

Chapter 2 Minimum Control Requirements

2.1 District of Columbia Stormwater Management Performance Requirements

This chapter presents a unified approach for sizing stormwater best management practices (BMPs) in the District of Columbia (District) to meet pollutant removal goals, reduce peak discharges, and pass extreme floods. Table 2.1 presents a summary of the sizing criteria used to achieve the stormwater management performance requirements for regulated activity.

Those portions of regulated activity that involve the reconstruction of the existing public right-of-way are governed by a “maximum extent practicable” approach, detailed in Appendix B. There are notes throughout this chapter that identify special conditions for regulated activity located in the Anacostia Waterfront Development Zone (AWDZ) that are governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012 (see D.C. Official Code §§ 2-1226.36(c)(1)). Figure 2.1 provides a map that outlines the boundaries of the AWDZ and the exact boundaries are provided in definitions found in Appendix U.

This chapter describes the seven sizing criteria in detail and provides guidance on how to properly compute and manage the required volumes. This chapter also presents an overview of acceptable BMP options that can be used to comply with the sizing criteria. Appendix A provides a line-by-line review of the accompanying calculator spreadsheets.

Note: 2-year post-development peak discharge requirements do not apply to projects when three conditions can be established: (1) site discharges flow directly to, or through the separate sewer system, into the main stem of the tidal Potomac or Anacostia Rivers, the Washington Channel, or the Chesapeake and Ohio Canal; (2) site discharges do not flow into or through a tributary to those waterbodies that runs above ground or that the District Department of the Environment (DDOE) expects to be daylighted to run above ground; and (3) site discharges will not cause erosion of land or transport of sediment.

Table 2.1 Sizing Criteria for Stormwater Management Performance Requirements

Sizing Criteria	Description of Stormwater Sizing Criteria
Stormwater Retention Volume (SWR_v) (gal)	$SWR_v = [P \times [(R_{v_I} \times \%I) + (R_{v_C} \times \%C) + (R_{v_N} \times \%N)] \times SA] \times 7.48/12$ where: <ul style="list-style-type: none"> SWR_v = volume required to be retained on site (gal) P = variable percentile rainfall event for the District dependent on regulatory trigger (see next criterion) R_{v_I} = 0.95 (runoff coefficient for impervious cover) R_{v_C} = 0.25 (runoff coefficient for compacted cover) R_{v_N} = 0.00 (runoff coefficient for natural cover) $\%I$ = percent of site in impervious cover (decimal) $\%C$ = percent of site in compacted cover (decimal) $\%N$ = percent of site in natural cover (decimal) SA = surface area (ft²) 7.48 = conversion factor, converting cubic feet to gallons 12 = conversion factor, converting inches to feet
Precipitation value selected based on Regulatory Trigger (P)	Major Land-Disturbing Activity (AWDZ and District-wide): 90th percentile event (1.2 inches) Major Substantial Improvement Activity (AWDZ): 85th percentile event (1.0 inches) Major Substantial Improvement Activity (District-wide): 80th percentile event (0.8 inches)
Reconstruction of public right-of-way	Consult Appendix B Maximum Extent Practicable Process for Existing Public Right-of-Way
Water Quality Treatment Volume (WQT_v) (gal) (applies only to regulated activity in the AWDZ area governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012)	$WQT_v = (P \times [(R_{v_I} \times \%I) + (R_{v_C} \times \%C) + (R_{v_N} \times \%N)] \times SA) \times 7.48/12 - SWR_v$ where: <ul style="list-style-type: none"> WQT_v = volume required to be retained or treated, above and beyond the SWR_v (gal) SWR_v = volume required to be retained on site (gal) P = 95th percentile rain event for the District (1.7 inches) R_{v_I} = 0.95 (runoff coefficient for impervious cover) R_{v_C} = 0.25 (runoff coefficient for compacted cover) R_{v_N} = 0.00 (runoff coefficient for natural cover) $\%I$ = percent of site in impervious cover (decimal) $\%C$ = percent of site in compacted cover (decimal) $\%N$ = percent of site in natural cover (decimal) SA = surface area (ft²) 7.48 = conversion factor, converting cubic feet to gallons 12 = conversion factor, converting inches to feet
2-Year Storm Control (Q_{p2})	The peak discharge rate from the 2-year, 24-hour storm event controlled to the predevelopment peak discharge rate.
15-Year Storm Control (Q_{p15})	The peak discharge rate from the 15-year, 24-hour storm event controlled to the preproject peak discharge rate.
Extreme Flood Requirements (Q_f)	The peak discharge rate from the 100-year storm event controlled to the preproject peak discharge rate if the site: <ol style="list-style-type: none"> 1) Increases the size of a Special Flood Hazard Area (SFHA) as delineated on the effective Flood Insurance Rate Maps (FIRM) or 2) Meets the following two conditions: <ol style="list-style-type: none"> (a) Does not discharge to the sewer system and (b) Has a post-development peak discharge rate for a 100-year frequency storm event that will cause flooding to a building.



Figure 2.1 Map of Anacostia Waterfront Development Zone.

