VSMP Energy Balance Test

1-Yr, 24-Hr Rainfall (in) = 2.57 DA (ac) = 20

Land Use	CN (HSG B)	1-Yr Q (cfs)	1-Yr Vol (in)	1-Yr Vol (A-F)	CN (HSG C)	1-Yr Q (cfs)	1-Yr Vol (in)	1-Yr Vol (A-F)	CN (HSG D)	1-Yr Q (cfs)	1-Yr Vol (in)	1-Yr Vol (A-F)	Exist VSMP ED Design - 30 Hr Drawdown of 2 x WQV % Imp	Imp Ac	2 x WQV (A-F)	ED WSEL (feet)	ED Orif Area (SF)
Woods	55	0.274	0.0956	0.1594	70	6.809	0.4891	0.8152	77	12.963	0.7846	1.3076	0%	0	0.0000		
Pasture	61	2.108	0.2170	0.3616	74	12.902	0.6480	1.0800	80	20.157	0.9376	1.5627	0%	0	0.0000		
SFD 1 acre	68	8.142	0.4188	0.6980	79	21.326	0.8847	1.4744	84	28.943	1.1705	1.9509	20%	4	0.3333	101.31	0.0488
SFD 0.25 acre	75	18.101	0.6918	1.1530	83	30.443	1.1090	1.8483	87	37.647	1.3699	2.2831	38%	7.6	0.6333	102.31	0.0698
TH	85	35.89	1.2345	2.0574	90	46.204	1.5936	2.6560	92	50.433	1.7581	2.9301	65%	13	1.0833	103.59	0.0958
Comm	92	53.966	1.7581	2.9301	94	58.383	1.9363	3.2272	95	60.459	2.0310	3.3851	85%	17	1.4167	104.42	0.1129
Paved	98	65.482	2.3403	3.9006	98	65.482	2.3403	3.9006	98	65.482	2.3403	3.9006	100%	20	1.6667	105	0.1249

Estimate Detention Storage Required for 20 Acre Site Discharging into a Natural Conveyance For:

Case 1) Proposed VSMP Design of Dry Pond Incorporating Energy Balance on 1-Yr Storm (Qdev = IF * Qpre-dev * RVpre-dev / RVdev) and Standard 10-Yr Detention

