	DURMM v.2				
BMP	**TN**	**TP**	**TSS**	**RR, A/B Soil**	**RR, C/D Soil**
Runoff Reduction Practices					
Urban Infiltration Practices with Sand/Vegetation (including Bioretention w/o Underdrain)	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Urban Infiltration Practices without Sand/Vegetation	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Bioretention with Underdrain (including planter boxes, etc.)	Max 60% inc. Load Reduct.	Max 50% inc. Load Reduct.	Max 80% inc. Load Reduct.	50% of Storage	50% of Storage
Permeable Pavement with Sand/Vegetation	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Permeable Pavement without Sand/Vegetation	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Vegetated Roofs	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Rainwater Harvesting	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	75% of Storage	75% of Storage
Impervious Disconnection	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	20%	10%
Bioswale	Max 45% inc. Load Reduct.	Max 45% inc. Load Reduct.	Max 80% inc. Load Reduct.	50%	25%
Vegetated Open Channels	Max 20% inc. Load Reduct.	Max 20% inc. Load Reduct.	Max 50% inc. Load Reduct.	20%	10%
Filter Strip	Max 20% inc. Load Reduct.	Max 20% inc. Load Reduct.	Max 80% inc. Load Reduct.	20%	15%
Urban Riparian Forest Buffers	Max 25% inc. Load Reduct.	Max 50% inc. Load Reduct.	Max 50% inc. Load Reduct.	25%	15%
Urban Tree Planting	N/A	N/A	N/A	0%	0%
Soil Amendments	N/A	N/A	N/A	0%	0%
Sheetflow to Turf Open Space	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	40%	40%
Sheetflow to Forested Open Space	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	65%	40%
Wet Swales and Ephemeral Wetlands	Max 40% inc. Load Reduct.	Max 25% inc. Load Reduct.	Max 80% inc. Load Reduct.	0%	10%
Stormwater Treatment Practices					
Dry Extended Detention Basins	20%	20%	60%	10%	10%
Dry Detention Ponds	5%	10%	10%	0%	0%
Hydrodynamic Structures	5%	10%	10%	0%	0%
Urban Filtering Practices	40%	60%	80%	0%	0%
Wetlands and Wet Ponds	20%	45%	60%	0%	0%
Source Control Practices					
Urban Nutrient Management	17%	22%	N/A	0%	0%
Street Sweeping	3%	3%	9%	0%	0%
Other Practices					
Urban Stream Restoration	0.02 lbs N/ft	0.003 lbs P/ft	2 lbs TSS/ft	0%	0%
BLUE: BMPs contained in CB P5 Model					
RED: BMPs not currently modeled in CB P5 Model					

		Removal Efficiency (EPA CBP Scenario Builder)			Removal Efficiency (GA Stormwater Manual)			Removal Efficiency (CSN Tech Note 4)		Runoff Reduction (CSN Tech. Note 4)	Runoff Reduction (CSN Tech. Note 4)	Runoff Reduction (GA CSS)		Runoff Reduction (VA DCR)		DURMM v.2				
BMP	**Definition**	**TN**	**TP**	**TSS**	**TN**	**TP**	**TSS**	**TN**	**TP**	**Level 1 Design**	**Level 2 Design**	**Level 2 or A/B Soil**	**Level 2 or C/D Soil**	**Level 2 or A/B Soil**	**Level 2 or C/D Soil**	**TN**	**TP**	**TSS**	**RR, A/B Soil**	**RR, C/D Soil**
Runoff Reduction Practices																				
Urban Infiltration Practices with Sand/Vegetation (including Bioretention w/o Underdrain)	A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration. Design specifications require infiltration basins and trenches to be build in good soil, they are not constructed on poor soils, such as C and D soil types. Engineers are required to test the soil	85%	85%	90%	50%	60%	80%	40-60%	25-50%	N/A	80%	100% of storage	100% of storage	90%	90%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Urban Infiltration Practices without Sand/Vegetation	A depression to form an infiltration basin where sediment is trapped and water infiltrates the soil. No underdrains are associated with infiltration basins and trenches, because by definition these systems provide complete infiltration.	80%	85%	90%	60%	60%	80%	15%	25%	50%	90%	100% of storage	100% of storage	90%	90%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Bioretention with Underdrain (including planter boxes, etc.)	An excavated pit backfilled with engineered media, topsoil, mulch, and vegetation. These are planting areas installed in shallow basins in which the storm water runoff is temporarily ponded and then treated by filtering through the bed components, and through biological and biochemical reactions within the soil matrix and around the root zones of the plants.	25-80%	45-85%	55-90%	50%	60%	80%	40-60%	25-50%	40%	N/A	50% of storage	50% of storage	80%	80%	Max 60% inc. Load Reduct.	Max 50% inc. Load Reduct.	Max 80% inc. Load Reduct.	50% of Storage	50% of Storage
