

Note : This sheet should be used in consultation with the *Guidance Document on New Probable Maximum Precipitation (PMP) Implementation* (March 23, 2016) and the *Certification Form: Review of New Probable Maximum Precipitation Values (Effective March 23, 2016) Using the PMP Evaluation Tool*.

Virginia 2015 PMP Watershed Calculation Worksheet (March 2016 version)

Dam: South River Dam #19 (Inv#01514)
 Company: Department of Conservation and Recreation; Division of Soil and Water Conservation
 Engineer: Charles Wilson

Date: 6/30/2016

NOTES

- A. PLEASE ENSURE ALL RELEVANT SECTIONS ARE FILLED OUT (PLEASE SCROLL DOWN THROUGH ENTIRE WORKSHEET)
 B. PLEASE ENSURE CELLS WITH EMBEDDED CALCULATIONS (CELLS WITH NO BLUE COLOR) ARE REFERENCING THE CORRECT NUMBERS. WHEN ADDING OR DELETING ROWS FOR GRID POINTS, CELLS WITH EMBEDDED CALCULATIONS MAY BE REFERENCING THE WRONG INFORMATION. PLEASE CHECK CALCULATION CELLS!

Example Cell	Cells Requiring User Input are Highlighted in Blue
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Calculation Section A - Drainage Area to Dam

Information obtained from GIS shapefile / watershed boundary analysis or previously completed Dam Failure Analysis

Drainage Area	1920.00	3.000
	Acres	Sq. Miles

Calculation Section B - Original HMR 51/52 Values

Information obtained from previously computed HMR 51/52 program (previously completed Dam Failure Analysis)

6-hr HMR 51/52 PMP Value	28	in / 6-hr
12-hr HMR 51/52 PMP Value	33	in / 12-hr
24-hr HMR 51/52 PMP Value	36	in / 24-hr

Calculation Section C - New 2015 PMP Values

Information obtained from new 2015 PMP GIS Evaluation Tool (see the PMP section of the DCR Dam Safety website for more details)

General Storm Events

Grid Pts	Point X	Point Y	Zone	6 Hr. PMP	12 Hr. PMP	24 Hr. PMP	Controlling 6 Hr. Storm	Controlling 12 Hr. Storm	Controlling 24 Hr. Storm
1	-79	37.95	5	15.8	18.3	19.8	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
2	-78.975	37.95	5	15.6	18.0	19.4	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
3	-79	37.975	1	15.1	17.5	18.8	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
4	-78.975	37.975	1	14.9	17.2	18.6	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
5	-78.975	38	1	14.3	16.5	17.8	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
6	-78.95	38	1	14.4	16.7	18.0	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1
7	-78.975	38.025	1	13.7	15.9	17.1	SPAS_1339_1	SPAS_1339_1	SPAS_1201_1

Average PMP Values:	14.8	17.2	18.5
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Local Storm Events

Grid Pts	Point X	Point Y	Zone	6 Hr. PMP	12 Hr. PMP	24 Hr. PMP	Controlling 6 Hr. Storm	Controlling 12 Hr. Storm	Controlling 24 Hr. Storm
1	-79	37.95	5	23.7	25.8	26.6	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
2	-78.975	37.95	5	23.5	25.5	26.4	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
3	-79	37.975	1	22.6	24.6	25.4	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
4	-78.975	37.975	1	22.4	24.4	25.2	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
5	-78.975	38	1	21.7	23.6	24.4	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
6	-78.95	38	1	21.8	23.8	24.6	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1
7	-78.975	38.025	1	21	22.9	23.6	SPAS_1406_1	SPAS_1406_1	SPAS_1406_1

Average PMP Values:	22.4	24.4	25.2
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Tropical Storm Events

Grid Pts	Point X	Point Y	Zone	6 Hr. PMP	12 Hr. PMP	24 Hr. PMP	Controlling 6 Hr. Storm	Controlling 12 Hr. Storm	Controlling 24 Hr. Storm
1	-79	37.95	5	18.7	28.7	28.7	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
2	-78.975	37.95	5	18.4	28.2	28.2	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
3	-79	37.975	1	17.4	26.8	26.8	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
4	-78.975	37.975	1	17.5	26.9	26.9	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
5	-78.975	38	1	16.4	25.2	25.2	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
6	-78.95	38	1	16.6	25.5	25.5	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1
7	-78.975	38.025	1	15.8	24.2	24.2	SPAS_1491_1	SPAS_1491_1	SPAS_1491_1

Average PMP Values:	17.3	26.5	26.5
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Governing PMP Values from Storm Events

	6 Hr. PMP	12 Hr. PMP	24 Hr. PMP
Governing PMP Values for Watershed	22.4	26.5	26.5

Calculation Section D - Comparison Calculations - Original HMR 51/52 Values vs. New 2015 PMP Values

Information for these calculations obtained from data provided in this spreadsheet. Section provides comparison between HMR 51/52 rainfall values and new 2015 PMP rainfall values. Please review options presented below and DCR Dam Safety PMP Guidance Documentation to determine if SDF calculations are required (next section).