2.2 Stormwater Retention Volume

Regulated sites that undergo a major land-disturbing activity or a major substantial improvement activity must employ BMPs and post-development land cover necessary to achieve the stormwater retention volume (SWR_v) equal to the post-development runoff from the applicable rainfall event, as measured for a 24-hour storm with a 72-hour antecedent dry period. For a major substantial improvement activity located in the AWDZ, governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012, the applicable rainfall event is the 85th percentile rainfall event (1.0 inches). For all other major substantial improvement activities throughout the District, the applicable rainfall event is the 80th percentile rainfall event (0.8 inches). The SWR_v is calculated as follows for the entire site and for each drainage area:

Equation 2.1 Stormwater Retention Volume

$$SWR_v = \frac{\{P \times [(R_{v_I} \times \%I) + (R_{v_C} \times \%C) + (R_{v_N} \times \%N)] \times SA\} \times 7.48}{12}$$

where:

SWR_v	=	volume required to be retained on site (gal)
P	=	selection of District rainfall event varies based on regulatory trigger; 90th percentile (1.2 inches) for major land-disturbing activity, 85th percentile (1.0 inches) for major substantial improvement activity in the AWDZ and governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012, 80th percentile (0.8 inches) for other major substantial improvement activities
R_{v_I}	=	runoff coefficient for impervious cover (0.95)
$\%I$	=	percent of site in impervious cover
R_{v_C}	=	runoff coefficient for compacted cover (0.25)
$\%C$	=	percent of site in compacted cover
R_{v_N}	=	runoff coefficient for natural cover (0.00)
$\%N$	=	percent of site in natural cover
SA	=	surface area (ft ²)
7.48	=	conversion factor, converting cubic feet to gallons
12	=	conversion factor, converting inches to feet

where the surface area under a BMP shall be calculated as part of the impervious cover (%I); and

A site may achieve on-site retention by directly conveying volume from the regulated site to a shared BMP with available retention capacity. A site may achieve the SWR_v on site or through a combination of on-site retention and off-site retention under the following conditions:

- The site shall retain on site a minimum of 50 percent of the SWR_v calculated for the entire site, unless DDOE approves an application for relief from extraordinarily difficult site conditions (Appendix E).
- The site shall use off-site retention for the portion of the SWR_v that is not retained on site (See Chapter 6 and Appendix C).
- Regulated activity in the AWDZ, governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012, must have all off-site retention approved by DDOE even if the minimum 50 percent on-site requirement has been achieved. These projects may apply to achieve retention compliance with off-site retention based on considerations of technical infeasibility and environmental harm as well as the limited appropriateness of on-site compliance in terms of impact on surrounding landowners or overall benefit to District waterbodies.
- Projects requesting relief from compliance with the minimum on-site retention obligation (50% of the SWR_v) and claiming “extraordinarily difficult site conditions” will follow the submission and evaluation process detailed in Appendix E. Sites approved for “relief from

extraordinarily difficult site conditions” are still responsible for the entire SWR_v but will be allowed to use off-site retention to achieve more than 50percent of the SWR_v.

An individual drainage area is defined as the area that drains to a single discharge point from the site. A site may achieve on-site retention by retaining more than the SWR_v in an individual drainage area, subject to the following conditions:

- For each drainage area, as well as for all vehicular access areas within each drainage area, at least 50 percent of the SWR_v must be retained or treated with an accepted practice to remove 80 percent of total suspended solids (TSS), unless it drains into the combined sewer system. For vehicular access areas that are part of a submission following the maximum extent practicable (MEP) process, the MEP narrative must address the placement and sizing opportunities and the restrictions of a retention practice where these minimums are not achieved. Figure 2.2 provides a map that outlines the boundaries of the District’s Combined Sewer System (CSS) and Municipal Separate Storm Sewer System (MS4).
- Retention in excess of the SWR_v for one drainage area may be applied to the retention volume required for another drainage area;
- Retention of volume greater than that from a 1.7-inch rainfall event, calculated using the SWR_v equation with a P equal to 1.7 inches, shall not be counted toward on-site retention.

