

## CHAPTER 1

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# Introduction



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# Chapter 1. Introduction

## 1-1. Basis for Manual Development

### 1-1.1. Purpose, Need, and Scope

The *Highway Runoff Manual* (HRM) was developed to direct the planning and design of stormwater management facilities for new and redeveloped Washington State highways, rest areas, park-and-ride lots, ferry terminals, and highway maintenance facilities throughout the state. The Washington State Department of Transportation (WSDOT) manages its stormwater discharges to protect water quality, beneficial uses of the state's waters, and the aquatic environment in general. Conformance to the provisions of this manual will result in consistent design procedures statewide and should support acceptance of WSDOT stormwater planning by regulatory agencies. Guidelines are provided for both western and eastern Washington, taking into account variations in climatic, geologic, and hydrogeologic conditions.

This manual's approach is consistent with WSDOT's objective of implementing a statewide highway runoff program that applies sound engineering principles to satisfy federal and state requirements. While federal and state stormwater requirements are subject to change, this manual is based on the best practicable engineering approaches to stormwater management currently available for WSDOT facilities.

The HRM establishes minimum requirements and provides uniform technical criteria for avoiding and mitigating impacts to water resources associated with the development of state-owned and -operated transportation infrastructure systems and for reducing and minimizing water resource impacts associated with the redevelopment of those facilities. The manual will receive periodic updates to enhance content clarity, as well as reflect changes in regulations, advances in stormwater management, and improvements in design tools. To ensure you are using the most current design criteria, users referencing printed copies and CD ROM versions of the manual should continually consult the HRM Resource Web Page ([www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm](http://www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm)) for postpublication updates. To receive e-mail announcements regarding HRM-related updates, training opportunities, and improvements in design tools, send a blank e-mail to: [subscribe-stormwater\\_list@lists.wsdot.wa.gov](mailto:subscribe-stormwater_list@lists.wsdot.wa.gov). You will then receive an e-mail asking you to confirm your subscription.

Primary users of this manual include:

- WSDOT engineers who design drainage systems and develop Hydraulic Reports; temporary erosion and sediment control (TESC) plans; and spill prevention, control, and countermeasures (SPCC) plans.

- WSDOT project inspectors in construction project offices responsible for inspection and maintenance of TESC plans.
- WSDOT maintenance staff responsible for developing roadside management plans and roadway maintenance practices.
- Developers of projects adjacent to WSDOT right of way that are linked to roadway and drainage facilities within the right of way.
- Consultants hired to develop Hydraulic Reports, TESC plans, and SPCC plans or design stormwater facilities for WSDOT.
- Counties, municipalities, and other jurisdictions that design transportation projects supported by federal or state funding.

The Headquarters (HQ) Hydraulics Section and the HQ Environmental Services Office (ESO) are jointly responsible for manual revisions and implementation oversight. The design criteria and procedures presented in this manual supersede conflicting information presented in other previously published WSDOT manuals.

Many aspects of stormwater management for environmental protection relate to drainage collection and conveyance systems, culverts, drainage outfalls, and a variety of other hydraulic features. This manual makes frequent references to the *Hydraulics Manual*, which is dedicated in large part to addressing the analysis and design of hydraulic features. The intent is that the two manuals are to be used in tandem for complete analysis and design of stormwater facilities for roadway and other transportation infrastructure projects.

### 1-1.2. Review Process and Regulatory Standing of the Manual

The *Highway Runoff Manual* (HRM) covers the entire state and meets the level of stormwater management established by the Washington State Department of Ecology (Ecology) in its *Stormwater Management Manual for Western Washington* (SMMWW) and *Stormwater Management Manual for Eastern Washington* (SMMEW). Stormwater management requirements for Washington State were developed to protect receiving waters from the adverse hydrologic change and water quality degradation that can occur with project development. The requirements vary for western and eastern Washington due to differences in climate, soils, receiving water characteristics, and environmental concerns. Ecology has been involved in a review capacity throughout the development of this manual.

The guidelines and criteria in the HRM also support WSDOT in its efforts to comply with the requirements of the federal Endangered Species Act (ESA). National Oceanic and Atmospheric Administration (NOAA) Fisheries and the United States Fish and Wildlife Service (USFWS) did not formally review the Ecology stormwater management manuals for programmatic “concurrence” under the ESA. Thus, to accomplish WSDOT’s objective to develop stormwater management design criteria that meet all regulatory requirements, NOAA and USFWS were invited to comment on the HRM during the development process.

