CHAPTER 3

Minimum Requirements

Chapter 3. Table of Contents

List of Tables

List of Figures

Chapter 3. Minimum Requirements

3-1 Introduction

Note to the designer: It is extremely important to take the time to thoroughly understand the minimum requirements presented in this chapter when making stormwater design decisions. A firm grasp of the chapter's terminology is essential; consult the manual's Glossary to clarify the intent and appropriate use of these terms. Direct your questions regarding the minimum requirements and terminology to the region hydraulics representative, the Headquarters (HQ) Highway Runoff Office, or the HQ Environmental Services Office.

This chapter describes the nine minimum requirements that apply to the planning and design of stormwater management facilities and best management practices (BMPs) for existing and new Washington State highways, rest areas, park-and-ride lots, ferry terminals, and highway maintenance facilities. In order to plan and design stormwater management systems appropriately, the designer must determine specific parameters related to the project, such as new impervious area created, converted pervious area, area of land disturbance, presence of wetlands, and applicability of basin and watershed plans. Projects that follow the stormwater management practices in this manual achieve compliance with federal and state water quality regulations through the *presumptive approach*. As an alternative, see Sections 1-1.3, 2-7.4, and 5-3.5.3 for a description of using the *demonstrative approach* to protect water resources in lieu of following the stormwater management practices in this manual.

This chapter provides information on applying the following minimum requirements to various types and sizes of projects:

1. Stormwater Planning
2. Construction Stormwater Pollution Prevention
3. Source Control of Pollutants
4. Maintaining the Natural Drainage
5. Runoff Treatment
6. Flow Control
7. Wetlands Protection
8. Watershed/Basin Planning
9. Operation and Maintenance

Not all of the minimum requirements apply to every project. The flowcharts in Figures 3.1, 3.2, and 3.3are provided to assist in determining which requirements **may** apply. **Consulting the flowcharts is the initial step in the process. The next critical step**

involves reviewing Section 3-2 for the detailed information provided for each minimum requirement in terms of its objective, applicability (and potential exemptions), and guidelines for application. Consult the Glossary to ensure complete understanding of the minimum requirements. Additional guidelines for retrofits are provided in Section 3-4.

Note: For the purposes of this manual, the boundary between eastern and western Washington is the Cascade Crest, except in Klickitat County, where the boundary line is the 16-inch mean annual precipitation contour (isopleth).

3-2 Applicability of the Minimum Requirements

3-2.1 Project Thresholds

Unless otherwise noted, all minimum requirements apply throughout the state. However, in some instances, design criteria, thresholds, and exemptions for eastern and western Washington differ due to different climatic, geologic, and hydrogeologic conditions. Regional differences for each minimum requirement are presented in Section 3-3 under the *Applicability* sections. Additional controls may be required, regardless of project type or size, as a result of adopted basin plans or to address special water quality concerns via a critical area ordinance or a requirement related to the total maximum daily load (TMDL).

All nonexempt projects are required to comply with Minimum Requirement 2. In addition, projects that exceed certain thresholds are required to comply with additional minimum requirements. Use Figures 3.1, 3.2, and 3.3 as the **initial step** in determining which requirements might apply. The **next critical step** involves reviewing the detailed information provided for each applicable minimum requirement in Section 3-3. Consult the Glossary to gain a clear understanding of the following terms, which are essential for correctly assessing minimum requirement applicability.

- New impervious surface
- Converted pervious surface
- Pollution-generating impervious surface (PGIS)
- Pollution-generating pervious surface (PGPS)
- Land-disturbing activity
- Native vegetation
- Non-road-related projects
- Existing roadway prism
- Project limits
- Replaced impervious surface
- Effective impervious surface

- Noneffective impervious surface
- Effective PGIS
- Noneffective PGIS
- Threshold discharge area (TDA)
- Net-new impervious surface

Upgrading by resurfacing state facilities from gravel to bituminous surface treatment (BST or "chip seal"), asphalt concrete pavement (ACP), or Portland cement concrete pavement (PCCP) is considered to be adding new impervious surfaces and is subject to the minimum requirements that are triggered when the thresholds are met.

Basin planning is encouraged and may be used to tailor applicable minimum requirements to a specific basin (see Minimum Requirement 8).

3-2.2 Exemptions

Some types of activities are fully or partially exempt from the minimum requirements. These include some road maintenance/preservation practices and some underground utility projects. The road maintenance and preservation practices that are exempt from all the minimum requirements are:

- Pothole and square cut patching.
- Overlaying existing bituminous surface treatment (BST or "chip seal"), asphalt concrete pavement (ACP), or Portland cement concrete pavement (PCCP) with BST, ACP, or PCCP without expanding the area of coverage.
- Shoulder grading.
- Reshaping/regrading drainage systems.
- Crack sealing.
- Resurfacing with in-kind material without expanding the road prism.
- Vegetation maintenance.
- Upgrading by resurfacing Washington State Department of Transportation (WSDOT) facilities from BST to ACP or PCCP without expanding the area of coverage.[1]

[1] This exemption is applicable only to WSDOT projects; whereas, the "gravel-to-BST" exemption in Ecology's stormwater management manuals is available to local governments. For local governments, upgrades that involve resurfacing from BST to ACP or PCCP are considered new impervious surfaces and are not categorically exempt.

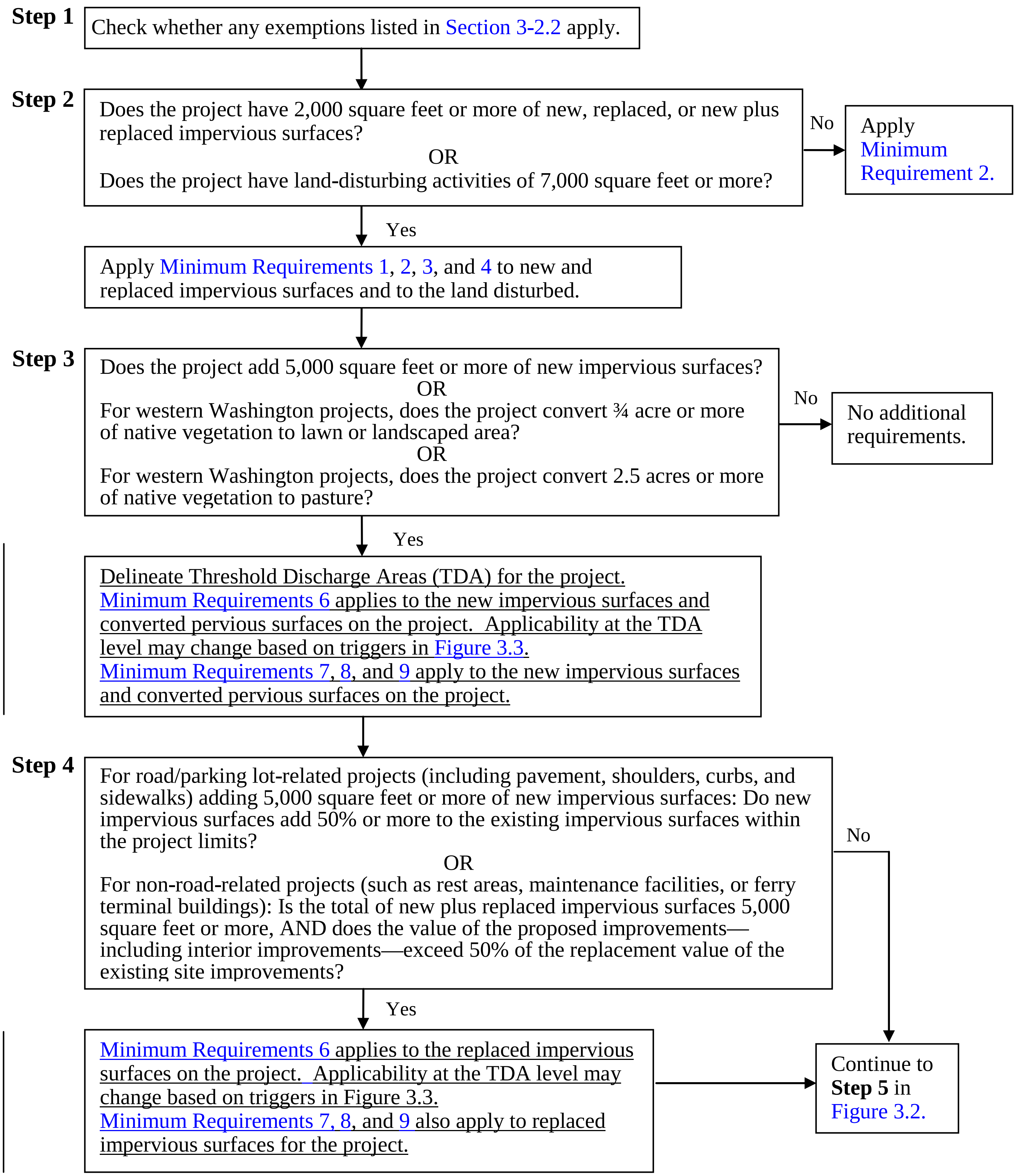


Figure 3.1 Minimum requirement applicability at project level.