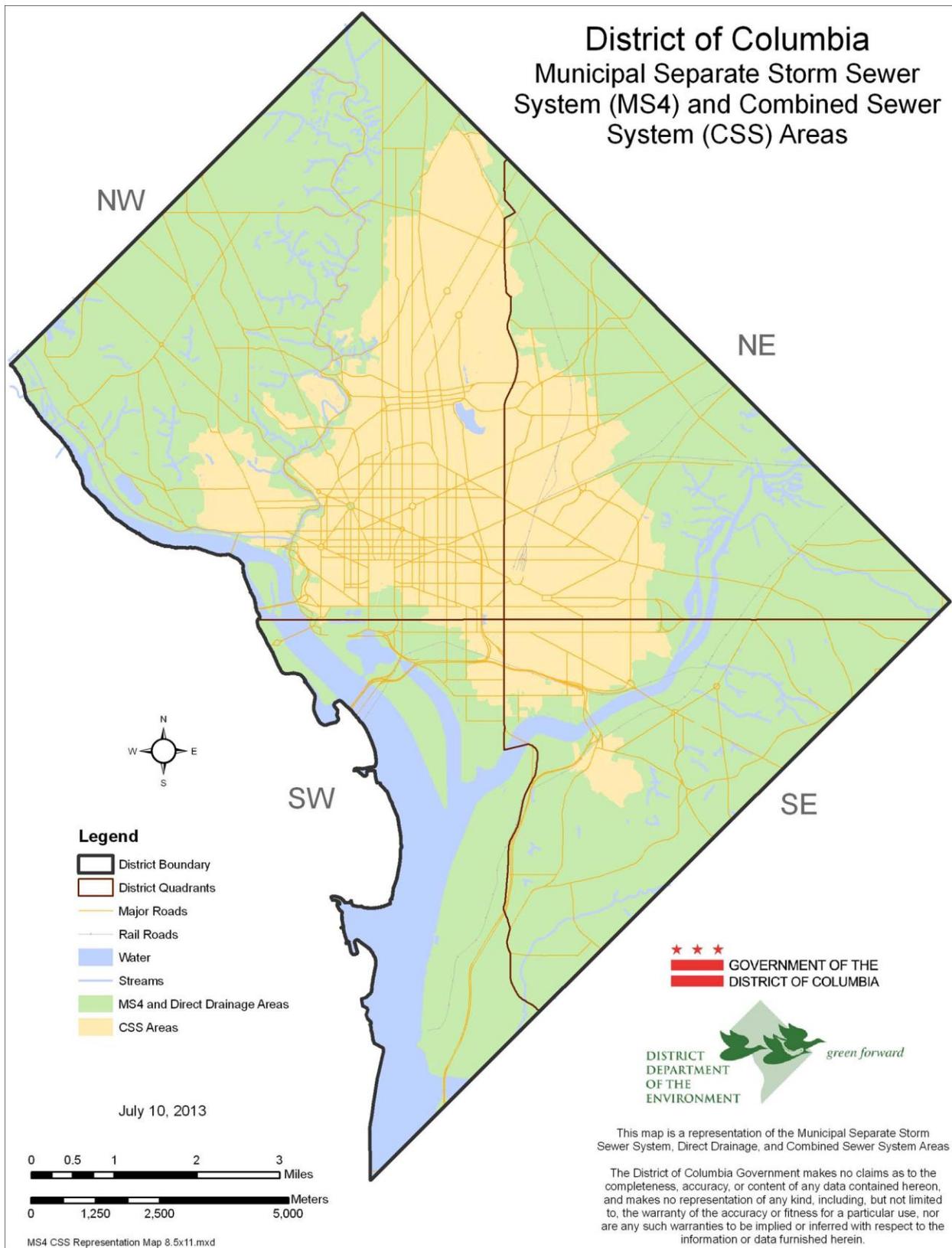


Figure 2.2 Map of District of Columbia MS4 and CSS areas.

The following are “Accepted Practices” by DDOE for treatment to remove 80 percent of TSS:

- Permeable Pavement Systems
- Bioretention
- Stormwater Filtering Systems
- Stormwater Ponds
- Wetlands
- Dry Swales
- Wet Swales
- Proprietary practices that have been demonstrated to achieve an 80 percent reduction in TSS in accordance with the requirements of Appendix S.

Major land-disturbing activities in the existing public right-of-way, including activities associated with a major land-disturbing activity on private property, must achieve the SWRV to the MEP. The MEP design and review process is detailed in Appendix B.

2.3 Water Quality Treatment Volume

In addition to the SWRV requirements above, sites located in the AWDZ and governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012 shall employ BMPs and post-development land cover necessary to achieve a water quality treatment volume (WQTV) equal to the difference between the post-development runoff from the 95th percentile rainfall event (1.7 inches), measured for a 24-hour rainfall event with a 72-hour antecedent dry period, and the SWRV. The WQTV is calculated as follows, for the entire site, and each individual drainage area:

Equation 2.2 Water Quality Treatment Volume

$$WQTV = \{P \times [(Rv_I \times \%I) + (Rv_C \times \%C) + (Rv_N \times \%N)] \times SA\} \times 7.48 - SWRV$$

where:

$WQTV$	=	volume, in gallons, required to be retained or treated, above and beyond the Stormwater Retention Volume (SWRV).
$SWRV$	=	volume, in gallons, required to be retained, as described in Section 2.2
P	=	95th percentile rainfall event for the District (1.7 inches)
Rv_I	=	0.95 (runoff coefficient for impervious cover)
Rv_C	=	0.25 (runoff coefficient for compacted cover)
Rv_N	=	0.00 (runoff coefficient for natural cover)
$\%I$	=	percent of site in impervious cover
$\%C$	=	percent of site in compacted cover
$\%N$	=	percent of site in natural cover
SA	=	surface area in square feet,

where, the surface area under a BMP shall be calculated as part of the impervious cover (%I); and

A site in the AWDZ that is governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012 may achieve on-site treatment for WQTV with:

- On-site treatment with an accepted treatment practice designed to remove 80 percent of TSS;
- On-site retention; or
- Direct conveyance of stormwater from the site to an approved shared BMP with sufficient available treatment or retention capacity.

An AWDZ site that is governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012 may achieve part of the WQTV by using off-site retention if site conditions make compliance technically infeasible or environmentally harmful and DDOE approves an application for “relief from extraordinarily difficult site conditions.”

An AWDZ site governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012 that achieves 1 gallon of off-Site retention volume (Offv) by using Stormwater Retention Credits (SRCs) certified for retention capacity located outside of the Anacostia watershed shall use 1.25 SRCs for that gallon of Offv.

Figures 2.3–2.7 describe the relationship between a variety of project types, the SWRV, and the WQTV.