### 1-1.3. Presumptive vs. Demonstrative Approaches to Protecting Water Quality

This manual is intended to provide project engineers and designers with technically sound stormwater management practices, equivalent to guidance provided in Ecology's stormwater management manuals, to achieve compliance with federal and state water quality regulations through the *presumptive approach*. Engineers and designers have the option of not following the stormwater management practices in this manual and seeking compliance via the *demonstrative approach*. However, this requires (1) demonstrating that the project will not adversely impact water quality by collecting and providing appropriate supporting data to show that the alternative approach protects water quality and satisfies state and federal water quality laws, and (2) performing the technology-based requirements of state and federal law.

Both the *presumptive* and *demonstrative approaches* are based on best available science and result from existing federal and state laws that require stormwater management systems to be properly designed, constructed, maintained, and operated to:

- Prevent pollution of state waters and protect water quality, including compliance with state water quality standards.
- Satisfy state requirements for all known available and reasonable methods of prevention, control, and treatment of wastes prior to discharge to waters of the state.
- Satisfy the federal technology-based treatment requirements under 40 CFR Part 125.3.

Under the *demonstrative approach*, the timeline and expectations for providing technical justification of stormwater management practices depend on the complexity of the individual project and the nature of the receiving water environment. In each case, the engineer or designer may be asked to document, to the satisfaction of Ecology or other approval authority, that the practices selected will result in compliance with the water quality protection requirements of the permit or of other local, state, or federal water quality-based project approval conditions. This approach may be more cost-effective for large, complex, or unusual types of projects.

Projects that follow the stormwater best management practices (BMPs) contained in this manual are presumed to have satisfied this demonstration requirement and do not need to provide technical justification to support the selection of BMPs. Following the stormwater management practices in this manual means adhering to the criteria provided for proper selection, design, construction, implementation, operation, and maintenance of BMPs. This approach will generally be more cost-effective for typical WSDOT projects.

### 1-1.4. Overview of Manual Development

The original *Highway Runoff Manual* was published in 1995 for primary application in the Puget Sound basin. The manual was designed to be consistent with Ecology's *Stormwater Management Manual for the Puget Sound Basin* (published in 1991), with specific guidance for transportation projects. The *Stormwater Management Manual for the Puget Sound Basin* became obsolete when Ecology published the SMMWW. Ecology's publication of the SMMEW provided the first comprehensive stormwater management manual for the eastern areas of the state. The guidance included in these two manuals forms the basis for this revised HRM and supports WSDOT's mission by providing technical and uniform criteria consistent with the intent of Ecology's stormwater guidance for all areas of the state.

This manual represents a culmination of years of extensive research, collaboration, and negotiation by an interdisciplinary technical team made up of water quality, stormwater, and erosion control specialists; designers; hydrologists; geotechnical and hydraulics engineers; landscape architects; and maintenance staff. The technical team also included several county representatives and benefited from a close working relationship with Ecology staff (with work also contributed by consultants and outside reviewers). The technical team recognized that it is inefficient, and in some instances ineffective, to attempt to emulate how local jurisdictions manage runoff from residential, commercial, and industrial land uses. Consequently, its approach to revising the manual took into consideration the following:

1. WSDOT needs a statewide approach for managing stormwater that recognizes the differences in climate, soils, and land uses in eastern and western Washington.
2. Highway projects are linear in nature and, as such, are faced with practical limitations in terms of locating and maintaining stormwater management facilities within state-owned right of way.
3. WSDOT has limited control over many pollution sources entering its right of way, such as pollutants generated from atmospheric deposition, vehicle operation, litter, organic debris, and surrounding land uses.
4. The option to discharge runoff to local jurisdictions' drainage systems is not always available.
5. WSDOT lacks funding mechanisms (such as stormwater utility fees) and land use controls (such as zoning and land use ordinances) available to local governments.
6. WSDOT must be accountable to taxpayers to provide cost-effective stormwater facilities. WSDOT cannot infringe on the Legislature's authority to allocate gasoline tax funds to transportation programs and projects by agreeing to measures that significantly increase project costs.

### 1-1.5. Overview of Federal, State, and Local Regulations Related to Stormwater

Water pollution control was formally established as a federal concern when Congress passed the first Water Pollution Control Act in 1948. For many years, the emphasis was on control of point source pollution; typically, outfalls from industrial factories and municipal sewage treatment plants. Since the early 1980s, water pollution control efforts have broadened to address non-point sources of pollution. Pollution collected and carried by stormwater often originates from nonpoint sources, but may be collected, conveyed, and discharged as a point source.

