

STORMWATER MANAGEMENT GUIDEBOOK

Prepared for:

District Department of the Environment Watershed Protection Division District of Columbia

Prepared by:

Center for Watershed Protection 8390 Main Street Ellicott City, MD 21043

August 2012





Technical information regarding future updates to the District of Columbia Stormwater Management Guidebook will be available at ,

http://ddoe.dc.gov/publication/stormwater-guidebook

Notices regarding future versions of the manual will be posted at this website. Future versions are expected to occur, at most, once a year.

Acknowledgements

A major undertaking such as this requires the dedication and cooperative efforts of many individuals. Dr. Hamid Karimi, Director of Natural Resources, Sheila Besse, Associate Director of Watershed Protection, Jeff Seltzer, Associate Director of Stormwater Management, and Timothy Karikari, Branch Chief of Technical Services each deserve credit for their overall leadership and support for this project. Their willingness to allow staff to pursue ideas to their fullest and provide necessary time, resources and managerial support, laid the foundation for much innovation.

Project Manger

Rebecca C. Stack, DDOE-technical services

Lead Authors

Greg Hoffmann, P.E., Center for Watershed Protection Rebecca C. Stack, DDOE-technical services Brian Van Wye, DDOE-stormwater

Contributors and Peer Reviewers

Joseph Battiata, P.E., Center for Watershed Protection Gerald Brock, Ph.D., George Washington University Josh Burch, DDOE-planning & restoration Collin R. Burrell, DDOE-water quality Walter Caldwell, DDOE-inspection enforcement Jonathan Champion, DDOE-stormwater Reid Christianson P.E., Ph.D., Center for Watershed Protection Laine Cidlowski, Office of Planning Richard DeGrandchamp, Ph.D., University of Colorado/Scientia Veritas Elias Demessie, DDOE-technical services Diane Douglas, DDOE-water quality Alex Foraste, Williamsburg Environmental Group, Inc. Timothy Karikari, P.E., DDOE-technical services Melissa Keeley, Ph.D., George Washington University Tim Klien, DDOE-inspection enforcement Sarah Lawson, Ph.D., Rainwater Management Solutions Leah Lemoine, DDOE-planning & restoration Susan Libes, Ph.D., Coastal Carolina University, Conway, SC. Kelly (Collins) Lindow, P.E., (Center for Watershed Protection)/RK&K Dennis Lye, Ph.D., US EPA Massoud Massoumi, DDOE-technical services Abdi Musse, P.E., DDOE-technical services Phetmano Phannavong, P.E., C.F.M., DDOE-technical services Philip C. Reidy, P.E., Geosyntec Consultants Stephen Reiling, DDOE-planning & restoration Emily Rice, DDOE-stormwater Tom Schueler, Chesapeake Bay Stormwater Network Jeff Seltzer, P.E., DDOE-stormwater Tanya Spano, MWCOG-water resources Bill Stack, P.E., Center for Watershed Protection Meredith Upchurch, DDOT-stormwater June M. Weintraub, ScD, San Francisco Department of Public Health

Table of ContentsStormwater Management Guidebook

Acknowledgments iii				
Chap	ter 1. Introduction to the Stormwater Management Guidebook			
1.0	Introduction	3		
1.1	Purpose and Scope			
1.2	Impacts of Urban Runoff	4		
Chap	ter 2. Minimum Control Requirements and Methods			
2.0	District of Columbia Stormwater Management Requirements	11		
2.1	Stormwater Retention Volume (SWRv)	13		
2.2	Quantity Control Requirements (Qp ₂ and Qp ₁₅)	14		
2.3	Extreme Flood Requirements (Q _f)	15		
2.4	Minimum Criteria for Determining Extreme Flood Requirements	16		
2.5	Additional Stormwater Management Requirements	17		
2.6	Hydrology Methods	18		
2.7	Acceptable Urban BMP Options	18		
Chap	ter 3. Stormwater Best Management Practices (BMP)			
3.0	Performance Criteria for Stormwater Best Management Practices	25		
3.1	Green Roofs	26		
3.2	Rainwater Harvesting	40		
3.3	Impervious Surface Disconnection	62		
3.4	Permeable Pavement Systems	74		
3.5	Bioretention	96		
3.6	Stormwater Filtering Systems	126		
3.7	Stormwater Infiltration	149		
3.8	Open Channel Systems	165		
3.9	Stormwater Ponds	190		
3.10	Stormwater Wetlands	210		
3.11	Storage Practices	230		
3.12	Proprietary Practices	244		
3.13	Tree Planting and Preservation	247		
Chap	ter 4. Selecting and Locating the Most Effective Stormwater Manager	nent		