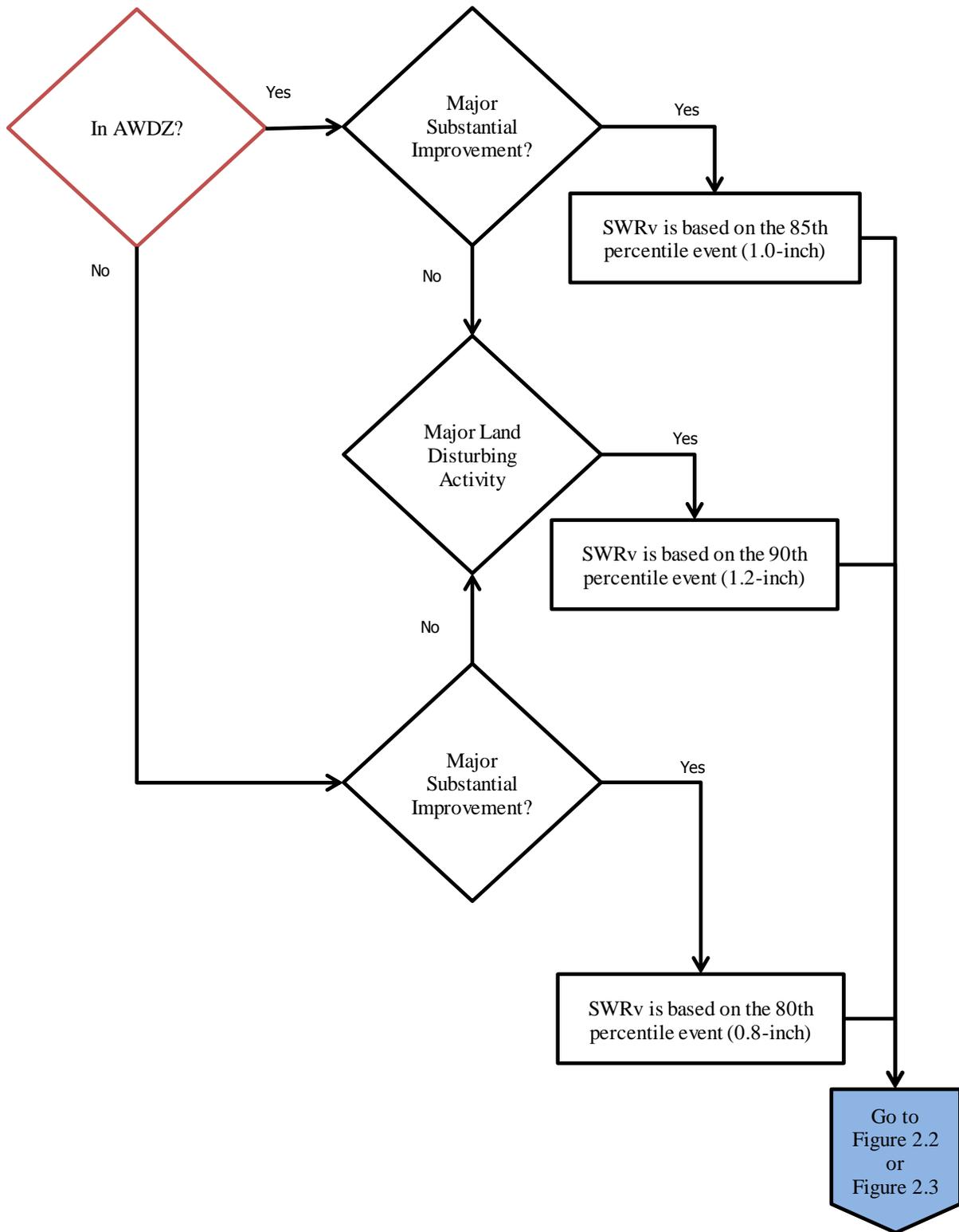


Figure 2.3 Determining the regulatory event used to calculate the SWRv.

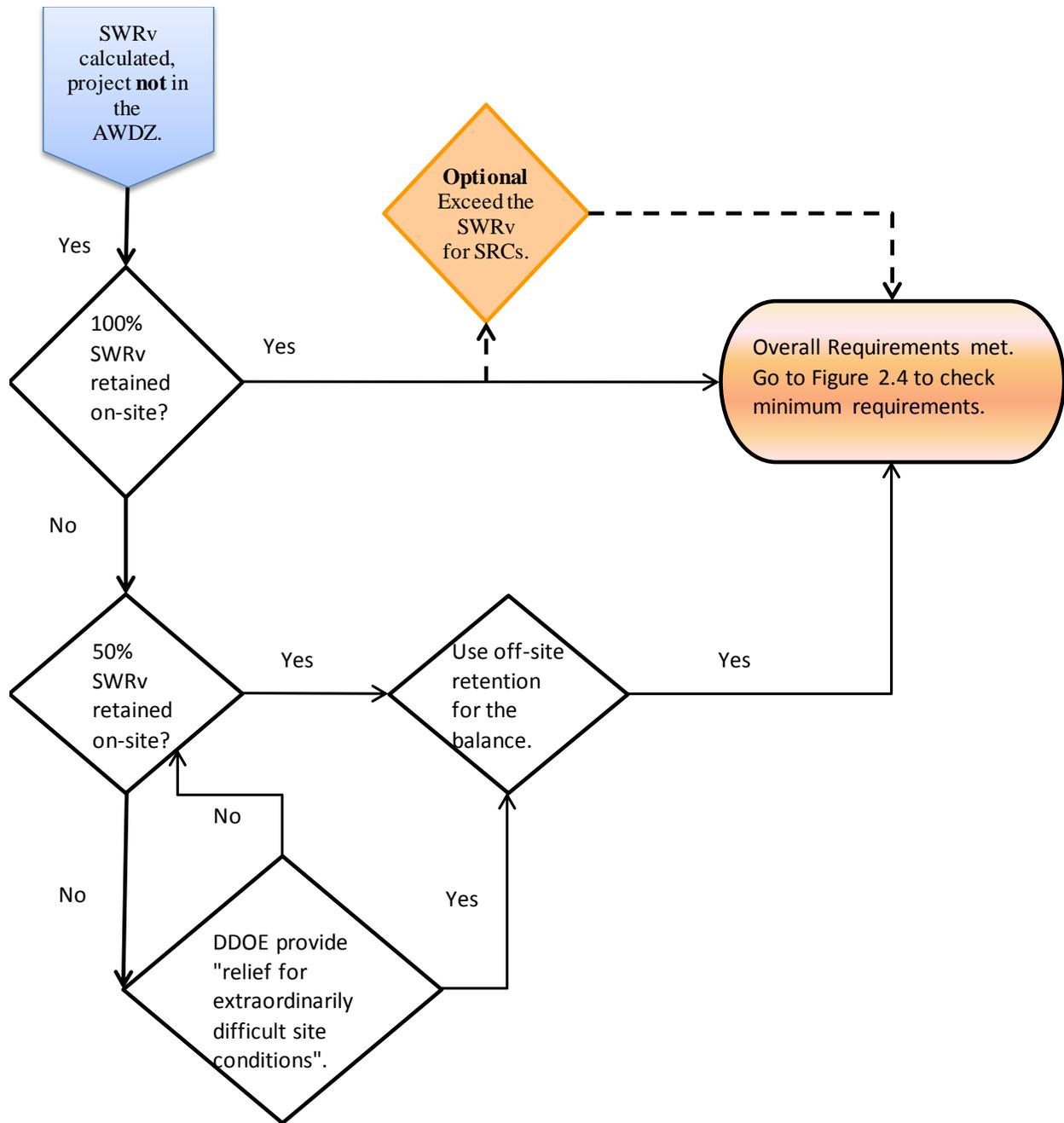


Figure 2.4 Determining if overall retention requirements have been met, outside the AWDZ.