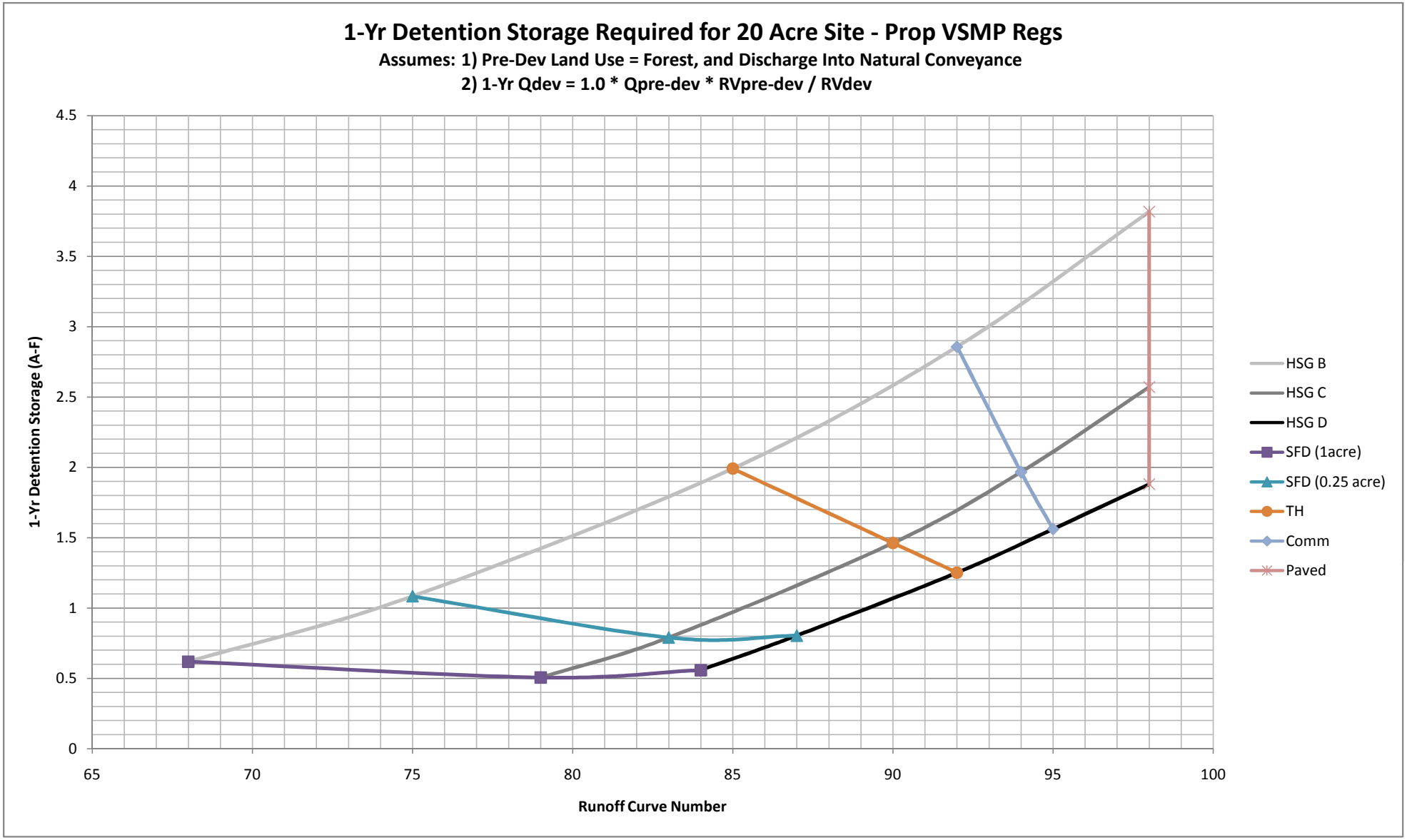
Case 2) Exist VSMP Design of Dry ED Pond Incorporating 30-Hr Drawdown of 2 x WQV and Standard 2- and 10-Yr Detention

* Assume Dry SWM Pond with 100' x 100' Bottom and 4H:1V Side Slopes for Both Cases