Major amendments to the Federal Water Pollution Control Act (which has become known as the Clean Water Act) in 1987 addressed stormwater pollution by extending the National Pollutant Discharge Elimination System (NPDES) permit program to include stormwater discharges. Also in 1987, the Puget Sound Water Quality Authority (now the Puget Sound Action Team) issued the Puget Sound Water Quality Management Plan. This plan called for a Highway Runoff Program, which was subsequently developed in detail by Ecology and codified in WAC 173-270.

#### 1-1.5.1. Phase I NPDES Municipal Stormwater General Permits

In 1995, Ecology prepared NPDES municipal separate storm sewer permits for several municipalities with populations greater than 100,000. The Phase I NPDES permittees included the cities of Seattle and Tacoma; the counties of Clark, King, Pierce, and Snohomish; and WSDOT.

The Phase I NPDES Municipal Stormwater General Permit (originally effective through the year 2000 and subsequently extended by Ecology pending reissuance of the Phase I municipal permit and issuance of the WSDOT municipal permit) requires WSDOT to implement a stormwater program within the Phase I jurisdictional areas, including minimum requirements and BMPs equal to those found in the *Stormwater Management Manual for the Puget Sound Basin* or equivalent. The stormwater management plan developed in accordance with this Phase I permit requires WSDOT to “reduce pollutants in discharges to the maximum extent practicable (MEP).” To attain future compliance with its revised NPDES permit, and to continue to meet the general standards of all known, available, and reasonable technology (AKART) and MEP, WSDOT must implement a stormwater program that includes minimum requirements and best management practices consistent with those found in the SMMWW and the SMMEW.

#### 1-1.5.2. NPDES Construction Stormwater General Permit

Beginning in 1995, WSDOT construction projects were also required to comply with the Ecology NPDES requirements specific to construction activities. The threshold for a site disturbance area that typically triggered an NPDES Construction Stormwater General Permit was 5 acres. Some large WSDOT projects with particularly sensitive environmental

concerns are required to obtain individual NPDES construction stormwater permits from Ecology. NPDES construction stormwater permits require:

- Detailed documentation of temporary erosion and sediment control (TESC) measures.
- Implementation of TESC measures.
- Other pollution prevention and control measures.

Activities at sites such as the Washington State Ferries Eagle Harbor maintenance facility are covered under the NPDES Industrial Stormwater General Permit. Beginning in 1999, several fish species in Washington State were listed as threatened or endangered under the ESA, thus expanding the necessity for stormwater runoff control at WSDOT project sites in many parts of the state. The ESA requires that a biological evaluation be conducted to determine potential project impacts on threatened or endangered species, including impacts associated with stormwater. Stormwater management measures implemented at many WSDOT sites have been shaped by requirements necessary to avoid, minimize, or reduce potential impacts to threatened and endangered species under the ESA. The Section 7 Consultation process serves as the primary ESA compliance pathway for WSDOT projects.

### **1-1.5.3. Phase II NPDES Municipal Stormwater General Permits**

Beginning in March 2003, the U.S. Environmental Protection Agency (U.S. EPA) extended the NPDES permit program (Phase II) for municipal separate storm sewer systems to encompass many more jurisdictions. Ecology's issuance of permits under Phase II of the NPDES program extended requirements for effective stormwater management to most of the state's urbanized areas. Also in 2003, the NPDES permit program lowered the threshold for construction projects that require general NPDES construction stormwater permits to 1 acre of ground disturbance; thus encompassing a much higher percentage of WSDOT projects. Ecology's reissuance of the NPDES Construction Stormwater General Permit incorporates additional regulations of the U.S. EPA's nationwide Phase II program and requires implementation of construction site BMPs in conformance with the SMMWW and SMMEW.

Additional state regulations applicable to stormwater include:

- Implementation of Total Maximum Daily Load (TMDL) plans by Ecology and local partners, resulting in limitations on pollutants in stormwater discharges. TMDLs are addressed in Section 303(d) of the Clean Water Act.
- Conditions of the underground injection control (UIC) program (WAC 173-218). The UIC program is administered by Ecology to implement provisions of the federal Safe Drinking Water Act. It applies to subsurface drainage facilities (such as drywells) that discharge water to the ground.
- Site-specific Section 401 (of the Clean Water Act) Water Quality Certifications issued by Ecology in relation to projects that require federal Section 404 permits for in-water work. Section 404 of the Clean Water Act

provides federal regulatory protection for wetlands and other waters of the United States.