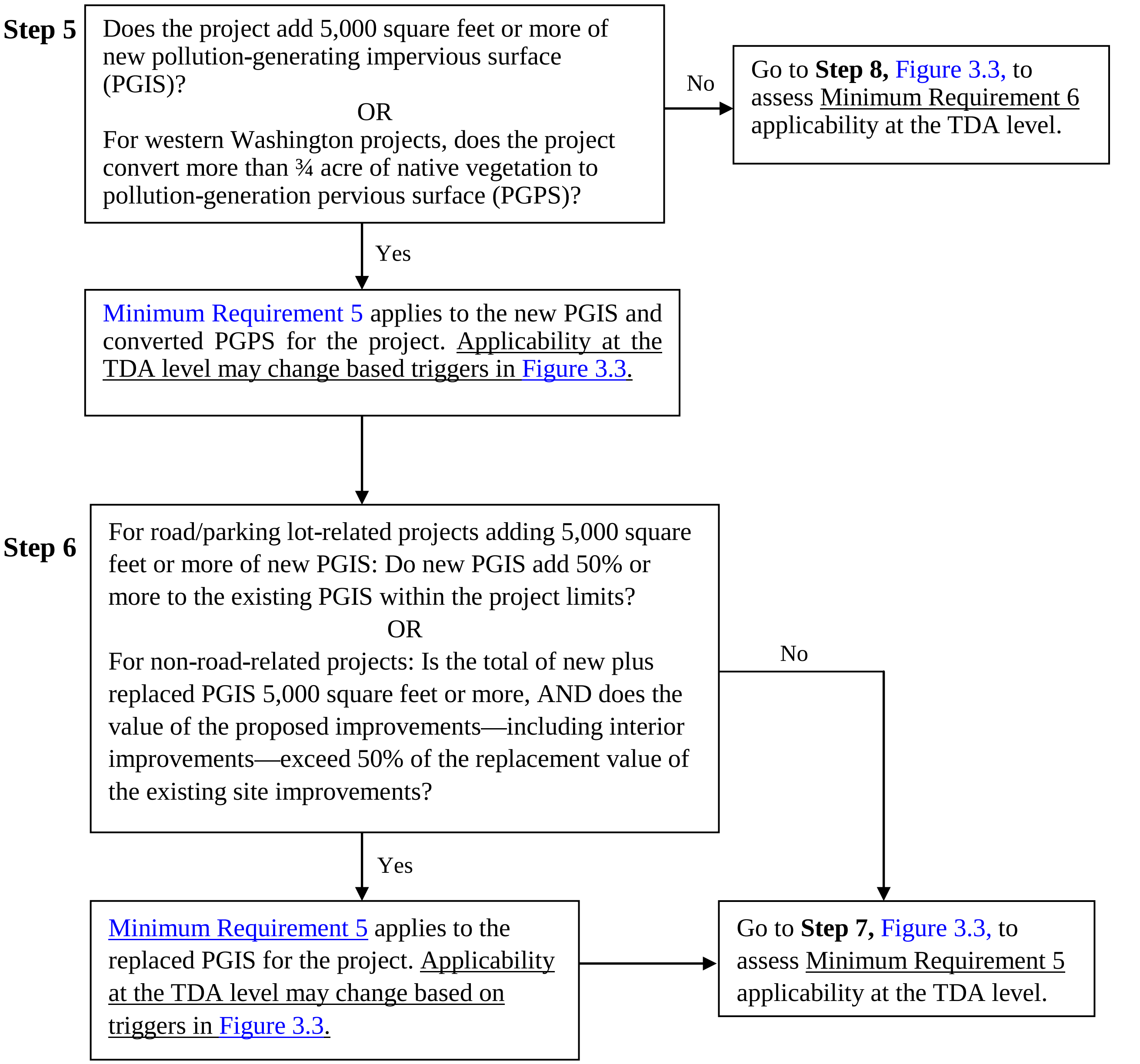
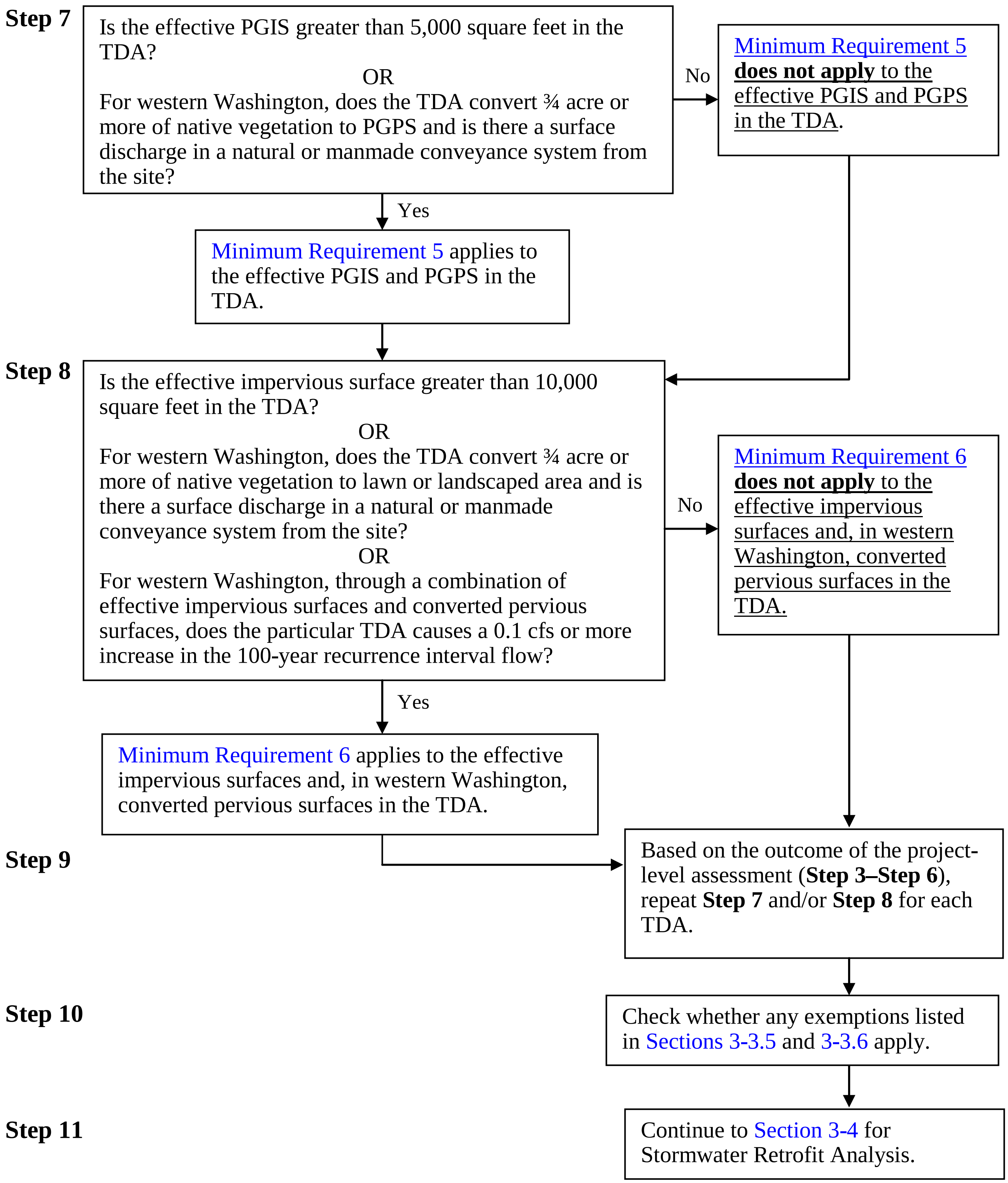


Figure 3.2 Minimum requirement applicability at project level (continued).



Note: For Figure 3.3, Minimum Requirements 1–4 and 7–9 still apply to all TDAs on the project, even though Minimum Requirements 5 and/or 6 may not apply to each TDA.

Figure 3.3 Minimum requirement applicability at TDA level.

The following practices are subject only to Minimum Requirement 2, Construction Stormwater Pollution Prevention:

- Underground utility projects that replace the ground surface with in-kind material or materials with similar runoff characteristics
- Removing and replacing a concrete or asphalt roadway to base course, or subgrade or lower, without expanding or upgrading the impervious surfaces
- Repairing the roadway base or subgrade

3-3 Minimum Requirements

This section describes the minimum requirements for stormwater management at project sites. Consult Section 3-2 to determine which requirements apply to any given project. (See Chapter 5 for BMPs to use in meeting Minimum Requirements 3, 5, 6, 7, and 9, and Chapter 6 for BMPs to use in meeting Minimum Requirement 2.)

