishes between overall project requirements and requirements for the individuals POIs. Steps 1-6 explain how to determine the required stormwater management; steps 7-9 discuss how to calculate the management provided by proposed best management practices (BMPs); and steps 10-11 summarize the final checks. The overlying objective for every project is that the provided management equal or exceed the required management. Computational spreadsheets that step the designer through this process have been developed by the Maryland Department of the Environment (MDE) and are available on the Division's webpage. All projects, except those exclusively limited to demolition, Municipal Separate Storm Sewer System (MS4) restoration, or work that is eligible for a waiver in accordance with Section 3.3.A of the Guidelines, are required to use these spreadsheets and adhere to the guidance contained herein. Instructions for the spreadsheets are contained in Technical Memorandum #11.

At the end of the SWM Overview, miscellaneous topics related to stormwater management are discussed on pages 8 – 12.

Questions about this information or other items relating to sediment and stormwater plans for State and federal projects can be directed to Amanda Malcolm amanda.malcolm@maryland.gov

SWM Overview for State and Federal Projects

Step 1. Identify the POIs. The "POI", "point of investigation" or "point of study" is a location where concentrated runoff from a drainage area flows from the project site. A line of investigation (LOI) is a linear location where runoff from a drainage area sheet flows from the project site. A POI needs to be identified at every location where concentrated runoff leaves the limit of disturbance (LOD). A line of investigation (LOI) needs to be identified at every location where sheet flow leaves the LOD. All areas within the LOD need to be included within a POI or LOI drainage area. For highway and other linear projects, the POI is typically located at the right-of-way (ROW). There may be situations where it may be more appropriate to locate the POI at the property line rather than the LOD. Also, in limited situations, where multiple POIs converge downstream within the applicant's property, it may be appropriate to use a single POI at the property line or ROW.

Be alert for newly created points of concentrated flow, especially ones discharging onto adjacent property owners. Refer to Section 7.4.A.5 of the Guidelines for further discussion on impacts to adjacent property owners. Also, POIs with shifted drainage area divides may result in disproportional increases in runoff and may therefore have additional quantity management requirements.

If the proposed activity is exclusively demolition, maintenance, or otherwise qualifies for a 3.3A waiver and the drainage patterns are unaffected by the proposed changes, the POIs do not need to be identified or evaluated.

Step 2. Evaluate each POI individually. A drainage area map delineating the drainage area to each POI is needed for both existing and proposed conditions. The drainage area, impervious area, time of concentration (t_c) flow path, and runoff curve number (RCN) will be required.

Step 3. Consider whether the POI qualifies for a SWM waiver in accordance with Section 3.3 of the Maryland SWM Guidelines for State and Federal Projects. If the proposed activity within the POI qualifies for a 3.3. A waiver (e.g. maintenance), there is no need to proceed with this process. If only a portion of the drainage area qualifies for a 3.3.A waiver, an assessment must be made for the remaining disturbance within the POI following the outline below. For POIs that qualify for a 3.3.B quantity waiver from channel protection volume (Cpv), step 6 outlined below explains the appropriate allowances. For more information on 3.3.A waivers, refer to *Technical Memorandum #4 - What is meant by "redevelopment", "reconstruction", "new development", and "maintenance"?*

Step 4. Determine the development classification. Calculate the percentage of existing impervious area for each POI with proposed reconstruction. Reconstruction will be classified as either "re-development" or "new development" depending on the existing imperviousness (I). This is done to determine which side of the 40% threshold the project falls on. If the existing condition I>40%, then the reconstructed areas are considered "redevelopment." If the existing condition I≤40%, then the reconstructed areas need to be managed as "new development." The area used for calculating percent I is referred to as the "SWM study area" and corresponds to either the site area, project area, LOD, or ROW within the drainage area to the POI. The SWM study area is discussed further in the additional topics section at the end of this document. It is only used to determine the development classification. Treatment requirements are based on the

LOD. Note that new construction will always be classified as new development regardless of the existing level of imperviousness.