- Conditions of aquatic lands use authorizations. The aquatic lands use authorization is administered by the Washington State Department of Natural Resources (DNR) and may apply to stormwater outfalls per RCW 79.90 through 79.96 and WAC 332-30.
- State surface water quality standards (WAC 173-201A).

In most instances, local stormwater management requirements will not override the requirements in this manual. RCW 47.01.260(1) grants WSDOT plenary power in planning, locating, designing, constructing, improving, repairing, operating, and maintaining state highways, including drainage facilities and channel changes necessary for the protection of such highways. This grant of authority means that, without express legislative direction, WSDOT is not subject to local ordinances in areas within WSDOT's purview, and attempts by local agencies to enforce such preempted ordinances are unconstitutional.

#### **1-1.5.4. Local Requirements**

With respect to all state highway right of way in the Puget Sound basin under WSDOT control, WSDOT must use the HRM to direct stormwater management for its existing and new facilities and rights of way, as addressed in WAC 173-270-030(1). Stated exceptions where more stringent stormwater management requirements may apply are addressed in WAC 173-270-030(3)(b) and (c).

- When a state highway is located in the jurisdiction of a local government that is required by Ecology to use more stringent standards to protect the quality of receiving waters, WSDOT will comply with the same standards to promote uniform stormwater management. The key emphasis here is that Ecology has to require the local government to use more stringent standards (such as via an existing TMDL) rather than the local jurisdiction simply doing so of its own accord.
- WSDOT will comply with standards identified in watershed action plans for WSDOT rights of way, as required by WAC 400-12-570. This is similar to the condition described above; however, its application is complicated by the fact that WAC 400-12-570 (*Action Plan Implementation*) was repealed on December 7, 1991.

Other instances where more stringent local stormwater standards can apply are projects subject to tribal government standards and to the stormwater management-related permit conditions associated with critical area ordinances (under the Growth Management Act) and shoreline master programs (under the Shoreline Management Act). In addition, WSDOT must comply with local jurisdiction stormwater standards when WSDOT elects, and is granted permission, to discharge stormwater runoff into a municipality's stormwater system.

Issuance of WSDOT's statewide municipal NPDES permit will further reduce the number of stormwater-related permits required by no longer regulating stormwater discharges under *Section 401 Water Quality Certification* and *Hydraulic Project Approval* permits.

This manual represents a set of tools and options that supports compliance with local, state, and federal regulations related to stormwater management. Incorporation of local and regional stormwater requirements into project design is further discussed in Sections 2-6 and 2-7.

## 1-2. The Importance of Stormwater Management

### 1-2.1. Background and Objectives

Land development can have a dramatic impact on the natural hydrologic cycle. In western Washington, land cover that once consisted primarily of mature forest has been replaced in many areas with impervious surfaces such as rooftops, parking areas, roadways, and manicured landscapes. Similar transitions have occurred in eastern Washington where prairies, pine forests, shrub-steppe landscapes, and channeled scablands have been replaced by farmland and urbanization. The creation of impervious surfaces has two main effects on the hydrologic cycle: a reduction in infiltration and an associated increase in surface runoff. Reducing land cover, mainly by tree removal, can also significantly increase runoff, even though pervious surfaces remain.

The creation of impervious surfaces increases both the volume of surface runoff and the peak rate of flow resulting from a storm event, leading to increased flooding rate, extent, and severity. Increasing impervious surfaces also decreases the time to peak discharge. The higher velocity and greater quantity of flow may cause streambank erosion and aquatic habitat destruction that could potentially result in geomorphological impacts. Sediment from cleared areas and eroded and unstable streambanks is deposited downstream, filling ponds, streambeds, and stormwater facilities. Construction projects with exposed and unstabilized soils, especially on slopes, can be significant sources of soil and sediment that adversely affect drainage systems and receiving waters.

Stormwater and snowmelt runoff function as the transport mechanisms for nonpoint sources of pollution, as well as for the atmospheric deposition of airborne pollutants. In addition to the hydrologic effects from runoff, land development significantly increases the amount of pollutants available for entrainment in stormwater and snowmelt runoff. Increased pollutant loadings resulting from human habitation and activity can result in the measurable degradation of receiving waters.

A more subtle impact of development on the hydrologic cycle is the reduction of infiltration. Infiltration of precipitation, stormwater, and snowmelt runoff recharges groundwater and produces interflow: the subsurface flow particularly common in many of the soils in

Washington State. Shallow groundwater is typically the source of summer base flows in streams, and it sustains water levels in some wetlands. Reduction in infiltration can dry up small streams and wetlands in the summer and, in turn, render aquatic systems uninhabitable during these times.