3-3.1 Minimum Requirement 1 – Stormwater Planning

The two main stormwater planning components of Minimum Requirement 1 are: (1) Construction Stormwater Pollution Prevention Planning, and (2) Permanent Stormwater Control Planning.

Multiple documents are used to fulfill the objective of this requirement, since addressing stormwater management needs is thoroughly integrated into WSDOT's design, construction, and maintenance programs. WSDOT's construction stormwater pollution prevention planning components consist of Spill Prevention, Control, and Countermeasures (SPCC) plans and Temporary Erosion and Sediment Control (TESC) plans. WSDOT's permanent stormwater control planning components include Hydraulic Reports and aspects of the *Maintenance Manual*.

3-3.1.1 Objective

The stormwater planning components collectively demonstrate how stormwater management will be accomplished, both during project construction and in the final, developed condition.

3-3.1.2 Applicability

Minimum Requirement 1 applies to all nonexempt projects that meet the thresholds described in Figure 3.1. Contractors are required to prepare SPCC plans for all projects, since all projects have the potential to spill hazardous materials. All projects that disturb soil must comply with the 12 TESC elements (see Section 6-2.1.2) and must apply the appropriate best management practices (BMPs) presented in Chapter 6. WSDOT prepares a TESC plan if a construction project adds or replaces (removes existing road surface down to base course) more than 2,000 square feet of impervious surface or disturbs more than 7,000 square feet of soil. Projects that disturb fewer than 7,000 square feet of soil must address erosion control and the 12 TESC elements; however, a stand-alone TESC plan is optional and plan sheets are not required. Both the SPCC and TESC plans must be kept on-site or within reasonable access of the site during construction and may require updates with changing site conditions.

To meet the objectives of the permanent stormwater control planning requirements, WSDOT prepares Hydraulic Reports and follows guidelines in the *Maintenance Manual*. The Hydraulic Report provides a complete record of the engineering justification for all drainage modifications and is prepared for all major and minor hydraulic projects based on guidelines in this manual as well as the *Hydraulics Manual*. As noted in the *Hydraulics Manual*, the Hydraulic Report must contain detailed descriptions of the following items:

- Existing and developed site hydrology
- Flow control and runoff treatment systems
- Conveyance system analysis and design
- Wetland hydrology analysis, if applicable
- Downstream analysis, if applicable

3-3.1.3 Guidelines

Instructions on how to prepare SPCC and TESC plans are provided in Minimum Requirement 2 and in Chapter 6.

Stormwater runoff treatment and flow control BMP maintenance criteria for each BMP in Chapter 5 are included in Section 5-5. Additional standards for maintaining stormwater BMPs are found in the *Regional Road Maintenance/Endangered Species Act Program Guidelines* (www.wsdot.wa.gov/maintenance/roadside/esa.htm). The criteria and guidelines are designed to ensure all BMPs function at design performance levels and that the maintenance activities themselves are protective of water quality and its beneficial uses.

3-3.2 Minimum Requirement 2 – Construction Stormwater Pollution Prevention

The two components of construction stormwater pollution prevention are as follows:

- Temporary Erosion and Sediment Control (TESC) planning
- Spill Prevention, Control, and Countermeasures (SPCC) planning

Erosion control is required to prevent erosion from damaging project sites, adjacent properties, and the environment. The emphasis of erosion control is to prevent the erosion process from starting by preserving native vegetation, limiting the amount of bare ground, and protecting slopes. A TESC plan must address the following elements:

- Element 1: Mark clearing limits
- Element 2: Establish construction access
- Element 3: Control flow rates
- Element 4: Install sediment controls
- Element 5: Stabilize soils
- Element 6: Protect slopes
- Element 7: Protect drain inlets
- Element 8: Stabilize channels and outlets
- Element 9: Control pollutants
- Element 10: Control dewatering
- Element 11: Maintain BMPs
- Element 12: Manage the project

All projects that involve mechanized equipment or construction materials that could potentially contaminate stormwater or soils require SPCC plans. The SPCC plan is a stand-alone document prepared by the contractor and contains the following:

- Site information and project description
- Spill prevention and containment
- Spill response
- Material and equipment requirements
- Reporting information
- Program management
- Plans to contain preexisting contamination, if necessary

Detailed requirements for each of these elements are provided in Sections 6-2 and 6-3. The TESC and SPCC plans must (1) demonstrate compliance with all of those detailed requirements, or (2) when site conditions warrant the exemption of an element(s), clearly document in the narrative why a requirement does not apply to the project.

3-3.2.1 Objective

The objective of construction stormwater pollution prevention is to ensure construction projects do not impair water quality by allowing sediment to discharge from the site or allowing pollutant spills.

3-3.2.2 Applicability

All nonexempt projects must address Construction Stormwater Pollution Prevention per Standard Specification 1.07.15(1). All projects that disturb 7,000 square feet or more of land or add 2,000 square feet or more of new, replaced, or new plus replaced impervious surface must prepare a TESC plan in addition to an SPCC plan.

3-3.2.3 Guidelines

Instructions on how to prepare SPCC and TESC plans are provided in Sections 6-2 and 6-3.

3-3.3 Minimum Requirement 3 – Source Control of Pollutants

All known, available, and reasonable source control BMPs must be applied and must be selected, designed, and maintained in accordance with this manual.

3-3.3.1 Objective

The intention of source control is to prevent pollutants from coming into contact and mixing with stormwater. In many cases, it is more cost-effective to apply source control than to remove pollutants after they have mixed with runoff. This is certainly the case for erosion control and spill prevention during the construction phase.

3-3.3.2 Applicability

Minimum Requirement 3 applies to all nonexempt projects that meet the thresholds described in Figure 3.1. Source control (erosion control and spill prevention) applies to all projects during the construction phase per Minimum Requirement 2. Postconstruction source controls are employed programmatically via WSDOT's maintenance program. Thus, in instances where structural BMPs may not be sufficient, consult with the environmental support staff of the HQ Maintenance and Operations Office to explore operational source control options that may be available to meet regulatory requirements.

Certain types of activities and facilities may require source control BMPs. Determine whether there are pollutant-generating activities or facilities in the project that warrant source controls. Source control BMPs for the activities listed in Section 5-2.1 must be specified to reduce pollutants. For detailed descriptions of the source control BMPs, see Chapter 2 of Volume IV of Ecology's *Stormwater Management Manual for Western Washington* (SMMWW) or Chapter 8 of the *Stormwater Management Manual for Eastern Washington* (SMMEW). Any deviations from the source control BMPs listed in either the SMMWW or the SMMEW must provide equivalent pollution source control benefits. The Project File must include documentation for why the deviation is considered equivalent. Section 5-3.5.3 describes the process for seeking approval of such deviations. The project may have additional source control responsibilities as a result of area-specific pollution control plans (such as watershed/basin plans, water cleanup plans, groundwater management plans, or lake management plans), ordinances, and regulations.

3-3.3.3 Guidelines

Source control BMPs include operational and structural BMPs.

- Operational BMPs are nonstructural practices that prevent (or reduce) pollutants from entering stormwater. Examples include preventative maintenance procedures; spill prevention and cleanup; and inspection of potential pollutant sources.

- Structural BMPs are physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater. Examples include installation of vegetation for temporary and permanent erosion control; putting roofs over outside storage areas; and putting berms around potential pollutant source areas to prevent both stormwater run-on and pollutant run-off.

Many source control BMPs combine operational and structural characteristics. A construction phase example is slope protection using various types of covers: temporary covers (structural) and the active inspection and maintenance needed for effective use of the covers (operational). A postconstruction phase example is street sweeping: a sweeper (mechanical) and the sweeping schedule and procedures for its use (operational) collectively support the BMP.

For criteria on the design of construction-related source control BMPs, see Chapter 6 and Appendix 6A. For criteria on the design of source control BMPs for the postconstruction phase, see Section 5-2.1.

3-3.4 Minimum Requirement 4 – Maintaining the Natural Drainage System

To the maximum extent practicable, natural drainage patterns must be maintained and discharges from the site must occur at the natural outfall locations. The manner by which runoff is discharged must not cause downstream erosion in receiving waters and downgradient properties. Outfalls require dispersal systems and/or energy-dissipation BMPs per *Hydraulics Manual* guidelines.

3-3.4.1 Objective

The intent of maintaining the natural drainage system is to (1) preserve and utilize natural drainage systems to the fullest extent because of the multiple benefits such systems provide, and (2) prevent erosion at, and downstream of, the discharge location.

3-3.4.2 Applicability

Minimum Requirement 4 applies to all nonexempt projects that meet the thresholds described in Figure 3.1, to the maximum extent practicable.

3-3.4.3 Guidelines

When projects affect subsurface and/or surface water drainage, use strategies that minimize impacts and maintain hydrologic continuity. For example, road cuts on hill slopes or roads bisecting wetlands or ephemeral streams can affect subsurface water drainage. Ditching, channel straightening, channel lining, channel obliteration, and roads that bisect wetlands or perennial streams change surface water drainage and stream channel processes. The designer must use the best available design practices to maintain hydrologic function and drainage patterns based on site geology, hydrology, and topography.