Step 5. Calculate the impervious area requiring treatment (IART) for each POI.

Development and most particularly the creation of impervious surface are the root cause of stormwater degradation. To mitigate the impact of development, Maryland's stormwater regulations require that the project area be treated for water quality. Seemingly straightforward, the reality is that quantifying this area has created an honest challenge in situations where the drainage areas and project areas do not coincide. The Division has therefore established criteria for determining the area requiring treatment. Because impervious surfaces are the areas that generate the majority of runoff and the bulk of pollutants, it is the impervious area that needs to be treated. Calculations are provided below for determining the impervious area requiring treatment (IART). Calculating IART and then treating an impervious area equal to or larger than the IART provides assurance that enough area is being treated and that the area being treated is actually impervious surface. The basis of the IART equation comes from pages 5.117-118 of the Design Manual. The objective of IART is to assure that in proposed conditions sufficient impervious surface is treated for water quality (i.e. P_E=1.0 inch).

Terms:

$\mathbf{A_i}$ = impervious area

existing $\mathbf{A_i}$ = the pre-development impervious area within the LOD

proposed $\mathbf{A_i}$ = the post-development impervious area within the LOD

$\mathbf{\Delta A_i}$ = net increase in impervious area within the LOD = (proposed impervious area) – (existing impervious area). This value will be negative for projects with an overall decrease in impervious area.

Calculating IART:

$$IART = IART_{RE\text{-}DEV'L} + IART_{NEW}$$

If existing condition I>40%, then $IART_{RE\text{-}DEV'L} = 50\%$ (existing A_i)
and $IART_{NEW} = 100\%$ (ΔA_i)
resulting in IART = 50% (existing A_i) + 100% (ΔA_i)

If existing condition I≤40%, then $IART_{RE\text{-}DEV'L} = 0$
and $IART_{NEW} = 100\%$ (existing A_i) + 100% (ΔA_i)
resulting in IART = 100% (proposed A_i)

IART Project Requirement:
At a minimum, the project must treat the entire IART for a P_E of at least 1 inch. In other words, the sum of the impervious areas treated by all the ESD facilities for water quality (P_E=1.0 inch) must equal or exceed the IART.

$[\sum$(treated A_i x achieved P_E[1]/1.0 in for each BMP) for project[2]$] \geq$ IART

[1] This is the P_E achieved by the respective BMP and is limited to 1.0 in since this is a water quality requirement.
[2] Approved Water Quality Bank debits are considered to be part of the treated A_i.

Note that impervious area within the LOD that qualifies as a 3.3.A maintenance waiver or is not being disturbed but is shown as part of the LOD or limit of work on the sediment control plan because it needs to be traversed for access or is used for staging, etc. may be subtracted out.

Note that if a project proposes to remove existing water quality practices or features (BMPs, disconnection areas, buffers, etc.), the lost water quality treatment will have to be replaced. How to account for this depends on whether the treated area is also being removed. Refer to the additional topics section at the end of this document for further discussion.

Applicants that have a Water Quality Bank may deposit excess treatment in the bank or withdrawal shortages from the bank.

Step 6. Calculate the required Environmental Site Design Volume (ESDv).

As stated in the Design Manual, ESDv = $(P_E)(Rv)(A)/12$. The required ESDv can essentially be broken down into two components, the ESDv from redevelopment and the ESDv from new development. However, this does not adequately consider the complexities commonly experienced on State and federal projects having multiple points of investigation, linear development, and/or reconstruction mixed with demolition and new construction. For starters, it is critical that the required volume be calculated based on an appropriate and consistent area. Additionally, because the drainage area to the POI can include both redevelopment and new development, how to compute the target P_E for POIs is particularly unclear. To eliminate these discussion points and achieve consistency, the process described herein is to be followed for State and federal projects.