Permeable Pavement with Sand/Vegetation	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain. When sand and vegetation are present, high reduction efficiencies can be achieved.	20-80%	20-80%	55-85%	80%	80%	N/A	25%	25%	45%	75%	100% storage w/o underdrain; 50% storage w/underdrain	100% storage w/o underdrain; 50% storage w/underdrain	75%	75%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Permeable Pavement without Sand/Vegetation	Pavement or pavers that reduce runoff volume and treat water quality through both infiltration and filtration mechanisms. Water filters through open voids in the pavement surface to a washed gravel subsurface storage reservoir, where it is then slowly infiltrated into the underlying soils or exits via an underdrain.	10-75%	20-80%	55-85%	65%	50%	N/A	25%	25%	45%	75%	100% storage w/o underdrain; 50% storage w/underdrain	100% storage w/o underdrain; 50% storage w/underdrain	75%	75%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Vegetated Roofs	Vegetated roofs (also known as green roofs, living roofs or ecoroofs) are alternative roof surfaces that typically consist of waterproofing and drainage materials and an engineered growing media that is designed to support plant growth. Vegetated roofs capture and temporarily store stormwater runoff in the growing media before it is conveyed into the storm drain system. A portion of the captured stormwater evaporates or is taken up by plants, which helps reduce runoff volumes, peak runoff rates, and pollutant loads on development sites.							0%	0%	45%	60%	60%	60%	60%	60%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	100% of Storage	100% of Storage
Rainwater Harvesting	Rainwater harvesting systems intercept, divert, store and release rainfall for future use. Rainwater that falls on a rooftop is collected and conveyed into an above- or below-ground storage tank where it can be used for non-potable water uses and on-site stormwater disposal/infiltration.							0%	0%	N/A	N/A	75% of storage	75% of storage	Variable	Variable	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	75% of Storage	75% of Storage
Impervious Disconnection	This strategy involves managing runoff close to its source by intercepting, infiltrating, filtering, treating or reusing it as it moves from the impervious surface to the drainage system whereby rooftops and/or on-lot residential impervious surfaces are directed to pervious areas.							15%	30%	N/A	N/A	60%	30%	50%	25%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	20%	10%
Bioswale	With a bioswale the load is reduced because unlike other open channel designs there is now treatment through the soil. A bioswale is designed to a specific hydraulic loading rate and/or residence time.	70%	75%	80%	50%	50%	80%	25-35%	20-40%	40%	60%			60%	60%	Max 45% inc. Load Reduct.	Max 45% inc. Load Reduct.	Max 80% inc. Load Reduct.	50%	25%
Vegetated Open Channels	Open channels are practices that convey stormwater runoff and provide treatment as the water is conveyed, but are not designed to meet specific hydraulic loading rates or residence times. Runoff passes through either vegetation in the channel, subsoil matrix, and/or is infiltrated into the underlying soils.	10-45%	10-45%	50-70%	20%	25%	50%	20%	15%	15%	30%	25%	12.5%	20%	10%	Max 20% inc. Load Reduct.	Max 20% inc. Load Reduct.	Max 50% inc. Load Reduct.	20%	10%
Filter Strip	Filter strips are uniformly graded and densely vegetated sections of land, engineered and designed to treat runoff from and remove pollutants through vegetative filtering and infiltration.				20%	20%	50%			N/A	N/A	60%	30%			Max 20% inc. Load Reduct.	Max 20% inc. Load Reduct.	Max 80% inc. Load Reduct.	20%	15%
Urban Riparian Forest Buffers	An area of trees at least 35 feet wide on one side of a stream, usually accompanied by trees, shrubs and other vegetation, that is adjacent to a body of water. The riparian area is managed to maintain the integrity of stream channels and shorelines, to reduce the impacts of upland sources of pollution by trapping, filtering, and converting sediments, nutrients, and other chemicals.	25%	50%	50%						N/A	N/A			N/A	N/A	Max 25% inc. Load Reduct.	Max 50% inc. Load Reduct.	Max 50% inc. Load Reduct.	25%	15%
Urban Tree Planting	Urban tree planting is planting trees on urban pervious areas at a rate that would produce a forest-like condition over time. The intent of the planting is to eventually convert the urban area to forest. If the trees are planted as part of the urban landscape, with no intention to covert the area to forest, then this would not count as urban tree planting.	N/A	N/A	N/A						N/A	N/A			N/A	N/A	N/A	N/A	N/A	CN Adj.	CN Adj.