If flows for a given outfall are not channeled in the preproject condition, runoff concentrated by the proposed project must be discharged overland through a dispersal system or to surface water through an energy dissipater BMP before leaving the project outfall. Typical *dispersal systems* are rock pads, dispersal trenches, level spreaders, and diffuser pipes. Typical *energy dissipaters* are rock pads and drop structures. These systems are listed in Sections 5-4.3.5 and 5-4.3.6.

In some instances, a diversion of flow from the existing (preproject) discharge location may be beneficial to the downstream properties or receiving water bodies. Examples of where the diversion of flows may be warranted include (1) areas where preproject drainage conditions are contributing to active erosion of a stream channel in a heavily impervious basin, and (2) areas where preproject drainage patterns are exacerbating flooding of downstream properties. If it is determined that a diversion of flow from the natural discharge location may be warranted, contact region or Headquarters hydraulics staff.

3-3.5 Minimum Requirement 5 – Runoff Treatment

Runoff treatment must be provided for all nonexempt projects that meet the threshold described in Figures 3.1, 3.2, and 3.3.

3-3.5.1 Objective

The purpose of runoff treatment is to reduce pollutant loads and concentrations in stormwater runoff using physical, biological, and chemical removal mechanisms to maintain or enhance beneficial uses of receiving waters. When site conditions are appropriate, infiltration can potentially be the most effective BMP for runoff treatment. Meeting runoff treatment requirements may also be achieved through regional stormwater facilities.

3-3.5.2 Runoff Treatment Exemptions

Any of the runoff treatment exemptions below may be negated by requirements set forth in a Total Maximum Daily Load (TMDL) or a TMDL-related water cleanup plan.

- Runoff treatment is not required where no new pollution-generating impervious surface (PGIS) is added. These include:

  - Projects where the only work involved is the addition of paved surfaces not intended for use by motor vehicles (such as sidewalks or bike/pedestrian trails) and that are separated from adjacent roadways.
  - Projects where the only work involved is an overlay or upgrade of existing bituminous surface treatment (BST or "chip seal"), asphalt concrete pavement (ACP), or Portland cement concrete pavement (PCCP) without an increase in impervious area. Note: Upgrading a facility from gravel surface to BST, ACP, or PCCP is considered an addition of new impervious surface and is subject to runoff treatment if the thresholds are met.
- Discharges to underground injection control (UIC) facilities may be exempt from basic runoff treatment requirements if the vadose zone matrix between the bottom of the facility and the water table provides adequate treatment capacity (see Section 4-5.4).

3-3.5.3 Applicability[2]

Minimum Requirement 5 applies to all nonexempt projects that meet the thresholds described in Figures 3.1, 3.2, and 3.3. Even if the threshold is not triggered, runoff from the applicable pollution-generating impervious surfaces (PGIS) and pollution-generating pervious surfaces (PGPS) must be dispersed and infiltrated to adjacent pervious areas when practicable. The extension of the roadway edge and the paving of gravel shoulders and lanes are new PGIS.

Projects not triggering the runoff treatment minimum requirement may still require treatment if a specific deficiency within the project limits is identified through the I-4 Stormwater Retrofit program. The decision to retrofit is made by the project office in collaboration with region and Headquarters program management and environmental services staff.

Natural dispersion areas meeting the requirements of BMP FC.01 must be identified along the project as a part of determining whether the particular TDA exceeds thresholds in Figure 3.3, Step 7. Those effective PGIS areas that are flowing to an existing (preproject) dispersion area can be subtracted as noneffective PGIS.

Equivalent area treatment is allowable for PGIS areas that drain to the same receiving waters and have the same pollutant loading characteristics. While the equivalent area will receive treatment, the new or expanded discharge must not cause a violation of surface water quality standards. Additional information on equivalent area treatment is provided in Section 4-3.6.1.

3-3.5.4 Guidelines

Runoff treatment design involves the following three steps:

[2] Consult the Glossary for the following key terms: *converted pervious surface*, *impervious surface*, *new PGIS, PGPS*, *project limits*, *replaced impervious surface*, *effective PGIS*, *noneffective PGIS*, and *threshold discharge area (TDA).*

1. Determine the specific runoff treatment requirements (basic treatment, enhanced treatment, oil control, and/or phosphorus control). Refer to *Treatment Targets* below.

2. Choose the method(s) of runoff treatment that will best meet the treatment requirements, taking into account the constraints/opportunities presented by the project's context and operation and maintenance. Refer to Sections 2-5, 2-6, 2-7.4, 4-3.1, 5-3.5, and 5-5.

3. Design runoff treatment facilities based on the sizing criteria. Refer to *Criteria for Sizing Runoff Treatment Facilities* below and Section 5-4.1.

WSDOT's stormwater management design philosophy (see Section 2-5.2) seeks to mimic natural hydrology, where feasible, through the dispersal and infiltration of runoff. The extent to which runoff flow rates and volumes can be (or remain) dispersed and then infiltrated determines the types and sizing of runoff treatment options available. This aspect of runoff treatment planning and design is discussed in detail in Sections 2-3.2, 4-3.6.1, 5-2, and 5-3.

Stormwater facilities are not allowed within a jurisdictional wetland or its natural vegetated buffer, except for conveyance systems allowed by applicable permit(s) or as allowed in a wetland mitigation plan. Wetlands may be considered for runoff treatment if the wetland meets the criteria for hydrologic modification (see Minimum Requirement 6 and Section 4-6 on wetland hydroperiods) and Minimum Requirement 7.

Sections 4-3 (western Washington) and 4-4 (eastern Washington) provide design criteria for sizing runoff treatment facilities, including a description on how to conduct the hydrological analysis to derive treatment volumes and flow rates for treatment facilities. Section 5-4 provides direction on how to design the treatment facilities chosen for the project.

Treatment Targets

There are four runoff treatment targets: *Basic Treatment* (total suspended solids removal), *Enhanced Treatment* (dissolved metals removal), *Oil Control*, and *Phosphorus Control*. Table 3-1 describes applicable treatment targets and performance goals for roadway projects. For nonroadway applications, refer to Ecology's SMMEW or SMMWW. Table 3-2 identifies receiving waters that do not require *Enhanced Treatment* for direct discharges.

Section 5-3.5 provides information on alternative options available to meet each of the four treatment targets. Per Figure 5-3.2, the designer must exhaust all approved runoff treatment BMP options before using a BMP from Section 5-3.5. Treatment facilities, designed in accordance with the design criteria presented in this manual, are presumed to meet the applicable performance goals.

An adopted and implemented Basin Plan, Total Maximum Daily Load (TMDL), or Water Cleanup Plan may also be used to set runoff treatment requirements that are tailored to a specific basin. However, treatment requirements must not be less than those achieved by facilities designed for Basic Treatment.

Table 3-1. Runoff treatment targets and applications for roadway projects.

Treatment Target	Application	Performance Goal
Basic Treatment	All project threshold discharge areas (TDAs) where runoff treatment threshold is met.	80% removal of total suspended solids (TSS)
Enhanced Treatment (dissolved metals)	Same as for Basic Treatment and does not discharge to Basic Treatment receiving water body AND Roadways within *Urban Growth Areas* (UGAs) with ADT[1] ≥ 7,500 OR Roadways outside of UGAs with ADT ≥ 15,000 OR Required by an adopted basin plan or water cleanup plan/TMDL. (See Table 3-2 for Basic Treatment receiving water bodies.)	Provide a higher rate of removal of dissolved metals than Basic Treatment facilities for influent concentrations ranging from 0.003 to 0.02 mg/L for dissolved copper and 0.02-0.3 mg/L for dissolved zinc
Oil Control	Same as for Basic Treatment AND There is an intersection where either ≥15,000 vehicles (ADT) must stop to cross a roadway with ≥25,000 vehicles (ADT) or vice versa[2] OR Rest areas with an expected trip end count greater than or equal to 300 vehicles per day OR Maintenance facilities that park, store, or maintain 25 or more vehicles (trucks or heavy equipment) that exceed 10 tons gross weight each OR Eastern Washington roadways with ADT >30,000.	No ongoing or recurring visible sheen and 24-hr average total petroleum hydrocarbon concentration of not greater than 10 mg/L with a maximum of 15 mg/L for a discrete (grab) sample
Phosphorus Control	Same as for Basic Treatment AND The project is located in a designated area requiring phosphorus control as prescribed through an adopted basin plan or water cleanup plan/TMDL.[3]	50% removal of total phosphorus (TP) for influent concentrations ranging from 0.1 to 0.5 mg/L TP

[1]Average daily traffic (ADT) is generally the design year ADT and not the current ADT. A possible exception to this rule is where road ADT would likely never reach levels that would exceed its design capacity (such as with rural portions of the state). Contact region hydraulics staff for more information.

