

## **2010 Highway Runoff Manual**

### **Post-Publication Update October 20, 2011**

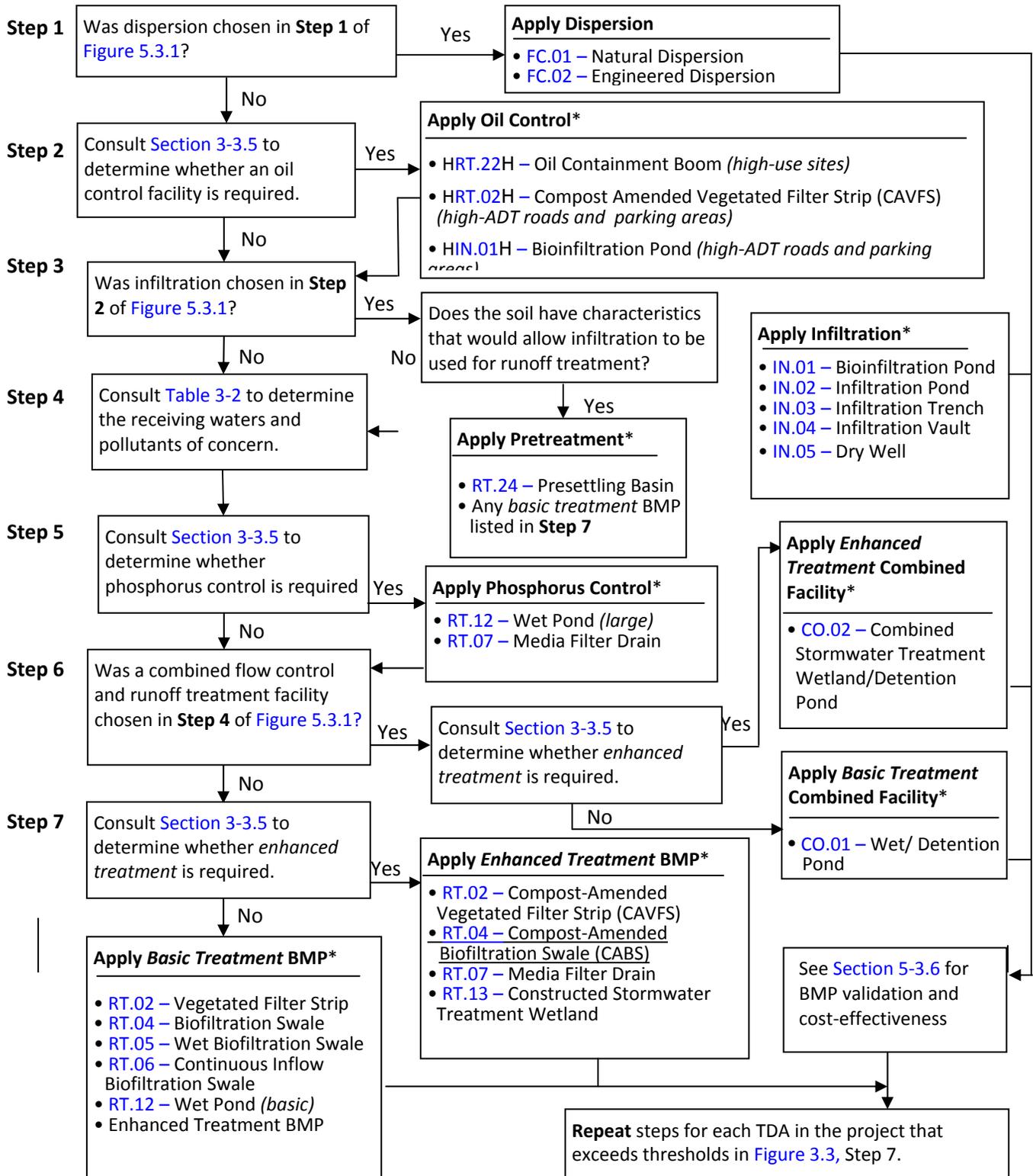
HRM Page 5-5 (inserted underlined text)

#### **5-2.2.3 Biofiltration BMPs**

Biofiltration BMPs are discussed in [Section 5-4.1.3](#) and include the following:

- RT.02 – Vegetated Filter Strip (basic, narrow area, and compost-amended or CAVFS)
- RT.04 – Biofiltration Swale (basic and compost-amended or CABS)
- RT.05 – Wet Biofiltration Swale
- RT.06 – Continuous Inflow Biofiltration Swale
- RT.07 – Media Filter Drain (previously referred to as the Ecology Embankment)

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*\*If these BMPs cannot be sited within or adjacent to the TDA, document the site constraints using the checklist in Appendix 2A. Seek authorization for alternative BMP options per the process described in Section 5-3.6.*

## Introduction

### *General Description*

*Biofiltration swales* are vegetation-lined channels designed to remove suspended solids from stormwater. The shallow, concentrated flow within these systems allows for the filtration of stormwater by plant stems and leaves. Biological uptake, biotransformation, sorption, and ion exchange are potential secondary pollutant-removal processes (see [Figures RT.04.1](#) and [RT.04.2](#)). Biofiltration swales are approved for basic runoff treatment. Compost-amended biofiltration swales (CABS)<sup>1</sup> are approved for basic and enhanced runoff treatment. There are two sizing procedures for each: the first is for both eastern and western Washington and the second is only for eastern Washington.

### *Applications and Limitations*

#### Applications

- Biofiltration swales and CABS have the flexibility to be located at end of a stormwater collection system.
- In less urbanized areas, biofiltration swales and CABS can generally be located at the bottom of existing roadside embankments, reducing the need for additional right of way acquisitions.

#### Limitations

- CABS should not be installed in areas that have a TMDL for phosphorous.

<sup>1</sup> “Design and Construction of a Field Test Site to Evaluate the Effectiveness of a Compost Amended Bioswale for Removing Metals from Highway Stormwater Runoff”, WARD 724.1, Research Report, June 3, 2011.

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**Table RT.04.1. Flow resistance coefficient in basic, wet, and continuous inflow biofiltration swales.**

Soil and Cover	Manning's Coefficient
Grass-legume mix on compacted native soil	0.20
Grass-legume mix on lightly compacted, compost-amended <sup>1</sup> soil (CABS)	0.22
Grass-legume mix on lightly compacted, compost-amended <sup>1</sup> soil with surface roughness features <sup>2</sup> (CABS)	0.35

<sup>1</sup> For information on compost-amended soils, refer to [Section 5-4.3.2](#). (Note that swales do not require a mulch layer and that compost amendments shall be a 3 inch thick blanket over the soil.)

<sup>2</sup> Acceptable surface roughness features are wattle check dams (Std. Spec. 8-01.3(6)D), gravel filter berms (Std. Spec. 8-01.3(9)B), or compost berms (Std. Plan I-14). These features must be placed every 50 feet (or closer) and should not exceed 1.5 feet in height above finished swale bottom. These features must not be used in place of level spreaders or energy dissipaters.

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***Soil Amendments (for CABS)***

Refer to [Section 5-4.3.2](#), Soil Amendments.