Soil Amendments	Soil restoration is a practice applied after construction, to deeply till compacted soils and restore their porosity by amending them with compost. These soil amendments can reduce the generation of runoff from compacted urban lawns and may also be used to enhance the runoff reduction performance of downspout disconnections, grass channels, and filter strips.									N/A	N/A			20%	10%	N/A	N/A	N/A	+1 HSG	+1 HSG
Sheetflow to Turf Open Space	Stormwater runoff is effectively treated when flow from developed land is directed to adjacent turf areas where it can soak into or filter over the ground. To function well, this practice is dependent on several site conditions (e.g., open space area, contributing flow path length, slopes, compaction, etc.). Flow must not enter the open space area in a concentrated condition.									N/A	N/A			50%	50%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	40%	40%
Sheetflow to Forested Open Space	Stormwater runoff is effectively treated when flow from developed land is directed to adjacent forested areas where it can soak into or filter over the ground. To function well, this practice is dependent on several site conditions (e.g., open space area, contributing flow path length, slopes, compaction, etc.). Flow must not enter the open space area in a concentrated condition.									N/A	N/A			75%	50%	100% of Load Reduct.	100% of Load Reduct.	100% of Load Reduct.	65%	40%
Wet Swales and Ephemeral Wetlands	Wet swales can provide runoff filtering and treatment within the conveyance system and are a cross between a wetland and a swale. These linear wetland cells often intercept shallow groundwater to maintain a wetland plant community. Ephemeral wetlands have a depressional configuration. Both these systems tend to vascilate between wet and dry conditions as the groundwater table fluctuates. The saturated soil and wetland vegetation provide an ideal environment for gravitational settling, biological uptake, and microbial activity. Under drier conditions, they also have some recharge capabilities.				40%	25%	80%			0%	0%			0%	0%	Max 40% inc. Load Reduct.	Max 25% inc. Load Reduct.	Max 80% inc. Load Reduct.	N/A	10%
Stormwater Treatment Practices																				
Dry Extended Detention Basins	Dry extended detention (ED) basins are depressions created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms. Dry ED basins are designed to dry out between storm events, in contrast with wet ponds, which contain standing water permanently. As such, they are similar in construction and function to dry detention basins, except that the duration of detention of stormwater is designed to be longer, theoretically improving treatment effectiveness.	20%	20%	60%				10%	15%	0%	15%			15%	15%	20%	20%	60%	10%	10%
Dry Detention Ponds	Dry Detention Ponds are depressions or basins created by excavation or berm construction that temporarily store runoff and release it slowly via surface flow or groundwater infiltration following storms.	5%	10%	10%						N/A	N/A			N/A	N/A	5%	10%	10%	0%	0%
Hydrodynamic Structures	Hydrodynamic Structures are devices designed to improve quality of stormwater using features such as swirl concentrators, grit chambers, oil barriers, baffles, micropools, and absorbent pads that are designed to remove sediments, nutrients, metals, organic chemicals, or oil and grease from urban runoff.	5%	10%	10%						N/A	N/A			N/A	N/A	5%	10%	10%	0%	0%
Urban Filtering Practices	Practices that capture and temporarily store runoff and pass it through a filter bed of either sand or an organic media. There are various sand filter designs, such as above ground, below ground, perimeter, etc. An organic media filter uses another medium besides sand to enhance pollutant removal for many compounds due to the increased cation exchange capacity achieved by increasing the organic matter. These systems require yearly inspection and maintenance to receive pollutant reduction credit.	40%	60%	80%	25%	50%	80%	60-65%	30-45%	0%	0%			0%	0%	40%	60%	80%	0%	0%
Wetlands and Wet Ponds	A water impoundment structure that intercepts stormwater runoff then releases it to an open water system at a specified flow rate. These structures retain a permanent pool and usually have retention times sufficient to allow settlement of some portion of the intercepted sediments and attached nutrients/toxics. Until recently, these practices were designed specifically to meet water quantity, not water quality objectives. There is little or no vegetation living within the pooled area nor are outfalls directed through vegetated areas prior to open water release. Nitrogen reduction is minimal.	20%	45%	60%	30%	40%	80%	Wetlands: 25-55%, Wet Ponds: 30-40%	Wetlands: 50-75%, Wet Ponds: 50-75%	0%	0%			0%	0%	20%	45%	60%	0%	0%
Source Control Practices																				
Urban Nutrient Management	Urban nutrient management involves the reduction of fertilizer to grass lawns and other urban areas. The implementation of urban nutrient management is based on public education and awareness, targeting suburban residences and businesses, with emphasis on reducing excessive fertilizer use.	17%	22%	N/A						N/A	N/A			N/A	N/A	17%	22%	N/A	0%	0%
Street Sweeping	Street sweeping and storm drain cleanout practices rank among the oldest practices used by communities for a variety of purposes to provide a clean and healthy environment, and more recently to comply with their National Pollutant Discharge Elimination System stormwater permits. The ability for these practices to achieve pollutant reductions is uncertain given current research findings. Only a few street sweeping studies provide sufficient data to statistically determine the impact of street sweeping and storm drain cleanouts on water quality and to quantify their improvements. The ability to quantify pollutant loading reductions from street sweeping is challenging given the range and variability of factors that impact its performance, such as the street sweeping technology, frequency and conditions of operation in addition to catchment characteristics. Fewer studies are available to evaluate the pollutant reduction capabilities due to storm drain inlet or catch basin cleanouts.	3%	3%	9%						N/A	N/A			N/A	N/A	3%	3%	9%	0%	0%
Other Practices																				
Urban Stream Restoration	Stream restoration in urban areas is used to restore the urban stream ecosystem by restoring the natural hydrology and landscape of a stream, help improve habitat and water quality conditions in degraded streams.	0.02 lbs N/ft	0.003 lbs P/ft	2 lbs TSS/ft						N/A	N/A			N/A	N/A	0.02 lbs N/ft	0.003 lbs P/ft	2 lbs TSS/ft	0%	0%

BLUE: BMPs contained in CB P5 Model

RED: BMPs not currently modeled in CB P5 Model