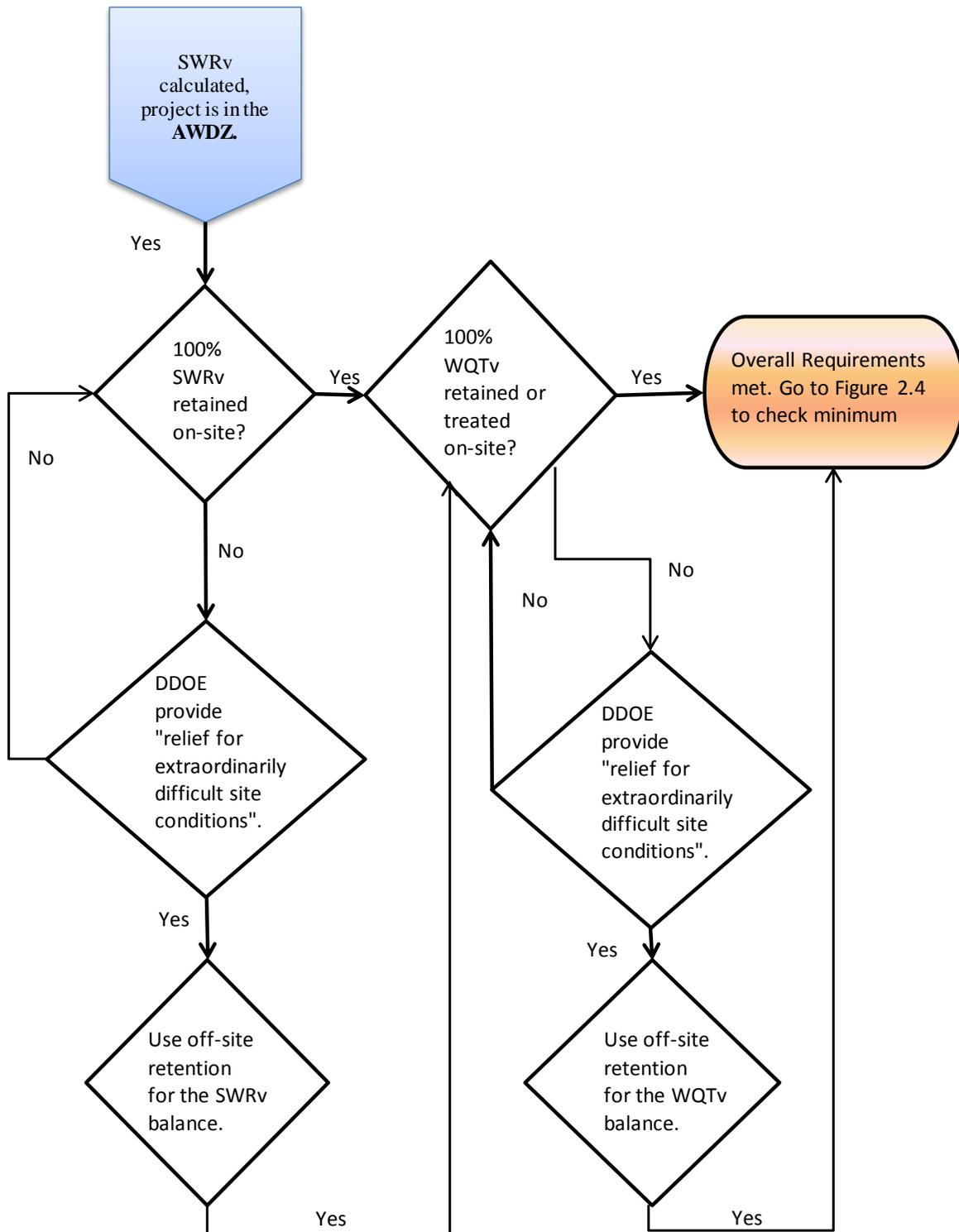
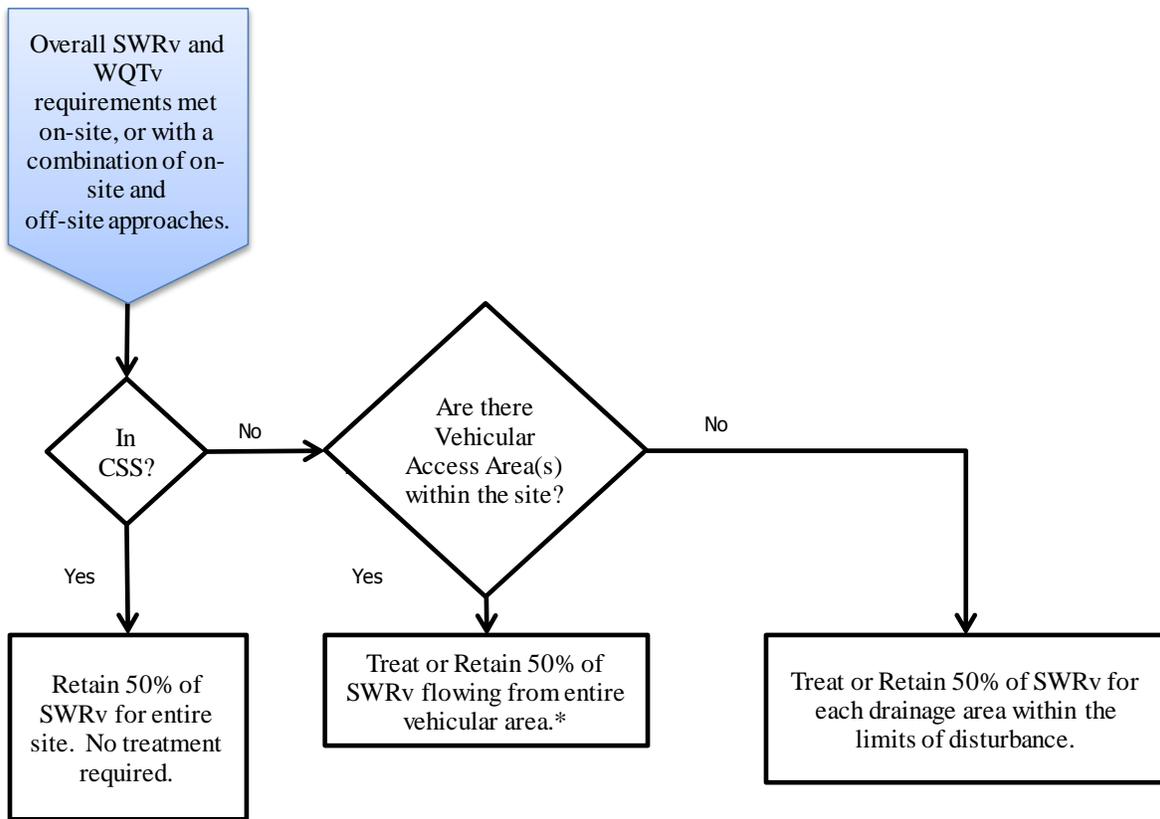