### **1-2.2. Impacts of Roadway Runoff**

Runoff from roadways and associated facilities may contain suspended solids; oil and grease (hydrocarbons); and heavy metals such as lead, copper, and zinc. Many of the pollutants in roadway runoff are attributed to motorized vehicle operation. The wearing of brake linings, thrust bearings, engine crankshafts, and tires results in the deposition of numerous heavy metal particles on the roadway surface. The dripping of oil and other engine fluids deposits additional heavy metals, phosphorus, hydrocarbons, and other toxic organic compounds on the roadway surface. Atmospheric deposition of airborne pollutants via rain and snow events also contributes to the pollutant content on roadways, particularly in heavily urbanized areas. Litter, organic debris, and other materials that are common in roadway corridors also contribute to the pollutant loading in roadway runoff. The motor vehicle industry is engaged in various efforts to reduce the extent to which vehicles produce pollutants. These include the manufacture of brake pads with less copper content and engines powered by alternative energy sources, which may reduce pollutant loadings in roadway runoff in the future.

Transportation projects, which tend to be linear in nature, may encompass multiple drainage basins and impact multiple receiving waters. While the runoff discharged from highways and other parts of the transportation infrastructure represents only a portion of the runoff affecting nearby water bodies, it contributes to the cumulative degradation of those waters. The effects of stormwater runoff on receiving waters are typically a function of the proximity of development site discharges to the receiving water body and the size of the receiving water body relative to discharge volumes and flow rates. The impacts of stormwater runoff from state-owned rights of way vary widely, depending on surrounding land use, climate patterns, soil characteristics, receiving water characteristics, and other local factors.

The construction of roadway improvement projects also contributes to surface runoff contamination, due mainly to suspended solids associated with soil erosion. Construction activities can also result in stormwater and nearby surface waters being contaminated with oil, heavy metals, and other pollutants resulting from vehicle operations and maintenance; runoff from areas where solvents, paints, and other liquid materials are used and stored; leaching of asphalt emulsion and concrete slurry; and a variety of other sources. Those impacts can be severe and long-lasting if appropriate actions are not taken to control construction site runoff quality.

### **1-2.3. Management of Runoff From Transportation Projects**

The key to controlling problems created by stormwater is the application of best management practices (BMPs). BMPs are defined as physical, structural, and managerial practices that,

when used individually or in combination, prevent or reduce pollution of water and attenuate peak flows and volumes. BMPs targeting the types of problems discussed above are typically categorized as *temporary* or *permanent*. Temporary BMPs are typically used only during the construction phase of a project. Permanent BMPs are used to control and treat runoff throughout operation of the highway, park-and-ride lots, rest areas, ferry terminals, or other transportation project sites. Some BMPs, such as detention ponds, may function in both temporary and permanent BMP capacities.

Temporary BMPs are designed to prevent the introduction of pollutants into runoff for the duration of the construction project and are concurrent with construction of the permanent BMPs. Common examples of temporary BMPs include mulching of bare ground, silt fencing, and spill control and containment. Permanent runoff treatment BMPs include facilities that remove pollutants from runoff by simple gravity settling of particulate matter and by filtration, biological uptake, and soil adsorption (typical examples include wet ponds and vegetated swales). Flow control BMPs reduce the peak rate of runoff during a storm event by storing the flow and releasing it at a slower rate, thus protecting stream ecosystems from excessive erosion (typical examples are detention ponds and dry vaults). Permanent BMPs are used to treat highway runoff for the design life of the project site.

Stormwater problems can be grouped into two categories: (1) impacts associated with existing impervious areas, and (2) impacts arising from new impervious areas if no stormwater controls are used. New projects that must comply with this manual are required to provide stormwater management for the new impervious surfaces.

Project designers should keep in mind that the ultimate goal is to provide practicable stormwater management for runoff from the existing impervious surfaces and protect the beneficial uses of receiving waters. Existing highway sections that have no stormwater treatment or flow control, or where treatment or flow control is substandard, may eventually be retrofitted in accordance with WSDOT's stormwater retrofit program. If it is cost-effective to include a BMP to address the entire project site, even though only a portion of the facility is undergoing expansion or redevelopment, the BMP should be designed and constructed to address the larger area. Guidelines for determining whether it is cost-effective to provide stormwater management beyond what is required are in Section 3-4.

