

Appendix E
Water Quality Volume and Channel Protection Volume Computations

Appendix E: Water Quality Volume and Channel Protection Volume Computations

E.1 DECLARATION RUN WATERSHED

Project: D-ES-2

Table E-1: Water Quality Volume Calculation for D-ES-2

Design Parameters	Site Value
Drainage Area (A, Acres)	11.3
Impervious Area (I, Acres)	4.9
Percent Impervious (%)	44
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.44
Soil Specific Recharge Factor (S)	0.24
Water Quality Volume (WQ_v, acre-feet)	0.42
Recharge Volume (Re_v, acre-feet)	0.10

Table E-2: Channel Protection Volume Calculation for D-ES-2

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.36
Time of Concentration (T_c , hrs)	0.24
Curve Number (CN)	86
Initial Abstraction (I_a , in)	0.32
I_a/P	0.12
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	728
1-Year post-development peak discharge (q_i , cfs)	17.4
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.02
Peak outflow discharge (q_o , cfs)	0.38
Ratio of storage to runoff volume (V_s/V_r)	0.65
Channel Protection Volume, Cp_v (acre-feet)	0.83

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Project: D-ES-5

Table E-3: Water Quality Volume Calculation for D-ES-5

Design Parameters	Site Value
Drainage Area (A, Acres)	8.9
Impervious Area (I, Acres)	2.8
Percent Impervious (%)	32
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.33
Soil Specific Recharge Factor (S)	0.25
Water Quality Volume (WQ_v, acre-feet)	0.25
Recharge Volume (Re_v, acre-feet)	0.06

Table E-4: Channel Protection Volume Calculation D-ES-5

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	0.82
Time of Concentration (T_c , hrs)	0.27
Curve Number (CN)	77
Initial Abstraction (I_a , in)	0.59
I_a/P	0.23
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	623
1-Year post-development peak discharge (q_i , cfs)	7.1
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.03
Peak outflow discharge (q_o , cfs)	0.21
Ratio of storage to runoff volume (V_s/V_r)	0.64
Channel Protection Volume, Cp_v (acre-feet)	0.39

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-ES-6

Table E-5: Water Quality Volume Calculation for D-ES-6

Design Parameters	Site Value
Drainage Area (A, Acres)	3.4
Impervious Area (I, Acres)	1.6
Percent Impervious (%)	47
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.47
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	0.13
Recharge Volume (Re_v, acre-feet)	0.03

Table E-6: Channel Protection Volume Calculation for D-ES-6

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.46
Time of Concentration (T_c , hrs)	0.28
Curve Number (CN)	88
Initial Abstraction (I_a , in)	0.28
I_a/P	0.11
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	685
1-Year post-development peak discharge (q_i , cfs)	5.29
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.03
Peak outflow discharge (q_o , cfs)	0.13
Ratio of storage to runoff volume (V_s/V_r)	0.65
Channel Protection Volume, Cp_v (acre-feet)	0.27

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-ES-7

Table E-7: Water Quality Volume Calculation for D-ES-7

Design Parameters	Site Value
Drainage Area (A, Acres)	2.8
Impervious Area (I, Acres)	1.6
Percent Impervious (%)	56
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.56
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	0.13
Recharge Volume (Re_v, acre-feet)	0.02

Table E-8: Channel Protection Volume Calculation for D-ES-7

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.74
Time of Concentration (T_c , hrs)	0.35
Curve Number (CN)	91
Initial Abstraction (I_a , in)	0.19
I_a/P	0.07
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	656
1-Year post-development peak discharge (q_i , cfs)	4.98
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.03
Peak outflow discharge (q_o , cfs)	0.12
Ratio of storage to runoff volume (V_s/V_r)	0.65
Channel Protection Volume, Cp_v (acre-feet)	0.26

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-ES-8

Table E-9: Water Quality Volume Calculation for D-ES-8

Design Parameters	Site Value
Drainage Area (A, Acres)	7.8
Impervious Area (I, Acres)	3.3
Percent Impervious (%)	42
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.43
Soil Specific Recharge Factor (S)	0.26
Water Quality Volume (WQ_v, acre-feet)	0.28
Recharge Volume (Re_v, acre-feet)	0.07