Figure 2.5 Determining if overall retention and water quality treatment requirements have been met, inside the AWDZ for regulated activity governed by the Anacostia Waterfront Environmental Standards Amendment Act of 2012.



* Existing Public right-of-way (PROW) sites follow these guidelines to the maximum extent practicable (MEP). The MEP design and review process is detailed in Appendix B.

Figure 2.6 Determining if minimum retention and water quality treatment requirements have been met.

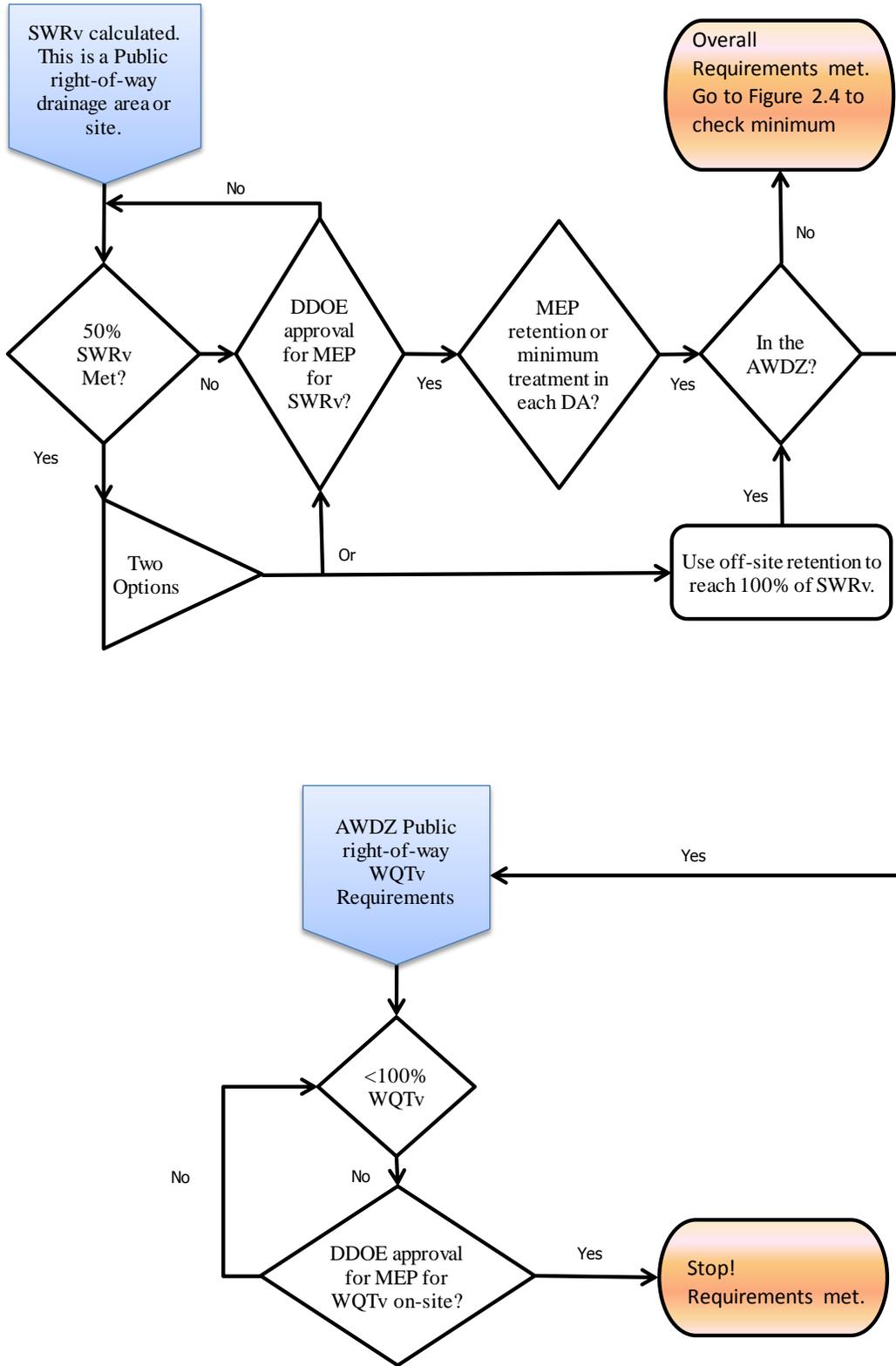


Figure 2.7 Determining retention and water quality requirements for projects in the existing public right-of-way (PROW).