In some cases, it may not be practicable to provide treatment or flow control for runoff from project-site areas, due to various constraints such as site limitations, costs, or other obstacles. If on-site mitigation is not feasible, opportunities that use this manual's off-site treatment options must be identified. Sections 2-7.3 and 2-7.4 present a process for analyzing off-site treatment options. WSDOT will continue to develop, pursue, and expand off-site options. However, these options are currently constrained to the "in-kind" variety, as Ecology has stated it will not authorize the use of "out-of-kind" mitigation options.

## 1-3. Organization of This Manual

The *Highway Runoff Manual* (HRM) is divided into six chapters. Chapter 1 provides background information on the development of the manual and an overview of the stormwater problems associated with highways and other parts of the transportation infrastructure.

Chapter 2 provides an overview of the WSDOT project design process and how the stormwater/drainage design elements should be integrated into that process. Guidelines are provided for gathering predesign data and analyzing design alternatives.

- Appendix 2A presents a method to assist in determining when site-specific factors could make constructing stormwater management facilities within or adjacent to the highway right of way infeasible.

Chapter 3 describes the minimum requirements that apply to the planning and design of stormwater facilities and best management practices. Guidelines are provided to determine which of the nine minimum requirements must be met for a given transportation project. The purpose and the applicability of the minimum requirements are described. Guidelines are also provided for assessing (1) whether project-driven stormwater retrofit obligations can be met off-site by retrofitting an equivalent area of state highway in targeted environmental priority locations, and (2) whether it is cost-effective to provide stormwater management retrofits beyond what is called for under these requirements.

Chapter 4 provides a description of the different hydrologic analysis methods that must be used to design stormwater runoff treatment and flow control facilities. This chapter also provides a detailed explanation of the analysis methods used as well as the supporting data and assumptions needed to complete the design.

- Appendix 4A contains the websites and web links related to Chapter 4.
- Appendix 4B contains the TR55 Curve Number Tables.
- Appendix 4C covers eastern Washington design storm events.

Chapter 5 guides the project designer through the selection of permanent stormwater treatment, infiltration, and flow control BMPs and their design processes. It includes a process for BMP selection in both western and eastern Washington. Criteria for the use of emerging technologies and discussions about operation and maintenance are included. Detailed design criteria for each permanent BMP are included in Section 5-4.

Chapter 6 guides the project designer through the process of selecting and designing temporary construction-related BMPs. It includes criteria for selecting appropriate erosion and sediment control (ESC), as well as spill prevention, control, and countermeasures (SPCC) BMPs (including operation and maintenance considerations). Chapter 6 also provides guidelines on water quality monitoring for projects required to monitor runoff quality and receiving water effects during construction.

- Appendix 6A includes the design criteria for each temporary BMP.

## 1-4. How to Use This Manual

The designer should follow the guidelines for integrating the planning and design of stormwater-related project elements into the context of WSDOT's project development process prior to using the guidelines in Chapter 3 to determine which minimum requirements must be satisfied for a specific project. In most instances, this process will spur the need to design construction and postconstruction BMPs according to the criteria provided in Chapters 4, 5, and 6.

Most projects lend themselves to relatively straightforward application of one or more of the BMP options presented in this manual. However, many WSDOT sites are not conducive to easy installation of any BMPs. When these types of problems arise, contact the following for assistance:

- **BMP Selection** – Region environmental or hydraulics staff, then the Hydraulics Section staff or the Stormwater & Watersheds Program staff at the HQ Environmental Services Office (ESO).
- **Outfall Inventory/Field Screening Results, Stormwater Retrofit Priorities, NPDES Municipal Stormwater Permit, and Water Quality Sampling** – Staff in the HQ ESO, Stormwater & Watersheds Program.
- **Spill Control, Containment, and Countermeasure Activities** – Region environmental staff, then staff in the HQ ESO, Hazardous Materials Program.
- **Temporary Erosion and Sediment Control Plans and Construction Site BMPs** – Region environmental staff, then staff in the HQ ESO, Stormwater & Watersheds Program.
- **Vegetation Management** – Region and HQ Landscape Architects, then HQ Highway Maintenance staff.
- **Roadway Maintenance Practices** – Region maintenance staff, then HQ Highway Maintenance environmental staff.
- **Emerging BMPs** – Region environmental staff and the HQ ESO, Stormwater & Watersheds Program staff.

For information about the HRM-related training curriculum, see the HRM Resource Web Page: [www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm](http://www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm)