

## CHAPTER 1

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# Introduction to the HRM



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## 1-1 Purpose, Need, and Scope

The *Highway Runoff Manual* (HRM) directs 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 statewide. The HRM establishes minimum requirements and provides uniform technical criteria for:

1. Avoiding and mitigating impacts to water resources associated with the development of state-owned and/or -operated transportation infrastructure systems.
2. Reducing and minimizing water resource impacts associated with the redevelopment of those facilities.
3. Retrofitting existing facilities for ~~both~~ project-driven, opportunity-based, and stand-alone stormwater retrofit projects.

The manual also provides guidelines for integrating the planning and design of stormwater-related project elements into the context of the Washington State Department of Transportation (WSDOT) project development process.

This manual frequently references the *Hydraulics Manual* to address the analysis and design of hydraulic features. The two manuals are used in tandem to complete the analysis and design of stormwater facilities and the other drainage components within the project.

The design criteria and procedures presented in this manual supersede conflicting information presented in other previously published WSDOT manuals. The manual receives periodic updates to enhance content clarity, as well as reflect changes in regulations, advances in stormwater management, and improvements in design tools.

- To ensure ~~the PEO you are~~ using the most current design criteria, see the post-publication updates on the HRM website:  
[www.wsdot.wa.gov/environment/waterquality/runoff/highwayrunoffmanual.htm](http://www.wsdot.wa.gov/environment/waterquality/runoff/highwayrunoffmanual.htm)  
[www.wsdot.wa.gov/Design/Hydraulics/HighwayRunoffManual.htm](http://www.wsdot.wa.gov/Design/Hydraulics/HighwayRunoffManual.htm)
- To receive email announcements regarding HRM-related updates, training opportunities, and improvements in design tools, please sign up at [HRM Electronic Mailing List](#).

## 1-2 Regulatory Standing of the Manual

The 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* (SWMMWW) and *Stormwater Management Manual for Eastern Washington* (SWMMEW). The requirements and guidelines vary for western and eastern Washington and take into account statewide variations in climate, soils, geology, receiving water characteristics, and environmental concerns.

The guidelines and criteria in the HRM also support WSDOT's efforts to comply with the requirements of the federal Endangered Species Act (ESA). However, unlike Ecology's formal review and approval process, the National Oceanic and Atmospheric Administration (NOAA) Fisheries and the United States Fish and Wildlife Service (USFWS) did not review the Ecology stormwater management manuals or the HRM for programmatic "concurrence" under the ESA.

## 1-2.1 Local Requirements

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.

~~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.~~

~~In NPDES permit covered areas statewide, WSDOT will apply the HRM Minimum Requirement Thresholds to determine treatment and/or flow control what stormwater HRM Minimum Requirements are required for the WSDOT projects discharging to receiving waters.~~

~~Since the HRM has equivalency status with Ecology's SWMMWW and SWMMEW, the HRM thresholds are also valid for determining what and when stormwater Minimum Requirements apply when discharging going through to another jurisdiction's MS4 (in Phase I/II NPDES covered areas (local jurisdictions) since the HRM has been deemed equivalent to Ecology's SWMMWW and SWMMEW. Once the WSDOT projects exceeding the HRM Minimum Requirement Thresholds, WSDOT will apply the HRM Minimum Requirements, BMP selection, and BMP design -per the HRM the HRMoe WSDOT will implement minimum requirements that are equivalent to HRM requirements, excluding those exceptions listed belowabove.~~

One exception where more stringent stormwater management requirements may apply is 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.<sup>7</sup> In such a case, WSDOT will comply with the same standards to promote uniform stormwater treatment. *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.*

Another exception is where a WSDOT project will discharge stormwater into a local jurisdiction's combined or storm sewer system. WSDOT will work with the local jurisdiction to determine how to address any new impacts that may decrease the capacity of the combined or storm sewer system and document the analysis and results in the hydraulic report. *The key emphasis here is that the local jurisdiction may have capacity constraints in the combined or storm sewer system which apply to all discharges (including WSDOT) to the system.*

~~If a WSDOT project will discharge stormwater into a combined sewer system, WSDOT must comply with requirements prescribed by Ecology regarding stormwater quality and quantity.~~

Other instances where more stringent ~~local~~ stormwater standards can apply are projects subject to tribal government-adopted water quality standards or CWA Section 401 water quality certifications, and to ~~the stormwater management-related permit conditions associated with critical area ordinances (under the Growth Management Act adopted critical area ordinance requirements that specifically apply to stormwater discharges) and shoreline master programs (under the Shoreline Management Act).~~ **In addition, if WSDOT seeks permission to discharge stormwater runoff into a utility's storm sewer system, WSDOT must comply with the storm sewer utility's standards for stormwater quality and quantity.**

Incorporation of local and regional stormwater requirements into project design is further discussed in Sections 2-6 and 2-7.