[2] Treatment is required for these high-use intersections for lanes where vehicles accumulate during the signal cycle, including left- and right-turn lanes from the beginning of the left-turn pocket. If no left-turn pocket exists, the treatable area must begin at a distance equal to three car lengths from the stop line. If runoff from the intersection drains to more than two collection areas that do not combine within the intersection, treatment may be limited to any two of the collection areas where the cars stop.

[3]Contact region hydraulics or environmental staff to determine whether phosphorus control is required for a project.

Table 3-2. Basic Treatment receiving water bodies.[1]

1. All saltwater bodies	
2. Rivers (only Basic Treatment applies below the location)	
Baker (Anderson Creek)	Quillayute (Bogachiel River)
Bogachiel (Bear Creek)	Quinault (Lake Quinault)
Cascade (Marblemount)	Sauk (Clear Creek)
Chehalis (Bunker Creek)	Satsop (Middle and East Fork confluence)
Clearwater (Town of Clearwater)	Similkameen
Columbia (Canadian Border)	Skagit (Cascade River)
Cowlitz (Skate Creek)	Skokomish (Vance Creek)
Elwha (Lake Mills)	Skykomish (Beckler River)
Green (Howard Hanson Dam)	Snake
Grand Ronde	Snohomish (Snoqualmie River)
Hoh (South Fork Hoh River)	Snoqualmie (Middle and North Fork confluence)
Humptulips (West and East Fork confluence)	Sol Duc (Beaver Creek)
Kalama (Italian Creek)	Spokane
Kettle	Stillaguamish (North and South Fork confluence)
Klickitat	North Fork Stillaguamish (Boulder River)
Lewis (Swift Reservoir)	South Fork Stillaguamish (Canyon Creek)
Methow	Suiattle (Darrington)
Moses	Tilton (Bear Canyon Creek)
Muddy (Clear Creek)	Toutle (North and South Fork confluence)
Naches	North Fork Toutle (Green River)
Nisqually (Alder Lake)	Washougal (Washougal)
Nooksack (Glacier Creek)	White (Greenwater River)
South Fork Nooksack (Hutchinson Creek)	Wenatchee
Okanogan	Wind (Carson)
Pend Oreille	Wynoochee (Wishkah River Road Bridge)
Puyallup (Carbon River)	Yakima
Queets (Clearwater River)	
3. Streams with a Strahler order of 4 or higher (as determined using 1:24,000 scale maps to delineate stream order) receiving discharges from roadway outside UGAs with ADT <30,000	
4. Non-fish-bearing streams tributary to Basic Treatment receiving waters	
5. Lakes (county location)	
Banks (Grant)	Silver (Cowlitz)
Chelan (Chelan)	Whatcom (Whatcom)
Moses (Grant)	Washington (King)
Potholes Reservoir (Grant)	Union (King)
Sammamish (King)	
6. Discharges to groundwater via rule-authorized UIC facilities or surface infiltration[2]	

[1] Receiving waters not requiring Enhanced Treatment for direct discharges (or, indirectly through a municipal storm sewer system). The initial criteria for this list are rivers whose mean annual flow exceeds 1,000 cubic feet per second and lakes whose surface area exceeds 300 acres. Local governments may petition Ecology for the addition of waters to this list, but waters should have sufficient background dilution capacity to accommodate dissolved metals additions from build-out conditions in the watershed under the latest Comprehensive Land Use Plan and zoning regulations.

[2] Contact region hydraulics or environmental staff to determine whether an underground injection control (UIC) facility is authorized by the rules under the UIC program (WAC 173-218). In western Washington, surface infiltration must meet the soil suitability criteria (SSC-7) when within ¼ mile of surface waters that require the application of Enhanced Treatment. In certain situations, Ecology may approve surface infiltration that would not need enhanced runoff treatment on a case-by-case basis.

Criteria for Sizing Runoff Treatment Facilities

Two sets of criteria exist for sizing runoff treatment facilities—one for western Washington (Table 3-3) and one for eastern Washington (Table 3-4). (See Sections 4-3.1 and 4-4.1 for a detailed discussion of on-line and off-line BMPs.)

Table 3-3. Criteria for sizing runoff treatment facilities in western Washington.

Facility Type	Criteria	Model
Flow-based: upstream of flow control facility (on-line and off-line)	Size treatment facility so that 91% of the annual average runoff will receive treatment at or below the design loading criteria, under postdeveloped conditions for each TDA. If the flow rate is split upstream of the treatment facility, use the off-line flow rates.	Approved continuous simulation model using 15-minute time steps
Flow-based: downstream of flow control facility	Size treatment facility using the full 2-year release rate from the detention facility, under postdeveloped conditions for each TDA.	Approved continuous simulation model using 1-hour time steps
Volume-based (on-line)	*Wetpool* – Size the wetpool to store the 91st percentile, 24-hour runoff volume. Other volume based infiltration and filtration facilities – Size the facility to treat 91% of the estimated runoff file for the postdeveloped condition.	Approved continuous simulation model with 1-hour time steps

Table 3-4. Criteria for sizing runoff treatment facilities in eastern Washington.

Facility Type	Criteria	Model
Volume-based	Size facility using the runoff volume predicted for the 6-month, long-duration* storm event under postdeveloped conditions for each TDA.	Single-event model (SCS or SBUH) Climatic Regions 1–4 Regional Storm; OR Type 1A for Climatic Regions 2 & 3 (10-minute time step)
Flow-based: upstream of detention/retention facility	Size facility using the peak flow rate predicted for the 6-month, short-duration storm under postdeveloped conditions for each TDA.	Single-event model (SCS or SBUH) Short-duration storm (5-minute time step)
Flow-based: downstream of detention facility	Size facility using the full 2-year release rate from the detention facility, under postdeveloped conditions for each TDA.	Single-event model (SCS or SBUH) Short-duration storm OR the appropriate long-duration storm depending on the Climate Region, whichever produces the greatest flow

* For more information on long-duration and short-duration storms, see Section 4-4.7.

If runoff from areas other than the total new PGIS and that portion of any replaced PGIS that requires treatment cannot be separated from the total new PGIS runoff, treatment facilities must be sized to treat this additional runoff.

3-3.6 Minimum Requirement 6 – Flow Control

This requirement applies to all nonexempt projects that discharge stormwater directly or indirectly through a conveyance system to a surface freshwater body.

3-3.6.1 Objective

The objective of flow control is to prevent increases in the stream channel erosion rates beyond those characteristic of natural or reestablished conditions. The intent is to prevent cumulative future impacts from increased stormwater runoff volumes and flow rates on streams. Wherever possible, infiltration is the preferred method of flow control. Meeting flow control requirements may also be achieved through regional stormwater facilities.

3-3.6.2 Flow Control Exemptions

Flow control is not required for all discharges to surface waters, because it is not always needed to protect stream morphology. Regardless of whether an exemption applies, projects need to take advantage of on-site opportunities to infiltrate storm runoff to the greatest extent feasible.

The following projects and discharges are exempt from flow control requirements; however, runoff treatment may still be required per Minimum Requirement 5:

1. A project able to disperse stormwater without discharging runoff either directly or indirectly through a conveyance system to surface waters per guidelines in Section 5-2.2.2.
2. Projects discharging stormwater directly or indirectly through a conveyance system into any of the exempt water bodies shown in Table 3-5.
3. Projects discharging stormwater from over-the-water structures such as bridges, docks, and piers in or over fresh water are exempt up to the 2-year flood plain elevation; OR that portion of an over-the-water structure that is over the ordinary high water mark.
4. Portions of a roadway that cut through the 2-year flood plain elevation.
5. Projects discharging stormwater directly or indirectly through a conveyance system into a wetland. However, flow control may still be required to maintain wetland hydrology (depth/duration of inundation) per Minimum Requirement 7. (See other applicable wetland protection criteria under Minimum Requirement 4.)