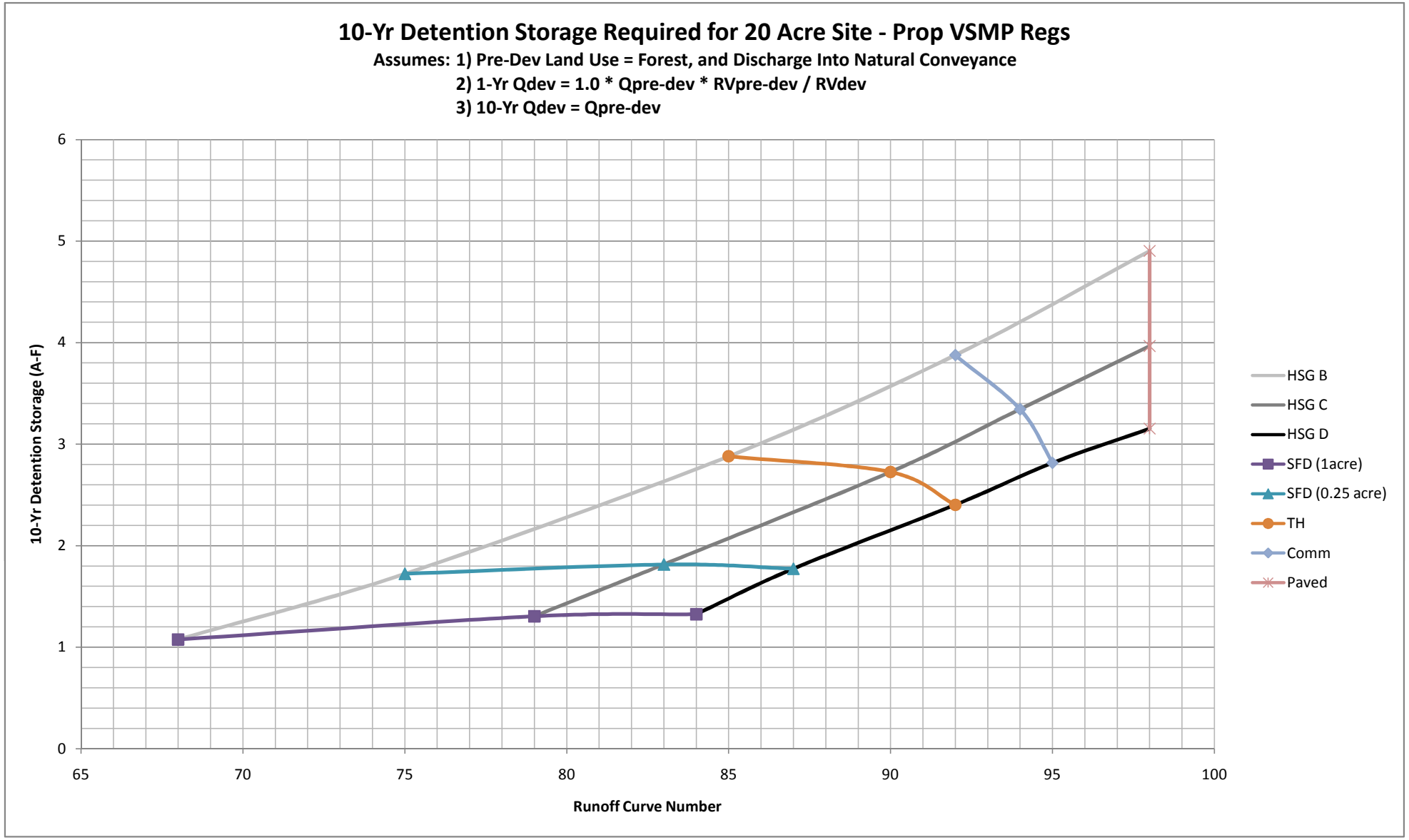
Assuming Pre-Dev Land Use is Forest & HSG B						Prop VSMP 1-Yr Energy Bal (IF=1.0)			Exist VSMP Design for Dry ED Pond			
Developed Land Use	CN (HSG B)	1-Yr RVpre-dev (A-F)	1-Yr RVdev (A-F)	1-Yr Qpre-dev (cfs)	1-Yr Undetained Qdev (cfs)	1-Yr Qdev Reqd (cfs)	1-Yr Det Vol Reqd (A-F)	10-Yr Det Vol Reqd (A-F)	2 x WQV (A-F)	1-Yr Det Vol (A-F)	10-Yr Det Vol Reqd (A-F)	Prop / Exist 10- Yr Vol (%)
SFD 1 acre	68	0.1594	0.6980	0.2740	8.142	0.0626	0.6184	1.0760	0.3333	0.3673	1.0196	106%
SFD 0.25 acre	75	0.1594	1.1530	0.2740	18.101	0.0379	1.0836	1.7227	0.6333	0.6701	1.6504	104%
TH	85	0.1594	2.0574	0.2740	35.89	0.0212	1.9913	2.8800	1.0833	1.2717	2.7144	106%
Comm	92	0.1594	2.9301	0.2740	53.966	0.0149	2.8568	3.8772	1.4167	1.8809	3.5728	109%
Paved	98	0.1594	3.9006	0.2740	65.482	0.0112	3.8166	4.9021	1.6667	2.6085	4.4094	111%

Assuming Pre-Dev Land Use is Forest & HSG C						Prop VSMP 1-Yr Energy Bal (IF = 1.0)			Exist VSMP Design for Dry ED Pond			
Developed Land Use	CN (HSG C)	1-Yr RVpre-dev (A-F)	1-Yr RVdev (A-F)	1-Yr Qpre-dev (cfs)	1-Yr Undetained Qdev (cfs)	1-Yr Qdev Reqd (cfs)	1-Yr Det Vol Reqd (A-F)	10-Yr Det Vol Reqd (A-F)	2 x WQV (A-F)	1-Yr Det Vol (A-F)	10-Yr Det Vol Reqd (A-F)	Prop / Exist 10- Yr Vol (%)
SFD 1 acre	79	0.8152	1.4744	6.8090	21.326	3.7644	0.5059	1.3042	0.3333	0.5677	1.4075	93%
SFD 0.25 acre	83	0.8152	1.8483	6.8090	30.443	3.0030	0.7908	1.8150	0.6333	0.8638	1.9525	93%
TH	90	0.8152	2.6560	6.8090	46.204	2.0898	1.4625	2.7256	1.0833	1.4033	2.8109	97%
Comm	94	0.8152	3.2272	6.8090	58.383	1.7199	1.967	3.3437	1.4167	1.7779	3.325	101%
Paved	98	0.8152	3.9006	6.8090	65.482	1.4230	2.57	3.9656	1.6667	2.1597	3.7898	105%

Assuming Pre-Dev Land Use is Forest & HSG D						Prop VSMP 1-Yr Energy Bal (IF = 1.0)			Exist VSMP Design for Dry ED Pond			
Developed Land Use	CN (HSG D)	1-Yr RVpre-dev (A-F)	1-Yr RVdev (A-F)	1-Yr Qpre-dev (cfs)	1-Yr Undetained Qdev (cfs)	1-Yr Qdev Reqd (cfs)	1-Yr Det Vol Reqd (A-F)	10-Yr Det Vol Reqd (A-F)	2 x WQV (A-F)	1-Yr Det Vol (A-F)	10-Yr Det Vol Reqd (A-F)	Prop / Exist 10- Yr Vol (%)
SFD 1 acre	84	1.3076	1.9509	12.9630	28.943	8.6886	0.5583	1.3246	0.3333	0.7264	1.5794	84%
SFD 0.25 acre	87	1.3076	2.2831	12.9630	37.647	7.4243	0.8045	1.7732	0.6333	1.0234	2.1145	84%
TH	92	1.3076	2.9301	12.9630	50.433	5.7850	1.2516	2.4029	1.0833	1.4925	2.8281	85%
Comm	95	1.3076	3.3851	12.9630	60.459	5.0075	1.5618	2.8166	1.4167	1.8103	3.263	86%
Paved	98	1.3076	3.9006	12.9630	65.482	4.3457	1.8809	3.1528	1.6667	2.1145	3.6118	87%


1-Yr Detention Storage Required for 20 Acre Site - Prop VSMP Regs
Assumes: 1) Pre-Dev Land Use = Forest, and Discharge Into Natural Conveyance
2) 1-Yr Qdev = 1.0 * Qpre-dev * RVpre-dev / RVdev
1-Yr Detention Storage (A-F)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
65
70
75
80
85
90
95
100
Runoff Curve Number
HSG B
HSG C
HSG D
SFD (1acre)
SFD (0.25 acre)
TH
Comm
Paved