Local agencies and private developers doing work on WSDOT right of way must use the HRM when discharging to WSDOTs conveyance systems. If the local agency or private developer is working on WSDOT right of way and discharges to the jurisdiction's MS4 (in Phase I/II NPDES covered areas), the local agency and private developer should follow the local jurisdiction's stormwater manual and requirements.

## 1-2.2 Presumptive vs. Demonstrative Approaches to Protecting Water Quality

This manual provides 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*. ~~The PEO~~**You** may opt not to follow the manual's stormwater management practices by seeking compliance via the *demonstrative approach*. However, this requires that ~~they~~**your** project (1) collects and provides appropriate supporting data demonstrating that the alternative approach protects water quality and satisfies state and federal water quality laws; and (2) performs the technology-based requirements of state and federal law.

Both the *presumptive* and *demonstrative* approaches require properly designed, constructed, maintained, and operated stormwater management systems in order 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 *presumptive approach*, 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.

However, 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 exist. 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 will not authorize the use of "out-of-kind" mitigation options.<sup>1</sup>

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<sup>1</sup> The term "in-kind" refers to methods that meet the requirements of those they are replacing, such as constructing a flow control facility off site for unmet project flow control requirements. The term "out-of-kind" mitigation is mitigation that does not directly match the project requirements, such as water quality treatment instead of flow control.



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 **or discharge location**. In each case, **the PEO~~you~~** may be asked to document, to the satisfaction of Ecology or other approval authority, that the practices **you-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. However, projects can also benefit from pursuing this compliance pathway where site constraints or conditions make applying the standard HRM guidelines impracticable. Contact the Highway Runoff Program Manager in the HQ Hydraulics Section as soon in the design process as possible to initiate the demonstrative approach process or to discuss possible alternatives.

## 1-3 Organization of This Manual

The HRM consists of five chapters. Chapter 1 describes the manual's purpose, regulatory standing, and application.

[Chapter 2](#) provides an overview of the WSDOT project design process and how to integrate the stormwater/drainage design elements into that process. The chapter includes guidelines 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. The chapter includes guidelines to determine which of the nine minimum requirements apply to a given transportation project. The chapter describes the purpose and the applicability of the minimum requirements. It also provides guidelines for assessing (1) whether project-driven stormwater retrofit obligations can be met **on-site or** off site, and (2) under what circumstances to provide stormwater management retrofits beyond what the manual requires.

[Chapter 4](#) ~~describes~~**provides** the hydrologic analysis methods to use to design stormwater runoff treatment and flow control facilities. This chapter also provides a detailed explanation of the analysis methods 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.
- [Appendix 4D](#) contains infiltration rate design and testing methods.
- [Appendix 4E](#) contains a discussion on continuous simulation modeling.

Chapter 5 guides the project designer through the selection of permanent stormwater treatment, infiltration, and flow control BMPs and their design processes. Section 5-4 includes detailed design criteria for each permanent BMP and Section 5-5 provides the maintenance standards for the various BMPs. The chapter also includes a process for seeking authorization to use emerging technologies and other alternative BMP options.

The former Chapter 6 is now a stand-alone *Temporary Erosion and Sediment Control Manual* (TESCM). The manual provides WSDOT the strategy for meeting the statewide stormwater pollution prevention planning (SWPPP) discharge sampling and reporting requirements in the National Pollutant Discharge Elimination System (NPDES) Construction Stormwater General Permit (CSWGP), which is issued by Ecology. It includes criteria for selecting appropriate temporary erosion and sediment control (TESC), as well guidelines on water quality monitoring for projects required to monitor runoff quality and receiving water effects during construction.

## 1-4 How to Use This Manual

Follow Chapter 2's guidelines for integrating the planning and design of stormwater-related project elements into the context of WSDOT's project development process prior to using Chapter 3 to determine the applicable minimum requirements for a specific project. In most instances, this process will spur the need to design construction and post-construction 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, in some instances a site presents a challenge and does not lend itself easily to the approaches prescribed herein. When these situations arise, contact the following for assistance:

- **BMP Selection** – Region ~~Hydraulics Engineer~~~~environmental or hydraulics staff~~, then the HQ ~~Hydraulics Section~~~~Highway Runoff Manual Program staff~~.
- **Outfall Inventory/Field Screening Results, Stormwater Retrofit Priorities, NPDES Municipal Stormwater Permit, and Water Quality Sampling** – Staff in the HQ Environmental Services Office's (ESO's) Stormwater and Watersheds Program.
- **Spill Control, Containment, and Countermeasure Activities** – Region environmental staff, then staff in the HQ ESO's Hazardous Materials Program.
- **Temporary Erosion and Sediment Control Plans and Construction Site BMPs** – Region environmental staff, then staff in the HQ ESO's Stormwater and 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 Hydraulics Engineer ~~environmental staff~~ and the HQ Hydraulics Section ~~Highway Runoff Program staff~~.
- **Demonstrative Approach** – HQ Hydraulics Section ~~Highway Runoff 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)~~  
<http://www.wsdot.wa.gov/Design/Hydraulics/HighwayRunoffManual.htm>