The required ESDv should be calculated for an area equal to the IART using an Rv equal to 0.95 (i.e. 100% impervious). For redevelopment, the target P_E should be 1.0 inch, and for new development the target P_E should equal 2.0 for D soils, 2.2 for C soils, or 2.6 for A/B soils.

There are two requirements that must be met for a project to satisfy ESDv. There is an overall project requirement, and there is a requirement for each POI. Unlike water quality treatment, which can be provided anywhere within the project (assuming the project is located in a single watershed*), channel protection volume must be provided in the POI with the new development. If the $IART_{NEW}$ is zero or negative, then the required channel protection portion is zero. The POI requirement must be met for each POI with new development. POIs that have been granted a waiver or variance from Cpv have no ESDv POI requirement.

Notes regarding the Water Quality Bank and ESDv.
The Water Quality Bank may be used to satisfy the water quality requirements for both redevelopment and new development (i.e. the total IART). Additionally, the WQv (i.e. ESDv for $P_E \leq 1.0$ in) provided by the bank for redevelopment can be applied toward meeting the project's overall ESDv requirement. However, the treatment provided by the bank may not be used to meet the ESDv requirement for new development (i.e. the ESDv POI requirement). To address channel protection, the full ESDv for new development needs to be physically provided within the actual POI. In short, the ESDv that can be satisfied by the bank is limited to $ESDv_{RE\text{-}DEV'L}$. A project that is strictly redevelopment and acceptably uses the bank to satisfy water quality treatment will not have to provide any on-site management for ESDv.

*See the additional topics section at end of this document.

ESDv Project Requirement:
At a minimum, the project must provide the ESDv for treating the redevelopment ($IART_{RE\text{-}DEV'L}$) plus the ESDv for treating the new development ($IART_{NEW}$).

$[\sum$(provided ESDv) for project[3]$] \geq$ [required $ESDv_{RE\text{-}DEV'L}$[4]] + [required $ESDv_{NEW}$[5]][6]

[3] Debits from the Water Quality Bank for redevelopment are considered part of the provided ESDv for the project.
[4] The required $ESDv_{RE\text{-}DEV'L}$ is (1.0 in)(0.95)($IART_{RE\text{-}DEV'L}$ for project)/12 in/ft
[5] The required $ESDv_{NEW}$ is (P_E)(0.95)($IART_{NEW}$ for project)/12 in/ft where the P_E equals 2.0 for D soils, 2.2 for C soils, or 2.6 for A/B soils. If there is a decrease in impervious area and $IART_{NEW}$ is negative, then the P_E in this equation changes to 1.0 inch. This reduces the total required ESDv by an amount equivalent to the water quality volume. In this case, the required ESDv is equivalent to the volume required to treat the entire IART for a P_E of 1.0 inch.
[6] Adjustments to the required ESDv for the project are made for POIs that (1) have a shift in drainage area divide from existing to proposed conditions whereby impervious area from outside the LOD is shifted into or out of the POI, (2) are granted a 3.3.B waiver or variance from Cpv, or (3) remove existing water quality. This is discussed further in the notes section at the end of this document and is addressed in the Division's computational spreadsheets.

ESDv POI Requirement:

At a minimum, the channel protection requirements must be satisfied at each POI by providing at least the required ESDv for treating the new development.

[∑(provided ESDv) for POI[7]] ≥ [required $ESDv_{NEW}$ for POI[8]][9]

[7] The ESDv provided by each BMP is based on the actual drainage area to the facility as well as the effective storage (see step 7 for additional explanation). Debits from the Water Quality Bank are not to be considered part of the provided ESDv for the POI. Note that this is different than notes 2 and 3.

[8] $ESDv_{NEW} = (P_E)(0.95)(IART_{NEW}$ for POI)/12 in/ft where P_E equals 2.0 for D soils, 2.2 for C soils, or 2.6 for A/B soils. If $IART_{NEW}$ for the POI is zero or negative, then there is no ESDv requirement for the POI.

