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# ***Chapter 1 – Introduction***

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## 1.1 Introduction

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This manual was prepared for the Virginia Department of Transportation by Virginia Tech under contract for the Virginia Center for Transportation Innovation and Research. It provides guidance in the design of Best Management Practices capable of contributing to the goal of stormwater management as defined in VDOT's Instructional and Informational Memorandum IIM-LD-195, under "Post Development Stormwater Management".

Additionally, the design examples apply the BMP design methodologies found in the [Virginia Stormwater Management Handbook](#) (DCR, 1999, Et seq.), to the site conditions and constraints typically encountered in linear development projects.

It is assumed that the readers of this document are knowledgeable in the engineering disciplines of hydrology and hydraulics and will understand fundamental fluid flow principles used in this manual.

This manual does not constitute a standard, specification, or regulation.

## 1.2 Project Site

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The *project site* as defined in the Stormwater Program Advisory SWPA 12-01 dated April 5, 2012, available at: [http://www.virginiadot.org/business/resources/LocDes/SWPA\\_12-01.pdf](http://www.virginiadot.org/business/resources/LocDes/SWPA_12-01.pdf) as:

The area of actual proposed land disturbance (i.e., construction limits) plus any right of way acquired in support of the proposed land disturbance activity/project. Any staging areas within existing or proposed VDOT right of way associated with the proposed land disturbance activity/project and identified in the pre-construction SWPPP for the proposed land disturbance activity/project shall also be considered a part of the site. Permanent easements and/or other property acquired through the right of way acquisition process in support of the proposed land disturbance activity/project may be considered a part of the site and utilized in the determination of the post development water quality requirements provided such property will remain under the ownership/control of the VDOT and providing such property is so identified/designated on the proposed land disturbance activity/project plans and legally encumbered for the purpose of stormwater management.

## 1.3 Water Quality Standards

Effective April 5, 2012, Stormwater Program Advisory SWPA 12-01 states that “Evaluation of water quality requirements shall be performed using the Performance Based Water Quality Criteria (see the [Virginia Stormwater Management Handbook](#) (1999) and VDOT IIM-LD-195. Although it is recognized that this is the standard for all new projects passed that date, there may be some projects underway prior to that date that may be designed under the direction found in VDOT IIM-LD-195.

Therefore, it is the designer’s responsibility to determine and verify with the Department the methodology that is required on individual projects. Details on the Technology and Performance Based water quality calculation methodologies may be found in the [Virginia Stormwater Management Handbook](#) (1999) and VDOT IIM-LD-195.

The BMP selection table is shown in Table 1.1. While typically Table 1.1 would be used to select appropriate BMPs based on post-construction impervious cover using the “Technology Based” approach, it may also be used as a reference for projected BMP efficiencies when using a “Performance Based” approach.

Water Quality BMP	Target Phosphorus Removal Efficiency (%)	Percent Impervious Cover Cover (%)**
Vegetated Filter Strip	10	16-21
Grassed Swale	15	
Constructed Wetlands	30	22-37
Extended Detention (2xWQV)	35	
Retention Basin I (3xWQV)	40	
Bioretention Basin	50	38-66
Bioretention Filter	50	
Extended Detention - Enhanced	50	
Retention Basin II (4xWQV)	50	
Infiltration (1xWQV)	50	
Sand Filter	65	67-100
Infiltration (2xWQV)	65	
Retention Basin III (4xWQV with aquatic bench)	65	

**Table 1.1 BMP Selection Table for VDOT Projects\***

\*Innovative or alternate BMPs not included in this table may be allowed at the discretion of DCR and with the concurrence of the VDOT State Hydraulics Engineer, as stated in IIM-LD-195.

(Refer to DCR website for current state of practice).

Source: [Virginia Stormwater Management Handbook](#), (DCR, 1999, Et seq.)

## 1.4 Water Quantity Standards

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Although it is recognized that some BMPs used for water quality control implicitly have the ability to partially, or in some cases, fully meet the requirements for stormwater quantity control, this manual is not intended to cover Commonwealth of Virginia requirements for flooding or erosion control. The user is directed to the [Virginia Erosion and Sediment Control Handbook](#) (Third Edition, 1992) the [Virginia Stormwater Management Handbook](#) (First Edition, 1999) the [Virginia Stormwater Management Program](#) (VSMP) Permit Regulations (latest revision effective Nov. 21, 2012), the [VDOT Drainage Manual](#) (rev. July 2012) and any applicable VDOT Instructional and Information Memoranda (specifically [IIM-LD-11](#); [IIM-LD-195](#); [IIM-LD-242](#); [IIM-LD-246](#)) for further discussion of specific state requirements and sample calculations related to stormwater quantity control.