Any of the exempted areas must meet the following requirements:

- Direct discharge to the exempt receiving water does not result in the diversion of drainage area from perennial streams classified as Types 1, 2, 3, or 4 in the

State of Washington Interim Water Typing System; or Types “S,” “F,” or “Np” in the Permanent Water Typing System; or from any Category I, II, or III wetland; AND

- Flow-splitting devices or drainage BMPs are applied to route natural runoff volumes from the project site to any downstream Type 5 stream or Category IV wetland:
  - Design of flow-splitting devices or drainage BMPs will be based on continuous hydrologic modeling analysis. The design will assure that flows delivered to Type 5 stream reaches will approximate, but in no case exceed, durations ranging from 50% of the 2-year to the 50-year peak flow.
  - Flow-splitting devices or drainage BMPs that deliver flow to category IV wetlands will also be designed using continuous hydrologic modeling to preserve preproject wetland hydrologic conditions unless specifically waived or exempted by regulatory agencies with permitting jurisdiction; AND
- The project site must be drained by a conveyance system that is comprised entirely of constructed conveyance elements (such as pipes, ditches, or drainage channels) and that extends to the ordinary high water mark of the exempt receiving water, unless, in order to avoid construction activities in sensitive areas, flows are properly dispersed before reaching the buffer zone of the sensitive or critical area; AND
- The conveyance system between the project site and the exempt receiving water must have a hydraulic capacity sufficient to convey discharges under future build-out conditions from all project and nonproject areas, if applicable (see the *Utilities Manual*, Section 1-18, for storm drainage requirements), from which runoff is collected; AND
- Any erodible elements of the constructed conveyance system for the area must be adequately stabilized to prevent erosion under future build-out conditions from areas that contribute flow to the system; AND
- If the discharge is to a stream that leads to a wetland, or to a wetland that has an outflow to a stream, both this requirement and Minimum Requirement 7 apply**.**

The following **additional** exemptions (or partial exemptions) are available in eastern Washington:

1. A site with less than 10-inch average annual rainfall that discharges to a seasonal stream that is not connected via surface flow to a nonexempt surface water by runoff generated during the 2-year regional storm for Climatic

Regions 1–4 OR during the 2-year Type 1A storm for Climatic Regions 2 and 3.

2. Discharges to a stream that flows only during runoff-producing events. The runoff carried by the stream following the 2-year regional storm in Climatic Regions 1–4 OR during the 2-year Type 1A storm for Climatic Regions 2 and 3, must not discharge via surface flow to a nonexempt surface water. The stream may carry runoff during an average annual snowmelt event, but must not have a period of base flow during a year of normal precipitation.

3. Discharges to stream reaches consisting primarily of irrigation return flows and not providing habitat for fish spawning and rearing. Projects must match the predeveloped 2-year and 25-year peak runoff rates for these discharges. Local irrigation districts may impose other requirements.

Petitions to seek exemptions in additional geographic areas can be submitted to Ecology for consideration. Such a petition must justify the proposed exemption based on a hydrologic analysis demonstrating that the potential stormwater runoff from the exempted area will not significantly increase the erosion forces on the stream channel, nor have near-field impacts. Contact the Region Hydraulics Office to determine the feasibility of potential exemption candidates.

Diversions of flow from perennial streams and from wetlands can be considered if significant existing (preproject) flooding, stream stability, water quality, or aquatic habitat problems would be solved or significantly mitigated by bypassing stormwater runoff, rather than providing stormwater detention and discharge to natural drainage features. Bypassing is not an alternative to applicable flow control or treatment if the flooding, stream stability, water quality, or habitat problem to be solved would be caused by the project. In addition, the proposal must not exacerbate other water quality/quantity problems such as inadequate low flows or inadequate wetland water elevations.

A stormwater engineer or scientist must document the existing problems and their solutions or mitigation as a result of the direct discharge after review of any available drainage reports, basin plans, or other relevant literature. The restrictions in this minimum requirement on conveyance systems that transfer water to exempt receiving waters are applicable in these situations. Approvals by all regulatory authorities with permitting jurisdiction are necessary.

Additional streams in eastern Washington may be exempt by applying the following criteria:

- Any river or stream that is fifth order or greater as determined from a 1:24,000 scale map; OR
- Any river or stream that is fourth order or greater as determined from a 1:100,000 or larger scale map.

Table 3-5. Flow control exempt surface waters list.

Water Body	**Upstream Point/Reach for Exemption** (if applicable)
Alder Lake	
Asotin Creek	Downstream of confluence with George Creek
Baker Lake	
Baker River	Baker River/Baker Lake downstream of confluence with Noisy Creek
Banks Lake	
Bogachiel River	0.4 miles downstream of Dowans Creek
Bumping Lake	
Bumping River	Downstream of confluence with American River
Calawah River	Downstream of confluence with South Fork Calawah River
Carbon River	Downstream of confluence with South Prairie Creek
Cascade River	Downstream of Found Creek
Cedar River	Downstream of confluence with Taylor Creek
Chehalis River	1,500 feet downstream of confluence with Stowe Creek
Chehalis River, South Fork	1,000 feet upstream of confluence with Lake Creek
Cispus River	Downstream of confluence with Cat Creek
Clearwater River	Downstream of confluence with Christmas Creek
Cle Elum River	Downstream of Cle Elum Lake
Columbia River	Downstream of Canadian border
Columbia River Reservoirs	
Colville River	Downstream of confluence with Chewelah Creek
Conconully Reservoir	
Coweman River	Downstream of confluence with Gobble Creek
Cowlitz River	Downstream of confluence of Ohanapecosh River and Clear Fork Cowlitz River
Crescent Lake	
Dickey River	Downstream of confluence with Coal Creek
Dosewallips River	Downstream of confluence with Rocky Brook
Dungeness River, main channels	Downstream of confluence with Gray Wolf River
Elwha River	Downstream of confluence with Goldie River
Grande Ronde River	Entire reach from the Oregon to Idaho border
Grays River	Downstream of confluence with Hull Creek
Green River (WRIA 26 – Cowlitz)	3.5 miles upstream of Devils Creek
Hoh River	1.2 miles downstream of Jackson Creek
Humptulips River	Downstream of confluence with West and East Forks
Kalama River	2.0 miles downstream of Jacks Creek
Kettle River	Downstream of confluence with Boulder Creek
Klickitat River	Downstream of confluence with West Fork
Latah Creek (formerly Hangman Creek)	Downstream of confluence with Rock Creek (in Spokane County)
Lake Chelan	
Lake Cle Elum	
Lake Cushman	
Lake Kachess	
Lake Keechelus	
Lake Quinault	
Lake Shannon	
Lake Sammamish	
Lake Union	King County

Water Body	**Upstream Point/Reach for Exemption** (if applicable)
Lake Wenatchee	
Lake Washington	
Lake Whatcom	
Lewis River	Downstream of confluence with Quartz Creek
Lewis River, East Fork	Downstream of confluence with Big Tree Creek
Lightning Creek	Downstream of confluence with Three Fools Creek
Little Spokane River	Downstream of confluence with Deadman Creek
Little White Salmon River	Downstream of confluence with Lava Creek
Lower Crab Creek	Entire reach
Mayfield Lake	
Methow River	Downstream of confluence with Early Winters Creek
Moses Lake	
Muddy River	Downstream of confluence with Clear Creek
Naches River	Downstream of confluence with Bumping River
Naselle River	Downstream of confluence with Johnson Creek
Newaukum River	Downstream of confluence with South Fork Newaukum River
Nisqually River	Downstream of confluence with Big Creek
Nooksack River	Downstream of confluence of North and Middle Forks
Nooksack River, North Fork	Downstream of confluence with Glacier Creek, at USGS gage 12205000
Nooksack River, South Fork	0.1 miles upstream of confluence with Skookum Creek
North River	Downstream of confluence with Vesta Creek
Ohanapecosh River	Downstream of confluence with Summit Creek
Okanogan River	Downstream of Canadian border
Osoyoos Lake	
Pacific Ocean	
Palouse River	Downstream of confluence with South Fork Palouse River
Pend Oreille River	Idaho to Canadian border
Pend Oreille River Reservoirs	
Pothole Reservoir	
Puget Sound	
Puyallup River	Half-mile downstream of confluence with Kellog Creek
Queets River	Downstream of confluence with Tshletshy Creek
Quillayute River	Downstream of Bogachiel River
Quinault River	Downstream of confluence with North Fork Quinault River
Riffe Lake	
Rimrock Lake	
Rock Creek	In Whitman County, downstream of confluence with Cottonwood Creek
Ruby Creek	Ruby Creek at State Route 20 crossing downstream of Granite and Canyon Creeks
Sammamish River	Downstream of Lake Sammamish
Sauk River	Downstream of confluence of North and South Forks
Satsop River	Downstream of confluence of Middle and East Forks
Satsop River, East Fork	Downstream of confluence with Decker Creek
Silver Lake	Cowlitz County
Similkameen River	Downstream of Canadian border
Skagit River	Downstream of Canadian border
Skokomish River	Downstream of confluence of North and South Forks
Skokomish River, South Fork	Downstream of confluence with Vance Creek