Table E-10: Channel Protection Volume Calculation for D-ES-8

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.60
1-Year post-development runoff depth (Q _a , in)	1.16
Time of Concentration (T _c , hrs)	0.15
Curve Number (CN)	83
Initial Abstraction (I _a , in)	0.40
I _a /P	0.15
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	854
1-Year post-development peak discharge (q _i , cfs)	12.09
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.02
Peak outflow discharge (q _o , cfs)	0.24
Ratio of storage to runoff volume (V _s /V _r)	0.66
Channel Protection Volume, C_p (acre-feet)	0.49

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-ES-12

Table E-11: Water Quality Volume Calculation for D-ES-12

Design Parameters	Site Value
Drainage Area (A, Acres)	1.8
Impervious Area (I, Acres)	1.0
Percent Impervious (%)	54
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.54
Soil Specific Recharge Factor (S)	0.22
Water Quality Volume (WQ_v, acre-feet)	0.08
Recharge Volume (Re_v, acre-feet)	0.02

Table E-12: Channel Protection Volume Calculation for D-ES-12

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.60
1-Year post-development runoff depth (Q_a , in)	1.24
Time of Concentration (T_c , hrs)	0.03
Curve Number (CN)	85
Initial Abstraction (I_a , in)	0.36
I_a/P	0.14
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	1000
1-Year post-development peak discharge (q_i , cfs)	3.4
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.02
Peak outflow discharge (q_o , cfs)	0.07
Ratio of storage to runoff volume (V_s/V_r)	0.66
Channel Protection Volume, Cp_v (acre-feet)	0.12

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-ES-15

Table E-13: Water Quality Volume Calculation for D-ES-15

Design Parameters	Site Value
Drainage Area (A, Acres)	3.3
Impervious Area (I, Acres)	2.2
Percent Impervious (%)	68
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.66
Soil Specific Recharge Factor (S)	0.22
Water Quality Volume (WQ_v, acre-feet)	0.18
Recharge Volume (Re_v, acre-feet)	0.04

Table E-14: Channel Protection Volume Calculation for D-ES-15

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.89
Time of Concentration (T _c , hrs)	0.18
Curve Number (CN)	93
Initial Abstraction (I _a , in)	0.15
I _a /P	0.06
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	829
1-Year post-development peak discharge (q _i , cfs)	8.00
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.03
Peak outflow discharge (q _o , cfs)	0.20
Ratio of storage to runoff volume (V _s /V _r)	0.65
Channel Protection Volume, C_p (acre-feet)	0.33

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-3

Table E-15: Water Quality Volume Calculation for D-NS-3

Design Parameters	Site Value
Drainage Area (A, Acres)	0.1
Impervious Area (I, Acres)	0.1
Percent Impervious (%)	99
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.95
Soil Specific Recharge Factor (S)	0.07
Water Quality Volume (WQ_v, acre-feet)	0.01
Recharge Volume (Re_v, acre-feet)	0.0004

Table E.16: Channel Protection Volume Calculation for D-NS-3

Channel Protection Volume, Cp_v (acre-feet)	Not Required
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Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-4

Table E-17: Water Quality Volume Calculation for D-NS-4

Design Parameters	Site Value
Drainage Area (A, Acres)	2.1
Impervious Area (I, Acres)	1.6
Percent Impervious (%)	79
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.76
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	0.13
Recharge Volume (Re_v, acre-feet)	0.025

Table E-18: Channel Protection Volume Calculation for D-NS-4

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	2.4
Time of Concentration (T _c , hrs)	0.1
Curve Number (CN)	98
Initial Abstraction (I _a , in)	0.04
I _a /P	0.016
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	1000
1-Year post-development peak discharge (q _i , cfs)	7.9
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.02
Peak outflow discharge (q _o , cfs)	0.2
Ratio of storage to runoff volume (V _s /V _r)	0.66
Channel Protection Volume, C_p (acre-feet)	0.27