[9] Adjustments to the required ESDv for the POI are made when (1) there is a shift in drainage area divide from existing to proposed conditions whereby impervious area from outside the LOD is shifted into or out of the POI, (2) a 3.3.B waiver or variance from Cpv is granted, or (3) existing water quality is removed. This is discussed further in the notes section at the end of this document and is addressed in the Division's computational spreadsheets.

Step 7. Provide ESD to the maximum extent practicable for each POI. The ESDv is comprised of a WQv component (equivalent to the first 1.0 inch of P_E) and a Cpv component. To meet Cpv, the full target P_E must be managed, not just the portion of the ESDv above the water quality volume. ESD practices (Chapter 5 of the Design Manual) must be used to treat the IART for the first 1.0 inch of P_E. ESD practices should also be used to the maximum extent practicable to meet the ESDv requirements beyond the first inch of P_E. If after exploring Chapter 5 practices, their use is sufficiently justified as impracticable, Chapter 3 structural practices may be used for treating the remaining ESDv. When strict adherence to the ESD requirement results in unnecessary hardship and does not fulfill the intent of the regulations, a variance to treat the entire ESDv in a structural practice that provides acceptable water quality treatment may be requested for consideration on a case-by-case basis. The mention of variances herein should in no way be construed as an endorsement of non-ESD facilities but rather an acknowledgement that a policy is necessary for situations when a variance from micro-scale practices is legitimate, due to the Division being the approval authority for institutions such as marine terminals and airports whose operation is dependent on large, uninterrupted, paved surfaces.

When Chapter 3 structural practices having water quality features are used to provide some or all of the Cpv requirements, the practice may be sized based on ESDv. If a structural practice with no water quality features, such as a dry pond or underground storage, is used to provide Cpv, Appendix D.11 of the Design Manual needs to be used to calculate the runoff volume that must be captured and stored by the structural practice.

All stormwater BMPs must be sized for the area draining to them. The runoff volumes and treated area are dependent on the drainage area to the BMP, and therefore the ESDv required to treat the impervious area for a P_E=1.0 inch must be calculated for each individual BMP.

Water quality management does not necessarily have to be provided in the POI for which it is required but must be provided in the same watershed.* This is possible because the Division allows existing impervious area outside the LOD to be treated in lieu of the project's impervious area so long as that surface is not already being treated for water quality.

Note that because the water quality volume is based on 1.0 inch of rainfall (considered to be the first flush and 90% of the average rainfall), additional QUALITY credit will not be given for treating a P_E over 1.0 inch. Also note that the amount of WQv provided by a facility is limited by the drainage area. If the impervious area draining to the facility is only 0.3 acres, physically sizing the facility to treat 0.5 acres does not result in additional water quality treatment.

Note that sometimes it is not possible to provide a full inch of treatment in a given practice. In those cases, partial credit will be given, and an additional facility(ies) can be provided using a treatment train approach. For example, suppose the IART is 0.5 acres, and the proposed facility only provides 0.7 inches of treatment. 0.3 inches more is needed over 0.5 acres. This could be achieved by treating 0.5 acres for 0.3 inches or 0.15 acres for 1.0 inch or 0.3 acres for 0.5 inches and so on.

Unlike quality management, quantity management (including the ESDv and Qp) must be provided within the POI for which it is required. The total provided ESDv within the POI (based on the drainage area to the practice and the achieved P_E) should equal or exceed the required ESDv for the POI. Sometimes it is necessary to provide excess ESDv in one facility to compensate for a shortage of ESDv in another. This is permissible within the given POI, but there is a limit on the amount of ESDv treatment that can be provided by a facility. The maximum ESDv is limited to the 1-year storm (2.4 to 3.0 inches depending on the county).