2.4 Extreme Flood Requirements

To meet the extreme flood requirements (Q_f), a site shall maintain the peak discharge rate from the 100-year storm event controlled to the preproject peak discharge rate if the site:

1. Increases the size of a Special Flood Hazard Area (SFHA) as delineated on the effective Flood Insurance Rate Maps (FIRM) or
2. Meets the following two conditions:
 - (a) Does not discharge to the sewer system and
 - (b) Has a post-development peak discharge rate for a 100-year-frequency storm event that will cause flooding to a building.

The intent of the extreme flood criteria is to (a) prevent flood damage from large storm events, and (b) maintain the boundaries of the 100-year Federal Emergency Management Agency (FEMA) floodplain.

In general, stormwater runoff leaving a development site shall be discharged directly into an adequate natural or man-made receiving channel, pipe, or storm sewer system, or the applicant shall provide a drainage system satisfactory to DDOE to preclude an adverse impact (e.g., soil erosion, sedimentation, flooding, duration of ponding water, inadequate overland relief) on downstream properties and receiving systems. If the applicant chooses to install a drainage system, the system shall be designed in accordance with established, applicable criteria for such systems.

Stormwater runoff leaving a development site where it does not discharge directly to the sewer system shall not aggravate or create a condition where an existing building is flooded from the 100-year storm event. If such a condition exists, on-site detention for the 100-year storm event shall be provided.

In situations where the size of the Special Flood Hazard Area (SFHA) as delineated on the effective Flood Insurance Rate Map (FIRM) by the Federal Emergency Management Agency (FEMA) will be increased based on the increased post-development 100-year discharge, the post-development 100-year peak discharge shall be maintained at a level that is equal to or less than the preproject 100-year peak discharge.

2.5 Minimum Criteria for Determining Extreme Flood Requirements

It is recommended that an applicant use the District's online Flood Zone Determination Tool (available at <http://ddoe.dc.gov/floodplainmap>) as an initial screening for this section.

An applicant shall use the following minimum criteria to determine whether extreme flood requirements are applicable:

Downstream Analysis:

1. Consult DDOE to initially determine whether or not the downstream analysis is needed. A site visit is necessary for the determination. This analysis is used to determine the impact of the 100-year post-development discharge on a building.
2. If the analysis is needed, the analysis shall contain supporting computations as justification for the conclusions contained in the analysis. For consistency, the following items are to be included, at a minimum:
 - (a) Site-specific narrative with a description of the elements of the storm drainage system, overland relief paths and adjoining properties;
 - (b) A drainage plan showing outfall location(s) with the contributing drainage areas for each outfall. Digital pictures of the outfall shall be included;
 - (c) A profile for each outfall channel and overland relief path;
 - (d) Two cross sections, at a minimum, at each critical location to verify the outfall and overland relief adequacy. Cross sections shall be based on a 2-foot contour interval and additional spot elevations in the vicinity. The cross sections shall have the same vertical and horizontal scales and shall identify the top of banks for the channel;
 - (e) Description of the outfall channel and permissible velocity. The Manning's roughness coefficient shall be supported by soil classification, cover material, and channel's or flow path's lining. The description of physical characteristics may include the amount of flow meandering, material classification of the flow path and its banks, vegetation, obstruction to flow, variations in cross sections and surface irregularity;
 - (f) Detailed hydrologic and hydraulic (H & H) calculations to obtain the 100-year water surface elevation (WSE). The acceptable methodologies and models are specified in Appendix H;
 - (g) Delineation of the 100-year WSE on the project drainage plan to show the location and approximate extent of the overland relief path and areas that may be affected by the surface storage for the 100-year storm event. Overlaying arrows, shading or other suitable see-through graphics are suggested for this purpose; and
 - (h) Certification by the District professional engineer that no buildings will be subject to increased flooding by the 100-year post-development discharge from the development site.
3. If buildings will be flooded based on the analysis, then the design engineer must perform more precise hydrologic and hydraulic computations. In addition to the on-site 100-year detention, the applicant shall design the outfall drainage system, overland relief swales, and/or surface storage in such a way that no building will be damaged by flooding.
4. If the protection measures for the outfall drainage system or overland relief path are provided, necessary design details shall be shown and supported by calculations and submitted to DDOE for review.

Hydrologic and Hydraulic Analysis:

1. Consult DDOE to initially determine whether or not the H&H analysis is needed. This analysis is used to determine the impact on SFHA by considering the entire watershed.
2. The acceptable methodologies and models for H&H analysis are specified in Section 2.7 and further described in Appendix H.
3. H&H investigations may be required to demonstrate that downstream roads, bridges, and public utilities are adequately protected from the Q_f storm. These investigations typically extend to the first downstream tributary of equal or greater drainage area or to any downstream dam, highway, or natural point of restricted stream flow.

2.6 Additional Stormwater Management Requirements

Any BMP that may receive stormwater runoff from areas that are potential sources of oil and grease contamination (concentrations exceeding 10 milligrams per liter) shall include a baffle, skimmer, oil separator, grease trap, or other mechanism that prevents oil and grease from escaping the BMP in concentrations exceeding 10 milligrams per liter.

Any BMP that receives stormwater runoff from areas used to confine animals may be required connect to a sanitary or combined sewer and to meet DC Water's pretreatment requirements.

2.7 Hydrology Methods

The following are the acceptable methodologies and computer models for estimating runoff hydrographs before and after development. These methods are used to predict the runoff response from given rainfall information and site surface characteristic conditions. The design storm frequencies used in all of the hydrologic engineering calculations will be based on design storms required in this guidebook unless circumstances make consideration of another storm intensity criteria appropriate.

- Urban Hydrology for Small Watersheds TR-55
- Storage-Indication Routing
- HEC-HMS, WinTR-55, TR-20, and SWMM Computer Models
- Rational Method (limited to sites under 5 acres)

These methods are given as valid in principle, and are applicable to most stormwater management design situations in the District. Other methods may be used when the District reviewing authority approves their application.

The use of the Natural Resource Conservation Service's (NRCS's) Storage Indication Routing method or an equivalent acceptable method may be required to route the design storms through stormwater facilities. A modified version of the NRCS Curve Number method is provided for computing the peak discharge for the SWRv 1.2-inch rain event. See Appendix H for further details and guidance on both computation procedures.