Dewberry



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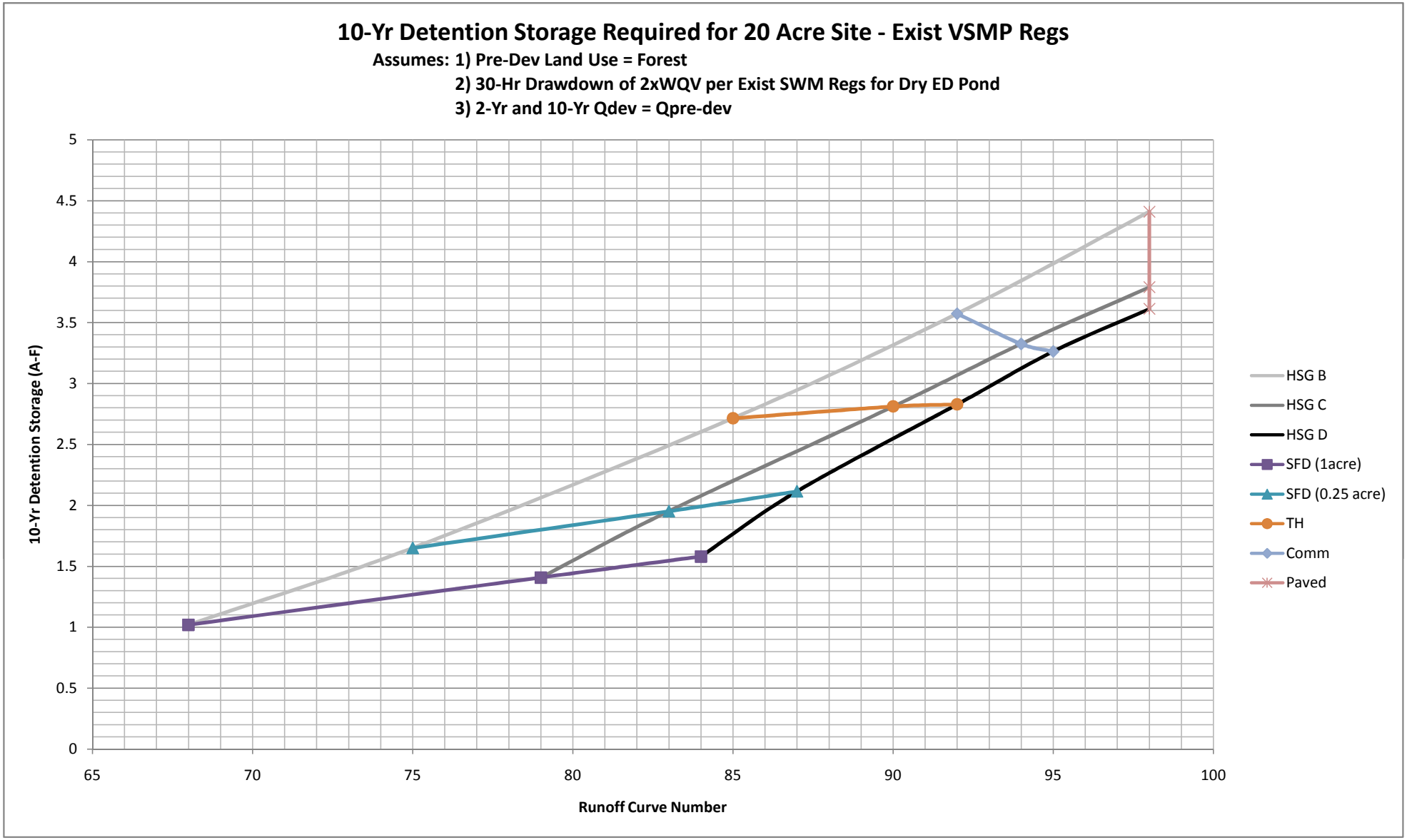
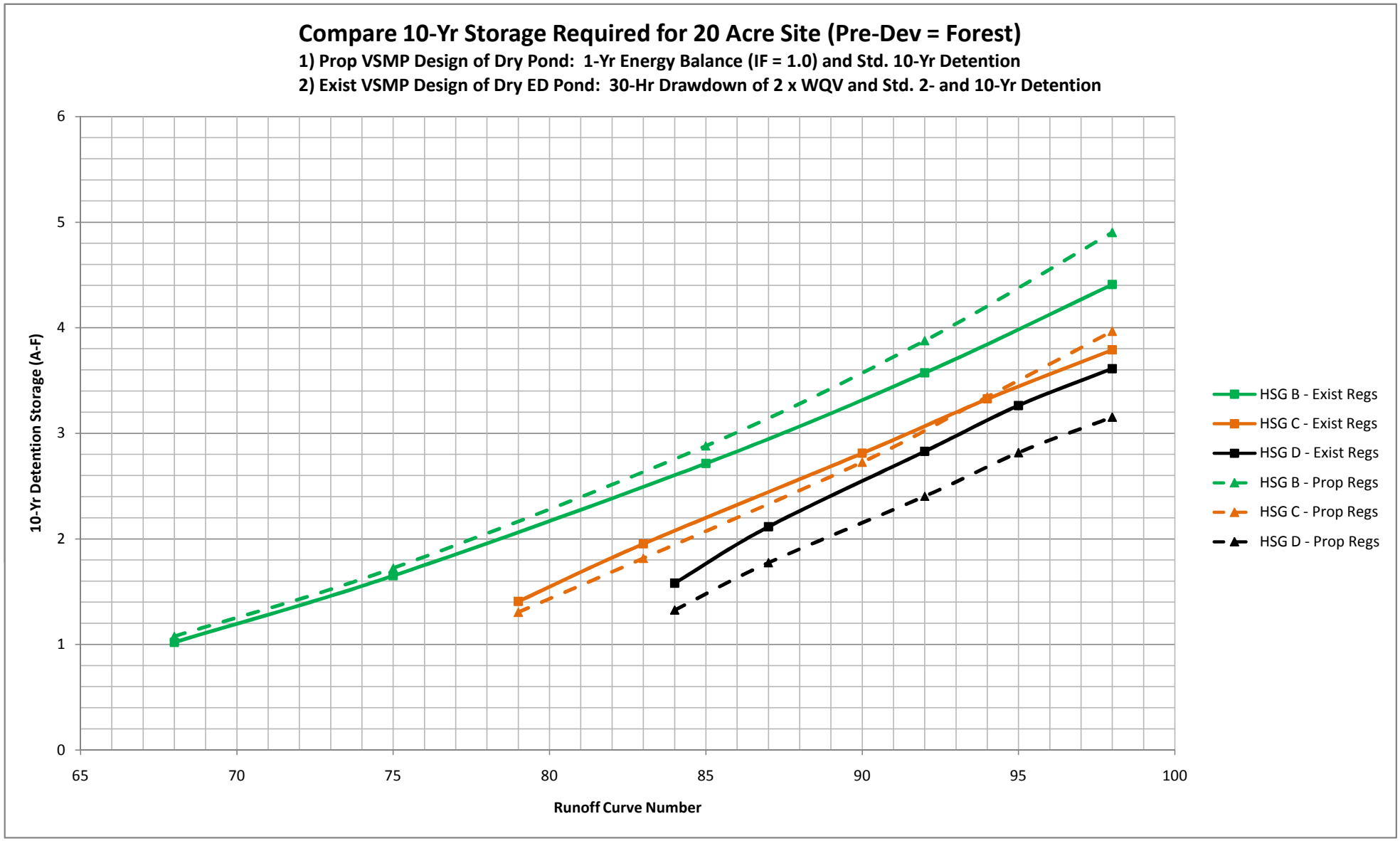
Dewberry