Step 8. Provide recharge volume (Rev) for all new development. Similar to Cpv, recharge is required for the new impervious area ($IART_{NEW}$). For POIs with existing condition I>40%, recharge is required for the increase in impervious area. For POIs with existing condition I≤40%, recharge is required for the entire impervious area. If an ESD practice has an underdrain and recharge is required for the contributing area, some method of providing Rev, such as storage below the invert of the underdrain, is required.

Step 9. Evaluate each POI for flood protection (Qp and Qf) and provide as required. Refer to Table 2 of the Guidelines to determine whether control of the 2-year, 10-year, and/or 100-year 24-hour frequency storm events is required. Also refer to Section 3.3.B of the Guidelines for a classification of POIs that are eligible for Qf and Qp quantity waivers. If 2-year or 10-year control is required, the post-development peak discharge rate must be equal to or lower than the pre-development peak discharge rate. Note that runoff captured by ESD practices may contribute to meeting the 2-year and/or 10-year management. Guidance on acceptable computational methods for reducing the RCN for the drainage area to an ESD facility is under development.

Provide peak management of the 100-year 24-hour frequency storm event for POIs located in Inter-jurisdictional Flood Hazard Watersheds.

If the project proposes to remove an existing quantity management BMP, the existing

management will have to be replaced, in accordance with requirements of the jurisdiction where the project is located.

Step 10. Evaluate the proposed management. The plan reviewer will be asking the following questions:

- Is the treated impervious area ≥ IART? This should be evaluated for each watershed. The WQv can be provided anywhere in the project as long as it is in the same six/eight* digit watershed.
- Is the IART being treated for a P_E of at least 1.0 inch?
- Is the provided ESDv for the project equal to or greater than the required ESDv for the project? Is the provided ESDv for each POI equal to or greater than the required ESDv for each POI? If not, is a structural practice being provided to manage the channel protection volume?
- Have the Qp and Qf requirements been addressed at each POI?

Step 11. Evaluate each outfall. The plan reviewer will be asking the following questions:

- Is there stable, non-erosive conveyance at each POI?
- Where does the POI outfall? What is downstream? Does flow from the POI drain to a downstream pond, dam, or other structure?
- If it is an open channel, is the channel stable under existing conditions? If so, are the proposed velocities non-erosive throughout construction phases and for final stormwater design?
- If there is existing erosion, have the proposed velocities been kept at or below existing rates throughout construction phases and for final stormwater design?
- If a new point of concentrated discharge is being created, what measures have been taken to prevent future erosion? Would a level spreader be effective? Is there a downstream property owner who is impacted?
- Is adequate outfall protection being provided?
- If the POI outfalls into a closed storm drain system, is there available capacity in the system? What are the tailwater effects?

ADDITIONAL TOPICS

Topic 1: Stormwater Management Study Area and Calculating Percent Impervious

The Design Manual uses the percentage of impervious area (%I) in various contexts. It is important to note that the %I is calculated differently depending on the context. The first %I that needs to be calculated is used to determine whether reconstruction will be considered new development or redevelopment. If the existing imperviousness (%I) of the stormwater management study area is equal to or less than 40%, the POI is classified as new development and any reconstruction must meet the new development criteria. If the %I exceeds 40%, the reconstruction is considered redevelopment.

Because "site area" does not apply to many State and federal sites the way it does to private development and because there is a need to evaluate the project based on its drainage area, Plan Review uses the "SWM Study Area" when calculating %I for the 40% threshold determination. Most of the time, the SWM Study Area will be the limit of disturbance, but it can be extended to either the project area, property area, or the right-of-way. Because Plan Review wants to incentivize the State and federal agencies to select reconstruction sites over new construction sites as well as to remove existing pavement wherever possible, the applicant will be allowed to use the area which yields the most favorable result (i.e. highest %I). If the ROW is used, the full ROW within the project limits should be used. Note that this %I and the SWM Study Area are only used for the 40% threshold. The %I used for determining the ESD requirements is based on LOD within the drainage area, and the %I used for determining the provided ESD and the surface storage volume requirements is based on the drainage area to the BMP.