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-7

Table E-19: Water Quality Volume Calculation for D-NS-7

Design Parameters	Site Value
Drainage Area (A, Acres)	6.0
Impervious Area (I, Acres)	2.1
Percent Impervious (%)	34
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.36
Soil Specific Recharge Factor (S)	0.24
Water Quality Volume (WQ_v, acre-feet)	0.18
Recharge Volume (Re_v, acre-feet)	0.04

Table E-20: Channel Protection Volume Calculation for D-NS-7

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	0.75
Time of Concentration (T_c , hrs)	0.27
Curve Number (CN)	76
Initial Abstraction (I_a , in)	0.64
I_a/P	0.25
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	614
1-Year post-development peak discharge (q_i , cfs)	4.31
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.04
Peak outflow discharge (q_o , cfs)	0.15
Ratio of storage to runoff volume (V_s/V_r)	0.63
Channel Protection Volume, Cp_v (acre-feet)	0.24

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-8

Table E-21: Water Quality Volume Calculation for D-NS-8

Design Parameters	Site Value
Drainage Area (A, Acres)	4.6
Impervious Area (I, Acres)	2.5
Percent impervious (%)	55
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.55
Soil Specific Recharge Factor (S)	0.22
Water Quality Volume (WQ_v, acre-feet)	0.21
Recharge Volume (Re_v, acre-feet)	0.05

Table E-22: Channel Protection Volume Calculation for D-NS-8

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.34
Time of Concentration (T_c , hrs)	0.13
Curve Number (CN)	86
Initial Abstraction (I_a , in)	0.32
I_a/P	0.12
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	936
1-Year post-development peak discharge (q_i , cfs)	8.9
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.02
Peak outflow discharge (q_o , cfs)	0.18
Ratio of storage to runoff volume (V_s/V_r)	0.65
Channel Protection Volume, C_p, (acre-feet)	0.33

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-9

Table E-23: Water Quality Volume Calculation for D-NS-9

Design Parameters	Site Value
Drainage Area (A, Acres)	6.3
Impervious Area (I, Acres)	3.6
Percent Impervious (%)	57
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.57
Soil Specific Recharge Factor (S)	0.23
Water Quality Volume (WQ_v, acre-feet)	0.30
Recharge Volume (Re_v, acre-feet)	0.07

Table E-24: Channel Protection Volume Calculation for D-NS-9

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.34
Time of Concentration (T_c , hrs)	0.19
Curve Number (CN)	86
Initial Abstraction (I_a , in)	0.32
I_a/P	0.12
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	780
1-Year post-development peak discharge (q_i , cfs)	10.3
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.03
Peak outflow discharge (q_o , cfs)	0.31
Ratio of storage to runoff volume (V_s/V_r)	0.64
Channel Protection Volume, Cp_v (acre-feet)	0.45

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-12

Table E-25: Water Quality Volume Calculation for D-NS-12

Design Parameters	Site Value
Drainage Area (A, Acres)	0.9
Impervious Area (I, Acres)	0.9
Percent Impervious (%)	96
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.91
Soil Specific Recharge Factor (S)	0.13
Water Quality Volume (WQ_v, acre-feet)	0.07
Recharge Volume (Re_v, acre-feet)	0.01

Table E-26: Channel Protection Volume Calculation for D-NS-12

Design Parameters	Site Value
Channel Protection Volume, Cp_v (acre-feet)	Not Required

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-NS-13

Table E-27: Water Quality Volume Calculation for D-NS-13

Design Parameters	Site Value
Drainage Area (A, Acres)	0.9
Impervious Area (I, Acres)	0.8
Percent Impervious (%)	84
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.81
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	0.06
Recharge Volume (Re_v, acre-feet)	0.01

Table E-28: Channel Protection Volume Calculation for D-NS-13

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.60
1-Year post-development runoff depth (Q_a , in)	2.36
Time of Concentration (T_c , hrs)	0.04
Curve Number (CN)	98
Initial Abstraction (I_a , in)	0.04
I_a/P	0.02
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	1000
1-Year post-development peak discharge (q_i , cfs)	3.35
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.02
Peak outflow discharge (q_o , cfs)	0.05
Ratio of storage to runoff volume (V_s/V_r)	0.66
Channel Protection Volume, Cp_v (acre-feet)	0.12