Water Body	**Upstream Point/Reach for Exemption** (if applicable)
Skokomish River, North Fork	Downstream of confluence with McTaggert Creek
Skookumchuck River	1 mile upstream of Bucoda at State Route 507, milepost 11.0
Skykomish River	Downstream of South Fork
Skykomish River, South Fork	Downstream of confluence of Tye and Foss Rivers
Snake River	Entire reach along Idaho border to the Columbia River
Snake River Reservoirs	
Snohomish River	Downstream of confluence of Snoqualmie and Skykomish Rivers
Snoqualmie River	Downstream of confluence of the Middle Fork
Snoqualmie River, Middle Fork	Downstream of confluence with Rainy Creek
Sol Duc River	Downstream of confluence of North and South Fork Soleduck River
Spokane River	Downstream of Idaho border
Spokane River Reservoirs	
Stillaguamish River	Downstream of confluence of North and South Forks
Stillaguamish River, North Fork	7.7 highway miles west of Darrington on State Route 530, downstream of confluence with French Creek
Stillaguamish River, South Fork	Downstream of confluence of Cranberry Creek and South Fork
Suiattle River	Downstream of confluence with Milk Creek
Sultan River	0.4 miles upstream of State Route 2
Swift Creek Reservoir	
Teanaway River	Downstream of confluence of North and West Forks
Thunder Creek	Downstream of confluence with Neve Creek
Tieton River	Downstream of Rimrock Lake
Tilton River	Downstream of confluence with North Fork Tilton River
Toppenish Creek	Downstream of confluence with Wanity Slough
Touchet River	Downstream of confluence with Patit Creek
Toutle River	North and South Fork confluence
Toutle River, North Fork	Downstream of confluence with Hoffstadt Creek
Toutle River, South Fork	Downstream of confluence with Thirteen Creek
Tucannon River	Downstream of confluence with Pataha Creek
Walla Walla River	Downstream of confluence with Mill Creek
Wenatchee River	Downstream of confluence with Icicle Creek
White River	Downstream of confluence with Huckleberry Creek
White Salmon River	0.15 miles upstream of confluence with Trout Lake Creek
Willapa River	Downstream of confluence with Mill Creek
Wind River	Downstream of confluence with Cold Creek
Wynochee Lake	
Wynoochee River	Downstream of confluence with Schafer Creek
Yakima River	Downstream of Lake Easton

3-3.6.3 Applicability[3]

Minimum Requirement 6 applies to all nonexempt projects that meet the thresholds described in Figures 3.1, 3.2, and 3.3. The threshold for triggering the flow control requirement takes into account the project's effective impervious surfaces and converted pervious surfaces.

[3] Consult the Glossary for the following key terms: *converted pervious surface*, *new impervious surface*, *effective impervious surface*, *net-new impervious surface*, *project limits*, *replaced impervious surface*, and *threshold discharge area (TDA)*.

Application of the "net-new impervious surface" concept only applies to Minimum Requirement 6 at the TDA level (Figure 3.3, Step 8). Application of the concept does not extend to any other minimum requirement. When applying the net-new impervious approach, the pavement permanently removed by the project needs to be reverted to a pervious condition per the guidelines in Section 4-3.6.1.

Natural dispersion areas meeting the requirements of BMP FC.01 must be identified within the project limits as a part of determining whether the particular TDA exceeds thresholds in Figure 3.3, Step 8. Those effective impervious surface areas that are flowing to an existing (preproject) dispersion area can be subtracted as noneffective impervious surfaces.

The analysis for Step 8 in Figure 3.3 is based on preproject (what is currently seen at the project site) land cover conditions for the predeveloped modeling condition and the postconstruction (after the project is completed) land cover conditions for the developed modeling conditions. When using the Single Scaling Factor Approach (called "Station Data" option in MGSFlood) to perform this analysis, contact the HQ Hydraulics Office, since the data station may not be able to produce the 100-year flow due to insufficient rainfall data. Refer to Section 4 of the MGSFlood User's Manual for additional information on the Single Scaling Factor Approach: 🖰 www.wsdot.wa.gov/Design/Hydraulics/Training.htm

3-3.6.4 Guidelines

Infiltration is the preferred method to control flow. If infiltration cannot be achieved at the project site, refer to the appropriate design criteria listed below and in Chapter 4.

Flow control BMPs or the live storage portion of a combination flow control/runoff treatment BMP must not be placed below the seasonal high water table. As an alternative, first look for equivalent areas within the same threshold discharge area (TDA) to provide the necessary flow control. If a feasible location cannot be found within the TDA, seek out equivalent areas—within WSDOT right of way—upstream of the TDA that discharges to the same receiving water body to provide the necessary flow control. Lastly, if a feasible location cannot be found upstream of the TDA, seek out equivalent areas—within WSDOT right of way—downstream of the TDA that discharges to the same receiving water body to provide the necessary flow control. Document these constraints using the Engineering and Economic Feasibility (EEF) Evaluation Checklist (Appendix 2A).

If none of the above options is feasible within the project site, then explore alternative flow control mitigation in the watershed (for example, purchasing land and converting it back to a forested condition or restoring wetlands in close proximity to the project site). Refer to Section 2-7.3 for more information on watershed-based approaches.

Avoid placing BMPs in wetlands, 100-year floodplains, and intertidal areas. These natural systems have a higher net environmental benefit than engineered stormwater management systems. If the placement of a required flow control BMP would impact such a sensitive area, consult the Region Hydraulics Office as early as possible for aid in properly analyzing the effects of various flow control options. The Region Hydraulics and Environmental offices will also coordinate with the appropriate state, local, tribal, and federal agencies to ensure adequate protection of all natural resources.

Design specifications for conveyance and flood prevention are reviewed with the assistance of the Region or HQ Hydraulics Office.

Western Washington Design Criteria

Stormwater discharges must match developed discharge durations to predeveloped durations for the range of predeveloped discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. Also, check the 100-year peak flow rate for downstream flooding and property damage using an approved continuous simulation model.

Refer to Section 4-3.6.1 for the appropriate modeling process. Also, reference the same section for the modeling process to address mitigated and nonmitigated areas on projects in on-site and off-site flow bypass situations.

Predeveloped Condition for Stormwater Hydrology Modeling

The project site's predeveloped conditions are to assume "historic" land cover conditions unless one of the following conditions applies:

- Reasonable, historic information is provided that indicates the site was prairie prior to settlement (modeled as "pasture" in MGSFlood).
- The drainage area of the immediate stream and all subsequent downstream basins has had at least 40% total impervious area since 1985. In this case the predeveloped condition to be matched must be the existing land cover condition. Where basin-specific studies determine a stream channel to be unstable, even though the above criterion is met, the predeveloped condition assumption must be the "historic" land cover condition or a land cover condition commensurate with achieving a target flow regime identified by an approved basin study. More information on qualifying basins is available at:
  www.ecy.wa.gov/programs/wq/stormwater/flow_control.html

For WSDOT projects, the designer can assume an existing land cover condition if following the Stormwater Retrofit Analysis procedure outlined in Section 3-4 and Figure 3-4. This process was created through an agreement between WSDOT and DOE for WSDOT projects.

Table 3-6 summarizes flow control criteria for western Washington. The duration standard does not apply to infiltration facilities that will reliably infiltrate all the runoff from impervious surfaces and converted pervious surfaces.

Table 3-6. Western Washington flow control criteria.

Facility Type	Criteria	Model
Detention/combination treatment and detention facilities	Provide storage volume required to match the duration of predeveloped peak flows from 50% of the 2-year up to the 50-year storm flow, using a flow restrictor (such as an orifice or weir), and check the 100-year peak flow for property damage.	Continuous simulation model using 1-hour time steps
Infiltration facilities	Size facility to infiltrate sufficient volumes so that the overflow matches the duration standard, and check the 100-year peak flow to estimate the potential for downstream property damage, or infiltrate the entire runoff file.	Continuous simulation model using 1-hour time steps

An alternative flow control standard may be established through applying watershed-scale hydrologic modeling and supporting field observations. Possible justifications for an alternative flow control standard include:

1. Establishment of a stream-specific threshold of significant bedload movement other than the assumed 50% of the 2-year peak flow; OR
2. Zoning and Land Clearing Ordinance restrictions that, in combination with an alternative flow control standard, maintain or reduce the naturally occurring erosive forces on the stream channel, with local jurisdiction approval; OR
3. A duration control standard is not necessary for protection, maintenance, or restoration of designated beneficial uses or Clean Water Act compliance.

Eastern Washington Design Criteria

Using a single-event model, flow control design requirements for projects must limit the peak release rate of the postdeveloped 2-year runoff volume to 50% of the predeveloped 2-year peak and maintain the predeveloped 25-year peak runoff rate. The 100-year event must be checked for downstream flooding and property damage.

Predeveloped Condition for Stormwater Hydrology Modeling

The project site's predeveloped conditions are to assume an existing land cover. Table 3-7 summarizes flow control criteria for eastern Washington. The peak flow matching standard does not apply to infiltration facilities that will reliably infiltrate all the runoff from impervious surfaces and converted pervious surfaces.

Table 3-7. Eastern Washington flow control criteria.

Facility Type	Criteria	Model
Detention/combination treatment and detention facilities	Provide storage volume required to match ½ of the 2-year predeveloped peak flow rate, match the predeveloped 25-year peak flow rate, and check the 100-year peak flow for property damage.	Single-event model (SCS or SBUH) Climatic Regions 1–4 Regional Storm; OR Type 1A Storm for Climatic Regions 2 & 3 only
Infiltration facilities	Size facility to infiltrate sufficient runoff volumes that the overflow does not exceed the 25-year peak flow requirement. Check the 100-year peak flow to estimate the potential for downstream property damage, or infiltrate the entire runoff file.	Single-event model (SCS or SBUH) Climatic Regions 1–4 Regional Storm; OR Type 1A Storm for Climatic Regions 2 & 3 only

Predevelopment and postdevelopment runoff volumes and flow rates must be estimated in accordance with Table 3-7 and Section 4-4.2 using the Regional Storm for Climatic Regions 1–4; OR Type 1A Storm for Climatic Regions 2 and 3.