2.8 Acceptable Urban BMP Options

This section sets forth 13 acceptable groups of BMPs that can be used to meet the SWRV and/or peak flow (Q_{p2} , Q_{p15} , Q_f) criteria.

The dozens of different BMP designs currently used in the District are assigned to 13 general categories for stormwater quality control:

BMP Group 1	Green Roofs
BMP Group 2	Rainwater Harvesting
BMP Group 3	Impervious Surface Disconnection
BMP Group 4	Permeable Pavement Systems
BMP Group 5	Bioretention
BMP Group 6	Filtering Systems
BMP Group 7	Infiltration
BMP Group 8	Open Channel Systems
BMP Group 9	Ponds
BMP Group 10	Wetlands
BMP Group 11	Storage Practices
BMP Group 12	Proprietary Practices
BMP Group 13	Tree Planting and Preservation

Within each BMP group, detailed performance criteria are presented that govern feasibility, conveyance, pretreatment, treatment, landscaping, construction sequence, maintenance, and stormwater retention calculations (see Chapter 3).

Guidance on selecting the most appropriate combination of BMPs is provided in Chapter 4.

BMP Group 1 Green Roofs

Green roofs are BMPs that capture and store rainfall, which would otherwise land on an impervious rooftop, in an engineered growing media that is designed to support plant growth. A portion of the captured rainfall evaporates or is taken up by plants, which helps reduce runoff volumes, peak runoff rates, and pollutant loads. Design variants include:

- G-1 Extensive green roofs have a much shallower growing media layer that typically ranges from 3 to 6 inches thick.
- G-2 Intensive green roofs have a growing media layer that ranges from 6 inches to 4 feet thick.

BMP Group 2 Rainwater Harvesting

Rain water 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 (also referred to as a cistern or rain tank), where it can be used for non-potable water uses and on-site stormwater disposal/infiltration.

BMP Group 3 Impervious Surface 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. Simple disconnection variants include:

- D-1 Simple disconnection to a pervious compacted cover area
- D-2 Simple disconnection to a conserved natural cover area
- D-3 Simple disconnection to a soil compost amended filter path

Disconnection can also be employed as part of infiltration, bioretention, and rainwater harvesting systems.

BMP Group 4 Permeable Pavement Systems

Permeable pavement is an alternative paving surface that captures and temporarily stores the design volume by filtering runoff through voids in the pavement surface into an underlying stone reservoir. Filtered runoff may be collected and returned to the conveyance system, or allowed to partially infiltrate into the soil. Design variants include:

- P-1 Porous asphalt (PA)
- P-2 Pervious concrete (PC)
- P-3 Permeable pavers (PP)

BMP Group 5 Bioretention

Bioretention facilities are BMPs that capture and store stormwater runoff and pass it through a filter bed of engineered soil media composed of sand, soil, and organic matter. Filtered runoff may be collected and returned to the conveyance system, or allowed to infiltrate into the soil. Design variants include:

- B-1 Traditional bioretention
- B-2 Streetscape bioretention
- B-3 Engineered tree pits
- B-4 Stormwater planters
- B-5 Residential rain gardens

BMP Group 6 Filtering Systems

Filtering systems are BMPs that capture and temporarily store the design volume and pass it through a filter bed of sand, organic matter, soil or other filtering media. Filtered runoff may be collected and returned to the conveyance system. Design variants include:

- F-1 Non-structural sand filter
- F-2 Surface sand filter
- F-3 Three-chamber underground sand filter
- F-4 Perimeter sand filter

BMP Group 7 Infiltration BMPs

Infiltration BMPs capture and store the design volume before allowing it to infiltrate into the soil over a 48-hour period. Design variants include:

- I-1 Infiltration trench
- I-2 Infiltration basin

BMP Group 8 Open Channel BMPs

Open channel BMPs are vegetated open channels that are designed to capture and treat or convey the design storm volume. Design variants include:

- O-1 Grass channels
- O-2 Dry swale
- O-3 Wet swale

BMP Group 9 Ponds

Stormwater ponds are stormwater storage BMPs that consist of a combination of a permanent pool, micropool, or shallow marsh that promote a good environment for gravitational settling, biological uptake, and microbial activity. Design variants include:

- P-1 Micropool extended detention pond
- P-2 Wet pond
- P-3 Wet extended detention (ED) pond

BMP Group 10 Wetlands

Stormwater wetlands are BMPs that create shallow marsh areas to treat urban stormwater which often incorporate small permanent pools and/or extended detention storage. Stormwater wetlands are explicitly designed to provide stormwater detention for larger storms (2-year, 15-year or flood control events) above the SWRv. Design variants include:

W-1 Shallow wetland

W-2 Extended detention (ED) shallow wetland

BMP Group 11 Storage Practices

Storage practices are explicitly designed to provide stormwater detention (2-year, 15-year, and/or flood control). Storage practices alone are not considered acceptable practices to meet the SWRv or TSS removal requirements. Design variants include:

S-1 Underground vault

S-2 Dry pond

S-3 Rooftop storage

S-4 Stone storage under permeable pavement or other BMPs

Design guidance and criteria for the practice of rooftop storage is provided in Appendix I.

BMP Group 12 Proprietary Practices

Proprietary practices are manufactured stormwater BMPs that utilize settling, filtration, absorptive/adsorptive materials, vortex separation, vegetative components, and/or other appropriate technology to manage the impacts of stormwater runoff.

Proprietary practices may meet the SWRv value as well as the TSS removal value, provided they have been approved by DDOE through the process detailed in Appendix S.

BMP Group 13 Tree Planting and Preservation

Trees can significantly reduce stormwater runoff by canopy interception and uptake of water from the soil. Trees are well documented in their ability to reduce stormwater runoff, particularly when the tree canopy covers impervious surface, such as in the case of street trees.