Practice System4.0Choosing between Stormwater Management Best Practice (BMP)262

Page

4.1	Storm	water Management Suitability	264	
4.2	Land U	Jse Factors	266	
4.3	Physic	al Feasibility Factors	268	
4.4	Comm	unity and Environmental Factors	270	
4.5	Locati	on and Permitting Considerations	274	
Chap	ter 5.	Administration of Stormwater Management Rules		
5.0		water Management Plan	278	
5.1		istration	284	
5.2	-	tion Requirements	285	
5.3	Mainte		289	
5.4	Penalt		290	
5.5	Appea		290	
5.6	Exemp	tions	291	
Chap	ter 6.	Use of Off-Site Retention by Regulated Sites		
6.0		te Retention Overview	308	
6.1		te Retention via Stormwater Retention Credits	309	
6.2	Off-Si	te Retention via In-Lieu Fee	310	
6.3	See A _j	opendix C for Sample Forms	311	
Chap		eneration, Certification, Trading and Retirement of Stormwater Retered	ention	
7.0		vater Retention Credits Overview	313	
7.1		lity Requirements	313	
7.2	-	cation of Stormwater Retention Credits	315	
7.3		t of SRC Serial Numbers	316	
7.4		to Maintain Retention After Certification of Stormwater Retention	317	
/	Credit		517	
7.5	Buying	g and Selling Stormwater Retention Credits	317	
7.6	Volun	ary Retirement of Stormwater Retention Credit	318	
7.7	Calcul	ations of Stormwater Retention Credits	318	
7.8	Storm	vater Credit Calculation Scenarios	323	
Appe	Appendix A. Compliance Calculations and Design Examples			
Appe	ndix B.	Maximum Extent Practical Process for Existing Public Right of Way	B.1	
Appe	ndix C.	Off-Site Retention Forms for Regulated Sites	C.1	
		Stormwater Retention Credit Forms (Certification, Trading, and	D1	
Appe	ndix E.	Retirement) Relief for Extraordinarily Difficult Site Conditions	E.1	
	nun L.	Rener for Extraor uniting Enforce of Conditions	2.1	

vi

Appendix F.	Stormwater Conveyance Systems Design	F.1
Appendix G.	Flow Control Structures Design	G.1
Appendix H.	Hydrologic Methods and Models	H1
Appendix I.	Rooftop Storage Guidance and Criteria	I.1
Appendix J.	Green Area Ratio	J.1
Appendix K.	Soil Compost Amendment Requirements	K .1
Appendix L.	Construction Inspection Checklists	L.1
Appendix M.	Maintenance Inspection Checklists	M .1
Appendix N.	Tiered Risk Assessment Management (TRAM): water quality end	N.1
	use standards for harvested stormwater for non-potable uses	
Appendix O.	Land Cover Designations	0.1
Appendix P.	Geotechnical Information Requirements for Underground BMPs	P.1
Appendix Q.	Stormwater Hotspots	Q.1
Appendix R.	Pollution Prevention through Good Housekeeping	R .1
Appendix S.	Stormwater Fee Discount Program	S.1
Appendix T.	Proprietary Practices Approval Process	T.1
Appendix U.	References	U.1
Appendix V.	Definitions	V. 1