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: D-SWM0110(ES-1)

Table E-29: Water Quality Volume Calculation for D-SWM0110 (ES-1)

Design Parameters	Site Value
Drainage Area (A, Acres)	8.2
Impervious Area (I, Acres)	4.4
Percent Impervious (%)	54
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.54
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	0.37
Recharge Volume (Re_v, acre-feet)	0.07

Table E-30: Channel Protection Volume Calculation for D-SWM0110 (ES-1)

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.60
1-Year post-development runoff depth (Q _a , in)	1.15
Time of Concentration (T _c , hrs)	0.36
Curve Number (CN)	83
Initial Abstraction (I _a , in)	0.41
I _a /P	0.16
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	600
1-Year post-development peak discharge (q _i , cfs)	8.81
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.03
Peak outflow discharge (q _o , cfs)	0.26
Ratio of storage to runoff volume (V _s /V _r)	0.64
Channel Protection Volume, C_p, (acre-feet)	0.50

Appendix E: Water Quality Volume and Channel Protection Volume Computations

E.2 RIVERSIDE WATERSHED

Project: R-ES-1

Table E-31: Water Quality Volume Calculation for R-ES-1

Design Parameters	Site Value
Drainage Area (A, Acres)	130.4
Impervious Area (I, Acres)	40.30
Percent Impervious (%)	31
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.33
Soil Specific Recharge Factor (S)	0.20
Water Quality Volume (WQ_v, Acre-feet)	3.57
Recharge Volume (Re_v, acre-feet)	0.71

Table E-32: Channel Protection Volume Calculation for R-ES-1

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.08
Time of Concentration (T _c , hrs)	0.43
Curve Number (CN)	82
Initial Abstraction (I _a , in)	0.44
I _a /P	0.17
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	542
1-Year post-development peak discharge (q _i , cfs)	118.8
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.04
Peak outflow discharge (q _o , cfs)	4.75
Ratio of storage to runoff volume (V _s /V _r)	0.63
Channel Protection Volume, C_{p_v} (acre-feet)	7.35

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-NS-1

Table E-33: Water Quality Volume Calculation for R-NS-1

Design Parameters	Site Value
Drainage Area (A, Acres)	5.5
Impervious Area (I, Acres)	1.7
Percent Impervious (%)	31
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.33
Soil Specific Recharge Factor (S)	0.15
Water Quality Volume (WQ_v, acre-feet)	0.15
Recharge Volume (Re_v, acre-feet)	0.02

Table E-34: Channel Protection Volume Calculation for R-NS-1

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.30
Time of Concentration (T _c , hrs)	0.30
Curve Number (CN)	86
Initial Abstraction (I _a , in)	0.34
I _a /P	0.13
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	662
1-Year post-development peak discharge (q _i , cfs)	7.4
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.03
Peak outflow discharge (q _o , cfs)	0.18
Ratio of storage to runoff volume (V _s /V _r)	0.65
Channel Protection Volume, C_p, (acre-feet)	0.38

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-NS-6

Table E-35: Water Quality Volume Calculation for R-NS-6

Design Parameters	Site Value
Drainage Area (A, Acres)	1.3
Impervious Area (I, Acres)	0.2
Percent Impervious (%)	17
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.20
Soil Specific Recharge Factor (S)	0.14
Water Quality Volume (WQ_v, acre-feet)	0.02
Recharge Volume (Re_v, acre-feet)	0.003

Table E-36: Channel Protection Volume Calculation for R-NS-6

Design Parameters	Site Value
Channel Protection Volume, Cp_v (acre-feet)	Not Required

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-NS-7

Table E-37: Water Quality Volume Calculation for R-NS-7

Design Parameters	Site Value
Drainage Area (A, Acres)	64.3
Impervious Area (I, Acres)	21.4
Percent Impervious (%)	33
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.35
Soil Specific Recharge Factor (S)	0.19
Water Quality Volume (WQ_v, acre-feet)	1.9
Recharge Volume (Re_v, acre-feet)	0.36