There has been a lot of discussion among applicants, designers, and reviewers about excluding certain areas from the SWM Study Area. Pervious areas that are not available for development including lands protected by forest preservation, conservation easements, or other mechanism, buffers, underground utility work areas, and areas used for stormwater management may be excluded from the SWM Study Area. This will create an incentive to preserve and protect natural resources in redevelopment projects.

The SWM study area cannot include property that is not owned by the applicant even if it is part of the drainage area to the POI. However, temporary stockpile areas, staging areas, and areas used for sediment control measures typically should be included in the SWM study area because these areas are available for development.

Topic 2: Water Quality Map

For projects with any combination of reconstruction, new construction, maintenance, and/or demolition, a water quality map needs to be provided in the SWM report. The map should use color coding or hatching to identify the following impervious areas:

- Existing (pre-development) impervious surfaces;
- Proposed (post-development) impervious surfaces;
- Impervious surfaces within the LOD that are not being disturbed but need to be included in the LOD for access;
- Impervious surfaces that are waived from SWM because they are maintenance or utility excavation areas that will be restored to existing conditions in accordance with Technical Memo #4;
- Impervious surfaces being reconstructed (identifiable as the overlap between existing impervious area and proposed impervious area); and,
- Impervious surfaces being demolished (identifiable as impervious area in existing conditions and pervious area in proposed conditions).
- USDA Hydrologic Soil Survey and Soil Map Unit

Topic 3: Impervious Removal

Impervious removal results in a 50% credit. A 100% credit cannot be given because it would wrongly allow a one to one (1:1) trade-off between removal and new development without any net benefit to water quality. 50% of the removal is therefore used to satisfy the redevelopment requirement, and 50% is available as credit. This assumes that I>40%. In the unlikely event that I≤40%, the resulting credit from demolition would technically be 0%. However, the Division recognizes that impervious removal is the best BMP, therefore encourages the removal of impervious area, and will readily work with the applicant to adjust the SWM study area so that a 50% credit can be attained as appropriate when demolition is outside the footprint of the proposed development.

Topic 4: Loss of Existing Water Quality

A loss of existing water quality results when, as the result of proposed project improvements, an existing water quality practice is removed. Over the years as regulations and policies have evolved, consideration about what qualifies as an existing water quality practice has changed.

Moving forward, the Plan Review Division will only consider the removal of a water quality feature to be a loss of existing water quality when that feature is part of a previously approved stormwater management design. Therefore, grass swales and disconnections that provide water quality by happenstance and are being removed will not be considered as a loss of water quality. However, grass swales, disconnections, or any other features that were designed as SWM practices and removed in a subsequent project will be considered a loss of water quality. This applies to Chapter 3 practices as well as Chapter 5 practices. Ponds are the exception; regardless of whether a pond was

constructed for water quality purposes, the removal of a pond with water quality features will be considered a loss of water quality.

Note that if an existing BMP is being removed and replaced for MS4 restoration purposes, the system-wide impervious area accounting will be done by the Program Review Division, and any questions regarding this oversight should be referred to them. The role of the Plan Review Division is limited to reviewing and approving the design and recording the level of treatment provided by the individual project.

Topic 5: ESDv and Waivers

An ESDv allowance will be given for POIs that have been waived from Cpv in accordance with Section 3.3.B of the Guidelines. For the ESDv project requirement, the $IART_{NEW}$ requiring Cpv management can be reduced by the ΔA_i attaining a waiver. Also, if a POI is granted a Cpv waiver, the ESDv POI requirement will be waived. This is addressed in the spreadsheets.

