

## **Section 2. Annotated Table of Contents Stormwater Management Report**

This section describes the contents of each Part of an ES<sub>2</sub>M Report. It also lists the sources of data and technical references of procedures used in design.

The stormwater management report should be assembled into distinctive sections with tabs and submitted in a three ring binder for ease of review and for future reference. The report should include all data, drawings, charts, maps, calculations, and explanations needed which lead to a clear understanding of the studies made, methods and criteria used, results obtained, conclusions reached and future actions required.

As stated in the Checklist (Section 1 of this Design Guide), the first report must accompany the Preliminary Construction Plans. The report should therefore contain those supporting data and calculations for the stormwater management features contained in the construction plans submitted for review.

Changes to the stormwater management features as reflected in later submittals of the Construction Plans must also be supported. Those changes and revision to the report must be submitted with the Plans with clear instructions on how these new pages are to be inserted in the report.

### **Part I. Project Description**

Provide a brief summary of the project scope. Such as, "The proposed project involves the widening of Lancaster Pike from a two lane roadway to a four lane divided highway from SR 41 to SR 141". List the approximate acreage of land disturbance associated with the proposed project.

### **Part II. Proposed Stormwater Management Measures**

Provide a brief narrative of the stormwater management strategy for each drainage area based on physical site constraints such as topography, soils, water table, etc and regulatory requirements. Discuss which management measures were considered and the reasons why one measure was chosen over another. If the proposed measures deviate from the preferred method in accordance with the latest update of the Delaware Sediment and Stormwater Regulations, include some discussion and justification as to why the preferred methods were ruled out.

Request all waivers, exemptions, and variances in writing and make them part of this section of the report.

### **Part III. Conclusions**

List the stormwater quality and quantity management measures chosen for each drainage area. Provide summary tables comparing the pre- and post project peak flow rates for the 2-, 10-, and 100-year storm events (see page 3 for suggested format).

#### **Part IV. Appendixes**

See pages 4 through 7.

**Summary Comparison of Pre-project with Post-project Conditions**

Project Name: \_\_\_\_\_

Contract Number: \_\_\_\_\_

**Subarea ID:** \_\_\_\_\_

	Pre-project	Pre-project W/O SWM	Post-project W/ SWM	Percent Change	Comments
Drainage Area (ac)	_____	_____	_____	_____	_____
Curve Number	_____	_____	_____	_____	_____
Tc – hours	_____	_____	_____	_____	_____
Q 2-yr peak (cfs)	_____	_____	_____	_____	_____
Q 10-yr peak (cfs)	_____	_____	_____	_____	_____
Q 100-yr peak (cfs)	_____	_____	_____	_____	_____

**Subarea ID:** \_\_\_\_\_

	Pre-project	Pre-project W/O SWM	Post-project W/ SWM	Percent Change	Comments
Drainage Area (ac)	_____	_____	_____	_____	_____
Curve Number	_____	_____	_____	_____	_____
Tc – hours	_____	_____	_____	_____	_____
Q 2-yr peak (cfs)	_____	_____	_____	_____	_____
Q 10-yr peak (cfs)	_____	_____	_____	_____	_____
Q 100-yr peak (cfs)	_____	_____	_____	_____	_____

**Subarea ID:** \_\_\_\_\_

	Pre-project	Pre-project W/O SWM	Post-project W/ SWM	Percent Change	Comments
Drainage Area (ac)	_____	_____	_____	_____	_____
Curve Number	_____	_____	_____	_____	_____
Tc – hours	_____	_____	_____	_____	_____
Q 2-yr peak (cfs)	_____	_____	_____	_____	_____
Q 10-yr peak (cfs)	_____	_____	_____	_____	_____
Q 100-yr peak (cfs)	_____	_____	_____	_____	_____

## **Appendix A - Maps**

Provide a **separate** map or set of maps of appropriate scale for both **existing** and **proposed** project conditions. The maps should include the following information:

<b>Item</b>	<b>References and Remarks</b>
Limits of Construction (LOC)	Project Plans
Contour Lines	USGS 7.5' quad maps or field run topo
Drainage Area Boundaries for each POA (Point of Analysis)	Field review, Drainage Reports, Tax Ditch Design files, USGS topo
Land Uses	Zoning maps and Aerial photos
Soil Types	NRCS Soil Survey Reports by County and/or Soil Borings
Times of Concentration Flow Paths	Field review and topo maps
Wetland Boundaries	US Fish & Wildlife National Wetland Inventory Maps, DNREC Tidal Wetland Maps, Wetland Delineation Reports
100-Year Flood Zone	FEMA Flood Insurance Rate Maps

