SECTION 6
PERMANENT TREATMENT PRACTICES (PTP)

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6.1 Introduction

This section presents the BMP fact sheets for Permanent Treatment Practices (PTP). PTPs are intended to treat stormwater runoff in the long-term. Some of these BMPs can be designed to achieve both stormwater quantity and quality management objectives.

This section contains the following BMP fact sheets.

PTP – 01	Stormwater Wet Ponds
PTP – 02	Constructed Wetlands
PTP – 03	Bioretention
PTP – 04	Surface Sand Filters
PTP – 05	Water Quality Swales
PTP – 06	Dry Ponds
PTP – 07	Filter Strips
PTP – 08	Grass Channels
PTP – 09	Greenroofs
PTP – 10	Underground Sand Filters
PTP – 11	Perimeter Sand Filters
PTP – 12	Organic Filters
PTP – 13	Gravity (Oil-Grit) Separators
PTP – 14	Infiltration Trenches
PTP – 15	Permeable Pavements

Each fact sheet has a quick reference guide indicating what pollutant constituents the BMP is targeting and implementation requirements.

The BMPs presented in this section are intended to serve as permanent treatment measures. Additional details are provided in sections covering Temporary Construction Site Management Practices (TCPs) for practices that are intended to function on a short-term basis (lasting only as long as construction activities) and covering Permanent Erosion Prevention and Sediment Control (PESC) that are intended to function on a long-term basis.

The BMPs found in the PTP section are listed in Table 1. BMPs have been categorized as either General Application or Limited Application BMPs. General Application BMPs meet the post-construction water quality program's pollutant reduction goal by themselves, if designed, built, and maintained according to MWS specifications. On the other hand, Limited Application BMPs, may only be suitable for some sites for one or more reasons: 1) they do not meet the pollutant reduction goal of 80 percent TSS removal 2) they are only suitable for sites with certain conditions 3) they require intensive and or frequent maintenance in order to function properly.

Since some BMPs do not have established removal data, and new structural BMPs are being introduced in to the market every year, Metro has established a set of testing standards, requirements and protocol in order that qualifying devices may be added to Metro's pre-approved BMP list.

Structural Stormwater Control Removal Efficiency for Total Suspended Solids (TSS)	
Structural Control	**TSS Removal (%)**
General Application Structural Stormwater Controls	
Stormwater Pond	80
Stormwater Wetland	80
Bioretention Area	80
Surface Sand Filter	80
Water Quality Swales	80
Limited Application Structural Stormwater Controls	
Filter Strip	50
Grass Channel	50
Organic Filter	80
Underground Sand Filter	80
Infiltration Trench	80
Gravity (Oil-Grit) Separator	40
Proprietary Structural Control	Based on Testing (see Volume 1, Section 7.5)
Dry Detention / Dry ED Basin	60
Perimeter Sand Filter	80

6.2 Calculations for BMPs in a Series

Some BMPs that do not meet Metro's pollutant reduction goal alone, and may be used with another BMP to meet the goal. That is, water may pass through one treatment device, into another in a "treatment train" to achieve added treatment. It is necessary to calculate the cumulative pollutant removal from BMPs in a series with an equation that accounts for the fact that the majority of the heavy (easily removed) suspended pollutants and particulate matter are removed by the first structural control in a series. The runoff that enters the second and subsequent controls contains sediment with much smaller particles, which are more difficult for the control to remove. Thus, the second control has a pollutant removal efficiency that is less than it would ordinarily have. The following equation accounts for the cumulative pollutant removal of BMPs in a series.

$$TR = A + (1 - A)*B$$

Where:
TR = Total Removal
A = 1st structural control in series
B = 2nd structural control in series

Notes:
1) When runoff flows from a more efficient structure (one with a higher removal rate) to a less efficient structure (one with a lower removal rate), the cumulative pollutant removal of a structure does not increase. The reason is that a structure with a lower removal efficiency that follows a structure with a higher removal efficiency does not have an appreciable affect on cumulative pollutant reduction.

6.2.1 Example Calculation

A site is planned to have a manufactured pretreatment device that ia pprovde for a 50% TSS removal credit, followed by a dry detention basin designed, built, and maintained as required by Metro regulations to achieve a 60% removal credit. The calculation is as follows:

$$\boldsymbol{TR} = A_{MD} + (1 - A_{MD}) * B_{DD}$$

Where:
TR = Total Removal
A_{MD} = 1st structural control—manufactured device
B_{DD} = 2nd structural control—dry detention basin

TR = 0.5 + (1-0.5)*0.6
TR = 0.5 + (0.5)*0.6
TR = 0.5 + 0.3
TR = 0.8

Total Removal equals 80%. The site meets Metro’s requirements of 80% TSS removal for the site.