Table E-38: Channel Protection Volume Calculation for R-NS-7

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.25
Time of Concentration (T _c , hrs)	0.42
Curve Number (CN)	85
Initial Abstraction (I _a , in)	0.36
I _a /P	0.14
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	561
1-Year post-development peak discharge (q _i , cfs)	70.2
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.04
Peak outflow discharge (q _o , cfs)	2.46
Ratio of storage to runoff volume (V _s /V _r)	0.64
Channel Protection Volume, C_p, (acre-feet)	4.24

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-NS-8

Table E-39: Water Quality Volume Calculation for R-NS-8

Design Parameters	Site Value
Drainage Area (A, Acres)	1.8
Impervious Area (I, Acres)	0.7
Percent Impervious (%)	38
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R_v)	0.39
Soil Specific Recharge Factor (S)	0.21
Water Quality Volume (WQ_v, acre-feet)	0.06
Recharge Volume (Re_v, acre-feet)	0.01

Table E-40: Channel Protection Volume Calculation for R-NS-8

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q_a , in)	1.06
Time of Concentration (T_c , hrs)	0.21
Curve Number (CN)	82
Initial Abstraction (I_a , in)	0.45
I_a/P	0.17
q_u (csm/in), (taken from Figure D.11.1, in MDE Manual)	764
1-Year post-development peak discharge (q_i , cfs)	2.34
Outflow to inflow ratio (q_o/q_i), Use Type I, 24 hours	0.03
Peak outflow discharge (q_o , cfs)	0.06
Ratio of storage to runoff volume (V_s/V_r)	0.65
Channel Protection Volume, Cp_v (acre-feet)	0.11

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-SWM0491

Table E-41: Water Quality Volume Calculation for R-SWM0491

Design Parameters	Site Value
Drainage Area (A, Acres)	4.9
Impervious Area (I, Acres)	3.1
Percent Impervious (%)	64
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.62
Soil Specific Recharge Factor (S)	0.14
Water Quality Volume (WQ_v, acre-feet)	0.25
Recharge Volume (Re_v, acre-feet)	0.034

Table E-42: Channel Protection Volume Calculation for R-SWM0491

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.87
Time of Concentration (T _c , hrs)	0.12
Curve Number (CN)	93
Initial Abstraction (I _a , in)	0.15
I _a /P	0.06
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	970
1-Year post-development peak discharge (q _i , cfs)	13.8
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.02
Peak outflow discharge (q _o , cfs)	0.28
Ratio of storage to runoff volume (V _s /V _r)	0.66
Channel Protection Volume, C_p, (acre-feet)	0.50

Appendix E: Water Quality Volume and Channel Protection Volume Computations

Project: R-SWM0627

Table E-43: Water Quality Volume Calculation for R-SWM0627

Design Parameters	Site Value
Drainage Area (A, Acres)	4.6
Impervious Area (I, Acres)	3.3
Percent Impervious (%)	73
Rainfall Depth (P, inches)	1.0
Volumetric Runoff Coefficient (R _v)	0.71
Soil Specific Recharge Factor (S)	0.12
Water Quality Volume (WQ_v, acre-feet)	0.27
Recharge Volume (Re_v, acre-feet)	0.032

Table E-44: Channel Protection Volume Calculation for R-SWM0627

Design Parameters	Site Value
1-Year Precipitation for Harford County (P, in)	2.6
1-Year post-development runoff depth (Q _a , in)	1.99
Time of Concentration (T _c , hrs)	0.06
Curve Number (CN)	94
Initial Abstraction (I _a , in)	0.12
I _a /P	0.05
q _u (csm/in), (taken from Figure D.11.1, in MDE Manual)	1000
1-Year post-development peak discharge (q _i , cfs)	14.2
Outflow to inflow ratio (q _o /q _i), Use Type I, 24 hours	0.02
Peak outflow discharge (q _o , cfs)	0.28
Ratio of storage to runoff volume (V _s /V _r)	0.66
Channel Protection Volume, C_p (acre-feet)	0.49