Storm Duration, hrs.	HMR 51/52 Value, in/hr	Governing 2015 PMP Value, in/hr	Comparison	Percent Difference, %
6	28	22.4	-5.61	-20.05%
12	33	26.5	-6.50	-19.70%
24	36	26.5	-9.50	-26.39%

Section Completion Options

Option A - The Dam in question has no previously completed (or approved) Inundation Study and will only be utilizing the Governing 2015 PMP values for the new Dam Failure Analysis. Calculation Section E and Calculation Section F are not required as the SDF for the Dam in question will be calculated from the new Dam Failure Analysis. This option only applies to Dams with no previously completed (or approved) Inundation Study on file with DCR Dam Safety.

Option B - All three of the new Governing 2015 PMP values decreased when compared to the previously completed HMR 51/52 values (negative values for all three storm durations in the comparison column above). At this time, revisions to the existing Inundation Maps / EAPs for the Dam in question are optional and not generally required [Please refer to the *Guidance Document on New Probable Maximum Precipitation (PMP) Implementation* for further details, restrictions, and exceptions]. Please fill out information below in Calculation Section E Only. Calculation Section F is not required for this option.

Option C - One or two of the new Governing 2015 PMP values increased when compared to the previously completed HMR 51/52 values (positive values for one or two storm durations in the comparison column above). At this time, revisions to the existing Inundation Maps / EAPs for the Dam in question may be required depending on further analysis of the Dam in question [Please refer to the *Guidance Document on New Probable Maximum Precipitation (PMP) Implementation* for further details, restrictions, and exceptions]. Please fill out information below in Calculation Section E and Calculation Section F as both are required. It must be determined if either of these new increased PMP values have become the controlling storm for the basin in question.

Option D - All of the new Governing 2015 PMP values increased when compared to the previously completed HMR 51/52 values (positive values for all three storm durations in the comparison column above). At this time revisions to the existing Inundation Maps / EAP's for the Dam in question will be required for the Dam in question [Please refer to the *Guidance Document on New Probable Maximum Precipitation (PMP) Implementation* for further details, restrictions, and exceptions]. Please fill out information below in Calculation Section E and Calculation Section F as both are required.

Calculation Section E - Current Flow and SDF for Dam in Question

Information for this calculation section obtained from previously completed Dam Failure Analysis hydrology calculations (HEC-1 or HEC-HMS). Section provides existing controlling storm for Dam in question, existing controlling flow (flow to Dam) from controlling storm for Dam in question, flow existing Dam in question can pass without overtopping, storm event (SDF) existing Dam in question can pass without overtopping, and storm event (SDF) existing Dam in question must pass per Regulations.

Current controlling storm duration for Dam (6, 12, or 24):	6	hour
PMF Flow TO existing Dam during controlling storm duration	7637	cfs
Flow existing Dam can pass without overtopping	4200.35	cfs
Storm event (SDF) existing Dam can pass without overtopping (calc)	0.55	PMF storm
Storm event (SDF) existing Dam <u>must</u> pass per State DS Regulations	0.9	storm

Calculation Section F - Revised Flow and SDF Calculations for Dam in Question

Information for this calculation section obtained from Calculation Section E and revised Dam Failure Analysis hydrology calculations (HEC-1 or HEC-HMS) (Please see DCR Dam Safety PMP Guidance Document). Section provides information on the revised controlling 6-hr, 12-hr, or 24-hr storm duration (if revisions needed), revised controlling storm for Dam in question (or previous controlling storm if no changes found), revised controlling flow (flow to Dam) from controlling storm for Dam in question, flow existing Dam in question can pass without overtopping (information from Calculation Section E), revised storm event (SDF) existing Dam in question can pass without overtopping, and storm event (SDF) existing Dam in question must pass per Regulations (information from Calculation Section E).

Did controlling storm duration for the Dam change based on revised flow / SDF data?	Not Required (Option B)	yes or no
Controlling storm duration for Dam based on Revised Data (6, 12, or 24):	Not Required (Option B)	hour
Revised PMF Flow TO existing Dam during revised controlling storm duration	Not Required (Option B)	cfs
Flow existing Dam can pass without overtopping (From Calculation Section E)	4200.35	cfs
Revised Storm event (SDF) existing Dam can pass without overtopping (calc)	#VALUE!	PMF storm
Storm event (SDF) existing Dam <u>must</u> pass per State DS Regulations	0.9	storm
Based on the revised flow / SDF values, can the Dam in question now pass the required SDF per State DS Regulations without overtopping?	Not Required (Option B)	yes or no