10-Yr Detention Storage Required for 20 Acre Site - Exist VSMP Regs
Assumes: 1) Pre-Dev Land Use = Forest
2) 30-Hr Drawdown of 2xWQV per Exist SWM Regs for Dry ED Pond
3) 2-Yr and 10-Yr Qdev = Qpre-dev
10-Yr Detention Storage (A-F)
0
0.5
1
1.5
2
2.5
3
3.5
4
4.5
5
65
70
75
80
85
90
95
100
Runoff Curve Number
HSG B
HSG C
HSG D
SFD (1acre)
SFD (0.25 acre)
TH
Comm
Paved

Dewberry


Compare 10-Yr Storage Required for 20 Acre Site (Pre-Dev = Forest)
1) Prop VSMP Design of Dry Pond: 1-Yr Energy Balance (IF = 1.0) and Std. 10-Yr Detention
2) Exist VSMP Design of Dry ED Pond: 30-Hr Drawdown of 2 x WQV and Std. 2- and 10-Yr Detention
10-Yr Detention Storage (A-F)
0
1
2
3
4
5
6
65
70
75
80
85
90
95
100
Runoff Curve Number
HSG B - Exist Regs
HSG C - Exist Regs
HSG D - Exist Regs
HSG B - Prop Regs
HSG C - Prop Regs
HSG D - Prop Regs

Dewberry