Topic 6: SWM Design Requirements for New Development

The following table summarizes the design practices and methodology required to meet the SWM criteria for new development:

SWM Criteria, Practices and Methodology for New Development			
	Chapter 5 ESD Practice	**Chapter 3 Structural Practice with Water Quality Feature**	**Structural Practice without Water Quality Feature (e.g. dry pond, underground storage)**
WQv	ESDv for P_E = 1.0 in	Only with variance; ESDv for P_E = 1.0 in	N/A
Cpv	ESDv for full target P_E or ΔESDv if WQv is provided in another practice	ESDv for full target P_E or ΔESDv if WQv is provided in another practice	Only with variance; follow Appendix D.11
Qp	Reduced RCN or route using TR-20. Qp storm should not be passed through filter (i.e. ESDv should be off-line).	Route using TR-20	Route using TR-20

Topic 7: Shifts in Drainage Areas Divides

Diverting stormwater runoff from one point of investigation in existing conditions to another point of investigation in proposed conditions complicates the stormwater management analysis. Determining the stormwater management required in this situation is based on separate assessments of quality and quantity criteria. Because water quality requirements are assessed on a project basis irrespective of drainage area (unless multiple six digit watersheds are involved), the required water quality and IART are not affected by drainage areas shifting into or out of the POI. Undisturbed areas that are diverted to the POI are not subject to water quality requirements. Quantity

management is different. Undisturbed areas that are diverted to the POI must be considered when assessing quantity management requirements. If the drainage area to the POI increases in proposed conditions, and the discharge rate (Qp) thereby increases, then quantitative stormwater management, specifically Cpv, Qp, and Qf, will need to be provided to maintain predevelopment discharges at the point of investigation, regardless of whether there is an associated earth disturbance.

Note that stormwater management is typically not required for areas (footprint) not being disturbed even if the project has an overall earth disturbance equal to or exceeding 5,000 square feet. The exception to this is construction that changes the discharge point from the study area without disturbing the drainage area, for example by constructing a storm drain diversion. In this case, quantity management must be addressed. Water quality treatment is not required unless the respective area is disturbed.

Topic 8: Cpv on the Eastern Shore

Chapter 2 of the Design Manual states that Cpv is not required for direct discharges to tidal waters or for the Eastern Shore of Maryland. However, as a result of the 2007 SWM Act and the revisions to Chapter 5 of the Design Manual, ESDv (and therefore Cpv) is now required for the Eastern Shore. Refer to page 5.31 of the Manual. However, there are multiple Cpv waivers in the Guidelines for which projects on the Eastern Shore may readily qualify due to the prevalence of tidal water. Be advised that projects located in the Chesapeake Bay Critical Area likely have additional management requirements including full ESDv treatment.

Topic 9: Western Rainfall Zone

The WQv equation in Chapter 2 of the Design Manual is a function of rainfall depth for the specific rainfall zone. For the Eastern Zone the P is 1.0 inch, and for the Western Zone the P is 0.9 inch. However, as a result of the 2007 SWM Act and the revisions to Chapter 5 of the SWM Manual, the criterion for calculating ESDv is the same statewide. The Plan Review Division, therefore, considers 1.0 inch to be the basis for water quality criteria statewide.

Topic 10: Watershed

"Watershed" refers to the Maryland 6-digit watershed. For applicants with a Water Quality Bank, the terms of the Memorandum of Agreement establish whether the watershed of concern will be the 6-digit or 8-digit watershed or other.

Topic 11: NOAA Atlas 14 Rainfall Rates

In 2016 the Natural Resources Conservation Service (NRCS) changed TR-55 and TR-20 to incorporate the National Oceanic and Atmospheric Administration (NOAA) Atlas 14 rainfall depths and distributions. These rainfall data replace rainfall data from Weather Bureau Technical Paper 40 (TP-40) and the standard NRCS Type II rainfall distribution.

MDE supports the USDA and NOAA updates and requires that the NOAA Altas 14 be used for designing dams and Code 378 small ponds. Albeit recommended, use of these updates is voluntary for stormwater management and sediment control plan designs until changes to Maryland's stormwater management regulations are adopted. Note that whichever rainfall distribution is used, it must be applied consistently in existing and proposed conditions.