**Appendix B - Hydrologic/Hydraulic for Existing Conditions**

Provide the following items for each identified POA (Point of Analysis):

<b>Item</b>	<b>References and Remarks</b>
Drainage Area	Drainage Area map and field verified
Curve Number	TR-55, NRCS National Engineering Handbook Section 4 – Hydrology
Time of Concentration	TR-55, NRCS National Engineering Handbook Section 4 Hydrology. Use <b><u>Good</u></b> hydrologic conditions
Hydraulics of existing streams, valleys, bridges, culverts, ponds, or reservoirs	FHWA HY-8, HEC-2, PondPack
Schematic Diagram	Required if the watershed has more than one subarea. TR 20, PondPack, other approved softwares
Peak Flows for 2-yr, 10-yr and 100-yr storm events for each POA using approved H&H software.	<b>Rainfall Distribution:</b> NRCS Type II <b>Dimensionless Unit Hydrographs:</b> NRCS Standard Dimensionless Unit Hydrograph (DUH) north of I95 and I295 and Delmarva DUH for areas south, Ref. ASCE Paper No. 80-2013.
<b><u>H&amp;H Input and Output of Approved Softwares</u></b>	<b><u>Printed Output (Typical):</u></b> <b><u>TR 20:</u></b> Input Data and Summary Tables 1,2, and 3 only.
<u>General Guideline:</u> Printed output of tables and graphs should be those needed to support the narrative portion of the report <b><u>only.</u></b>	<b><u>PondPack:</u></b> Warning Messages, Master Network Summary, Tc calcs, CN calcs, Elev-storage, Outlet Structure data and Composite Rating of existing BMPs
Complete Input and Output data on appropriately labeled disk in a protective case placed at back of SWM Report	Standard Output of other approved softwares

**Appendix C - Hydrologic/Hydraulic Data for Post-project Conditions**

Provide the following items for each identified POA (Point of Analysis):

<b>Item</b>	<b>References and Remarks</b>
Drainage Area	Drainage Area map and field verified
Curve Number	TR-55, NRCS National Engineering Handbook Section 4 – Hydrology
Time of Concentration	TR-55, NRCS Nat. Engineering Handbook Sect. 4 Hydrology. Use <b>Good</b> hydrologic conditions
Stage-Storage Data for each BMP	
Detail of Outlet Structure of BMP	
Hydraulics of existing streams, valleys, bridges, culverts, ponds, or reservoirs	FHWA HY-8, HEC-2
Schematic Diagram	Required if the watershed has more than one subarea. TR 20, PondPack, other approved softwares
Peak Flows for 2-yr, 10-yr and 100-yr storm events for each POA using approved H&H software.	<b>Rainfall Distribution:</b> NRCS Type II <b>Dimensionless Unit Hydrographs:</b> NRCS Standard Dimensionless Unit Hydrograph (DUH) north of I95 and I295 and Delmarva DUH for areas south, Ref. ASCE Paper No. 80-2013.
<b>H&amp;H Input and Output of Approved softwares</b>	<b><u>Printed Output (Typical):</u></b> <b>TR 20:</b> Input Data and Summary Tables 1,2, and 3 only.
<u>General Guideline:</u> Printed output of tables and graphs should be those needed to support the narrative portion of the report <b>only.</b>	<b><u>PondPack:</u></b> Warning Messages, Master Network Summary, Tc calcs, CN calcs, Elev-Storage, Outlet Structure data, Composite Rating Curve.
Complete Input and Output data on appropriately labeled disk in a protective case placed at back of report	Standard Output of other approved softwares
Detention Time for Water Quality Storm for a detention pond BMP	

## **Appendix D – Foundation, Embankment, Inflow and Outlet Protection Design Data**

<b>Item</b>	<b>References</b>
Soils classification using Unified Soil Classification System	Soil Borings and Laboratory Reports
Foundation Cutoff core and embankment design	See Pond Design and Specification Sections of this Design Guide
Anti-floatation check for Pond Outlet Structure	See Pond Design and Specification Sections of this Design Guide
Sizing and Spacing of Anti-seep Collars	NRCS Pond Code 378 adapted for DE. DE E&SC Handbook
Riprap protection of inflow areas into each BMP and outlet of BMP Outlet Structure	FWHA HEC 14 Hydraulic Design for Energy Dissipators for Culverts and Channels