



Selecting Best Management Practices for Stormwater Management



The Problem

In recent years, urbanization in the Puget Sound basin has damaged the water quality in our streams and lakes. Stormwater runoff can pick up all sorts of harmful substances from surfaces such as parking lots, roofs, streets, sidewalks, and construction sites. Pollutants and sediments get carried away by stormwater runoff and dumped into our waterways.



What Can We Do?

In response to stormwater quality problems in the region, the Puget Sound Water Quality Management Plan (Puget Sound Plan) was adopted in 1987. The stormwater element of the Puget Sound Plan directed the Washington State Department of Ecology (Ecology) to develop minimum requirements for stormwater management — based on the proposed type and size of the development.

The minimum requirements cover temporary stormwater controls for use on construction sites, and permanent stormwater controls for long-term protection of water quality. There are promising indications that this emphasis on designing and carrying out stormwater best management practices (BMPs) is achieving desired results.

Stormwater BMPs are defined as physical, structural, and/or managerial practices that prevent or reduce the pollution of water.

The minimum requirements, and methods for meeting them, are presented in the *Stormwater Management Manual for the Puget Sound Basin* (Technical Manual).

Compliance with the minimum requirements contained in Ecology's Technical Manual is demonstrated through the development and implementation of a stormwater site plan. The stormwater site plan, which the owner/developer must submit to the local plan approval authority, documents the selection, design, and implementation of the appropriate BMPs for each site.

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This detention pond is an example of a best management practice (BMP) that removes pollutants

Specific BMPs have been approved by Ecology to control the quality and quantity of stormwater runoff for the protection of receiving waters, and are found in the Technical Manual. In addition to the state requirements, local and federal agencies have requirements on the use of BMPs for stormwater management, such as the National Pollutant Discharge Elimination System (NPDES) baseline general permit for stormwater discharges from industrial and construction sites. It is important to note that local jurisdiction may have adopted stormwater manuals that include additional requirements, and there may be adopted basin plans that owner/developers must comply with as well.



What Do BMPs Do?

Stormwater BMPs can be temporary (e.g., for use during construction activity) or permanent. BMPs are categorized to indicate which of three general stormwater control objectives they meet: source control, runoff treatment, and/or streambank erosion control.

Source Control BMPs are designed to prevent pollutants from entering stormwater by eliminating the source of pollution or by preventing the contact of pollutants with rainfall and runoff. They are

generally the most cost-effective because they reduce or eliminate the need for treatment BMPs and are usually less elaborate and less expensive to implement. Covering material storage areas and eliminating illicit discharges are two examples of source control BMPs.

Runoff Treatment BMPs are designed to remove pollutants contained in stormwater runoff. One example is water filtration basins that use sand or other substances to treat pollutants. Other examples are wetponds and constructed wetlands which provide treatment of runoff by encouraging biological uptake through aquatic plants, and by the filtration process provided by the vegetation. Biofiltration swales and filter strips use vegetation to remove pollutants and to settle out suspended solids.

Stormwater Best Management Practices		
	<i>BMP Objective and Type of Pollutant Controlled</i>	<i>When And Where Is It Required?</i>
Source Control	Conventional Pollutants	All large parcel development and redevelopment
	Nutrient Pollutants	Nutrient controls are mandated based upon condition of receiving water.
Runoff Treatment	Conventional Pollutants	All large parcel development and redevelopment.
	Nutrient Pollutants	Nutrient controls are mandated by local government based upon condition of receiving water.
	Oil/Grease	When site is subject to high vehicular traffic or petroleum products are stored or handled on-site.
	Pretreatment for Sediment removal	Before discharge into infiltration or filtration BMPs.
Streambank Erosion Control	Detention	When site drainage discharges directly or indirectly to a stream.
	Streambank Stabilization	When receiving stream has an existing channel or bank erosion problem.

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Streambank Erosion Control BMPs

are designed to protect stream ecosystems from erosion and sedimentation. Examples include Infiltration BMPs which reduce or eliminate the discharge of runoff to receiving waters and can also recharge the groundwater table. Detention BMPs control peak flows by detaining runoff and releasing it back to the stream system at reduced flow rates, thereby reducing downstream erosion and flooding. Detention BMPs include wet and dry ponds, vaults or tanks, and constructed wetlands. Streambank stabilization BMPs are vegetative, bioengineered, and structural controls for stabilizing, strengthening and protecting streambanks from channel erosion and bank failure.

Order of Preference for Runoff Treatment BMPs (Conventional and Nutrient Pollutants)		
Rank	Conventional Pollutants	Conventional and Nutrient Pollutants
Most Preferred	Infiltration BMPs	Infiltration BMPs
Second Preferred	Constructed wetland or wet pond or biofiltration swale or vegetative filter strip or sand filtration	Constructed wetland or wet pond with marsh
Least Preferred	Wet Vault/Tank	

What Types of BMPs Are Appropriate for Your Project?

The most preferred BMPs mimic a natural process such as infiltration systems or constructed wetlands. These systems are generally more effective than structural systems such as wet vaults and dry detention vaults, and they can provide greater benefits for fish and wildlife habitat.

BMPs for permanent stormwater control must be selected based upon the specific site conditions including land use activity, condition of receiving waters, and types of pollutants present. Pollutants are classified as conventional (e.g., particulates), nutrient (e.g., nitrogen, phosphorous), and oil/grease.



Selecting BMPs

Here are some points to consider when you're choosing BMPs for your site.

- Use of most runoff treatment and flow attenuation BMPs is limited by site conditions such as soil type, water table or impermeable layers, and proximity of BMPs to wells and other features. An understanding to these site specific characteristics, as well as a careful design, and appropriate construction, are key to the success of the BMPs.

Order of Preference for Streambank Erosion Control BMPs		
Rank	Flow Attenuation	Streambank Stabilization
Most Preferred	Infiltration BMPs	Vegetative Streambank or Bioengineering method
Least Preferred	Detention BMPs (wet and dry ponds, wetlands, vaults)	Structural Stabilization

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- ▼ Consider space constraints above and below ground when selecting BMPs. Some BMPs take up more surface area than others. For example, wetlands require more surface area than wet ponds. Infiltration trenches and biofilters can be used in places where long narrow space is available, such as parking lots.
- ▼ Some BMPs have limits on the tributary area draining into it. For example, a detention vault should have a maximum of five acres draining into it. This might require use of more than one vault to handle all of the site drainage.
- ▼ Make sure the existing drainage features on the site allow for drainage to the selected BMPs. Site topography may preclude the use of a single facility to handle all of the site drainage.

- ▼ Consider site layout and topography. Use the topography to limit the volume of excavation and to protect the natural buffer areas of the site. Make use of existing structures and conveyances.

For more information on municipal stormwater requirements, or if you have special accommodation needs, please call the Urban Nonpoint Management Unit of Ecology's Water Quality Program at 206/438-7058. The agency's telecommunications device for the deaf (TDD) number is 206/438-8721. Ecology is an Equal Opportunity and Affirmative Action Employer.



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