In some instances, the 2-year predeveloped flow rate is zero cubic feet per second or the flow rate is so small that it is impracticable to design a pond to release at the prescribed flow rate from an engineered outlet structure. In these cases, the total postdeveloped 2-year storm runoff volume must be infiltrated (preferred) or stored in a retention pond for evaporation and the detention pond designed to release the predeveloped 10- and 25-year flow rates. (See BMP FC.03, Detention Pond, in Section 5-4.2.3 for pond and release structure design information.)

Infiltration facilities for flow control must be designed based on postdeveloped runoff volumes, and must be designed to infiltrate the entire volume of the criteria noted in Table 3-7. If full infiltration is not possible, all surface discharges must match the following criteria:

- If the 2-year postdeveloped outflow volume discharged to a surface water and is less than or equal to the 2-year predeveloped outflow volume, then the postdeveloped 2-year flow rate must be less than or equal to the 2-year predeveloped flow rates. The flows for the 25- and 100-year events must meet the criteria in Table 3-7, row 1.
- If the 2-year postdeveloped outflow volume is greater than the 2-year predeveloped outflow volume, then all surface water discharges must match the flow rate standards in Table 3-7, row 1.

The justification from Ecology for matching one-half the preexisting flow rate is the added work done on the natural channel by the excess volume released in a typical “detention/ retention” pond system. If infiltration disposes of the extra volume produced by the added impervious areas, then releasing flow at the preexisting 2-year rate mimics the existing hydrologic conditions.

3-3.7 Minimum Requirement 7 – Wetlands Protection

Stormwater discharges to wetlands must maintain the wetland's hydrologic conditions (particularly hydroperiod), hydrophytic vegetation, and substrate characteristics that are necessary to maintain existing wetland functions and values.

3-3.7.1 Objective

The objective of wetlands protection is to ensure wetlands receive the same level of protection as any other waters of the state.

3-3.7.2 Applicability

Minimum Requirement 7 applies to all nonexempt projects that meet the thresholds described in Figure 3.1 and where stormwater discharges into a wetland, either directly or indirectly, through a conveyance system.

All stormwater discharges to wetlands must comply with this manual's runoff treatment requirements.

3-3.7.3 Guidelines

Steps must be taken during design to maximize natural water storage and infiltration opportunities within the project site and outside existing wetlands. Natural wetlands may not be used as pollution control facilities in lieu of runoff treatment BMPs.

Building stormwater runoff treatment and flow control facilities within a wetland or its natural vegetated buffer is discouraged, except for:

- Necessary conveyance systems as allowed by applicable permit(s); OR
- As allowed in wetlands approved for hydrologic modification or treatment in accordance with Ecology guidance. For western Washington projects, refer to *Guide Sheet 1B* in Appendix I-D of Ecology's SMMWW. For eastern Washington projects, refer to *Use of Existing Wetlands to Provide Runoff Treatment* (in Section 2.2.5) and *Application to Wetlands and Lakes* (in Section 2.2.6) in Ecology's SMMEW, and the *Eastern Washington Wetland Rating Form*: www.wsdot.wa.gov/NR/rdonlyres/41520679-F96D-47A9-9B70-3EE8BBEC391F/0/WetlandRatingForm_EasternWA.doc); OR
- Projects with approved permits from the appropriate resource agencies.

An adopted and implemented basin plan (see Minimum Requirement 8), or a Total Maximum Daily Load (TMDL) Water Cleanup Plan may be used to develop requirements for wetlands that are tailored to a specific basin.

The thresholds identified in Minimum Requirement 5 (Runoff Treatment) and Minimum Requirement 6 (Flow Control) must also be applied for discharges to wetlands. In addition, a hydroperiod analysis must be performed and must show that the discharge will not adversely affect the wetland hydroperiod.

When considering constructing new wetlands or using existing wetlands for flow control or runoff treatment, or when looking for guidelines on protecting wetlands from stormwater impacts, seek input from the appropriate in-house experts in the environmental, biological, wetlands, and landscape architectural disciplines. For projects in the Puget Sound basin, refer to *Guide Sheet 2B* in Appendix I-D of Ecology's SMMWW. Refer to Section 2-6.1.1 regarding special wetland design considerations, Section 4-6 for additional information on wetland hydroperiod analysis, and Section 5-4.1.4 for additional information on the Constructed Stormwater Treatment Wetland (see BMP RT.13).

3-3.8 Minimum Requirement 8 – Incorporating Watershed/Basin Planning Into Stormwater Management

Watershed/basin plans may subject projects to different minimum requirements for erosion control; source control; runoff treatment; and operation and maintenance; and to alternative requirements for flow control and wetlands hydrologic control. Watershed/basin plans must evaluate and include, as necessary, retrofitting urban stormwater BMPs into existing development or redevelopment in order to achieve watershed-wide pollutant reduction and flow control goals consistent with the requirements of the federal Clean Water Act. Standards developed from basin plans cannot modify any of the above minimum requirements until the basin plan is formally adopted and implemented by the local governments within the basin and has received approval or concurrence from Ecology.

3-3.8.1 Objective

The objective of incorporating watershed-based/basin planning into stormwater management is to promote the development of watershed-based resource plans as a means to develop and implement comprehensive water resource protection measures. The primary objective of basin planning is to reduce pollutant loads and hydrologic impacts to surface waters and groundwaters in order to protect water resources.

3-3.8.2 Applicability

Minimum Requirement 8 applies where watershed and basin plans are in effect for all nonexempt projects that meet the thresholds described in Figure 3.1.

3-3.8.3 Guidelines

While Minimum Requirements 1 through 7 establish general standards for individual sites, they do not evaluate the overall pollution impacts and protection opportunities that could exist at a watershed scale. For a basin plan to serve as a means of modifying the minimum requirements, the following conditions must be met:

- The plan must be formally adopted by all jurisdictions with implementation responsibilities under the plan; AND
- All ordinances or regulations called for by the plan must be in effect.

Basin planning provides a mechanism by which the minimum requirements and implementing BMPs can be evaluated and refined based on an analysis of an entire watershed. Basin plans are especially well suited for developing control strategies to address impacts from future development and to correct specific problems whose sources are known or suspected. Basin plans can be effective in addressing both long-term and cumulative impacts of pollutant loads; short-term acute impacts of pollutant concentrations; and hydrologic impacts to streams, wetlands, and groundwater resources. (See Section 2-7.3 for further guidelines on basin/watershed planning.) Refer to Appendix I-A of Ecology's SMMWW for examples of how basin planning can alter the minimum requirements of this manual.

3-3.9 Minimum Requirement 9 – Operation and Maintenance

An operation and maintenance manual that is consistent with the criteria in Section 5-5 will be provided for all proposed stormwater facilities and BMPs. The party (or parties) responsible for such maintenance and operation must be identified and a record of maintenance activities kept.

3-3.9.1 Objective

The objective of operation and maintenance is to achieve appropriate preventive maintenance and performance checks to ensure stormwater control facilities are adequately maintained and properly operated to:

- Remove pollutants and/or control flows as designed.
- Permit the maximum use of the roadway.
- Prevent damage to the highway structure.
- Protect natural resources.
- Protect abutting property from physical damage.

3-3.9.2 Applicability

Minimum Requirement 9 applies to all projects that require stormwater control facilities or BMPs and is accomplished programmatically via WSDOT's maintenance program.

3-3.9.3 Guidelines

Inadequate maintenance is a common cause of stormwater management facility degraded performance or failure. Section 5-5 provides criteria for BMP maintenance. The *Maintenance Manual* provides further guidelines on stormwater management-related operation and maintenance activities.

3-4 Stormwater Retrofit Guidelines

This section provides guidelines to assess (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 (see Figure 3.4 for Stormwater Retrofit Analysis for projects), and (2) whether it is cost-effective to provide stormwater management retrofits beyond what are called for under these requirements. This section also provides guidelines for the documentation and recording of any project-related stormwater retrofit activity. Following are the five general cases where a stormwater retrofit might occur:

1. Where WSDOT can retrofit existing impervious surfaces
2. Where a stand-alone high-priority stormwater retrofit project is already scoped and funded and is within the project limits
3. Where a TDA does not provide all the required flow control for replaced impervious surfaces after providing as much flow control as possible on the project site
4. Where a TDA does not provide all the required runoff treatment for replaced pollution-generating impervious surfaces (PGIS) after providing as much runoff treatment as possible on the project site
5. Where the project provides flow control to predeveloped "existing land cover" conditions

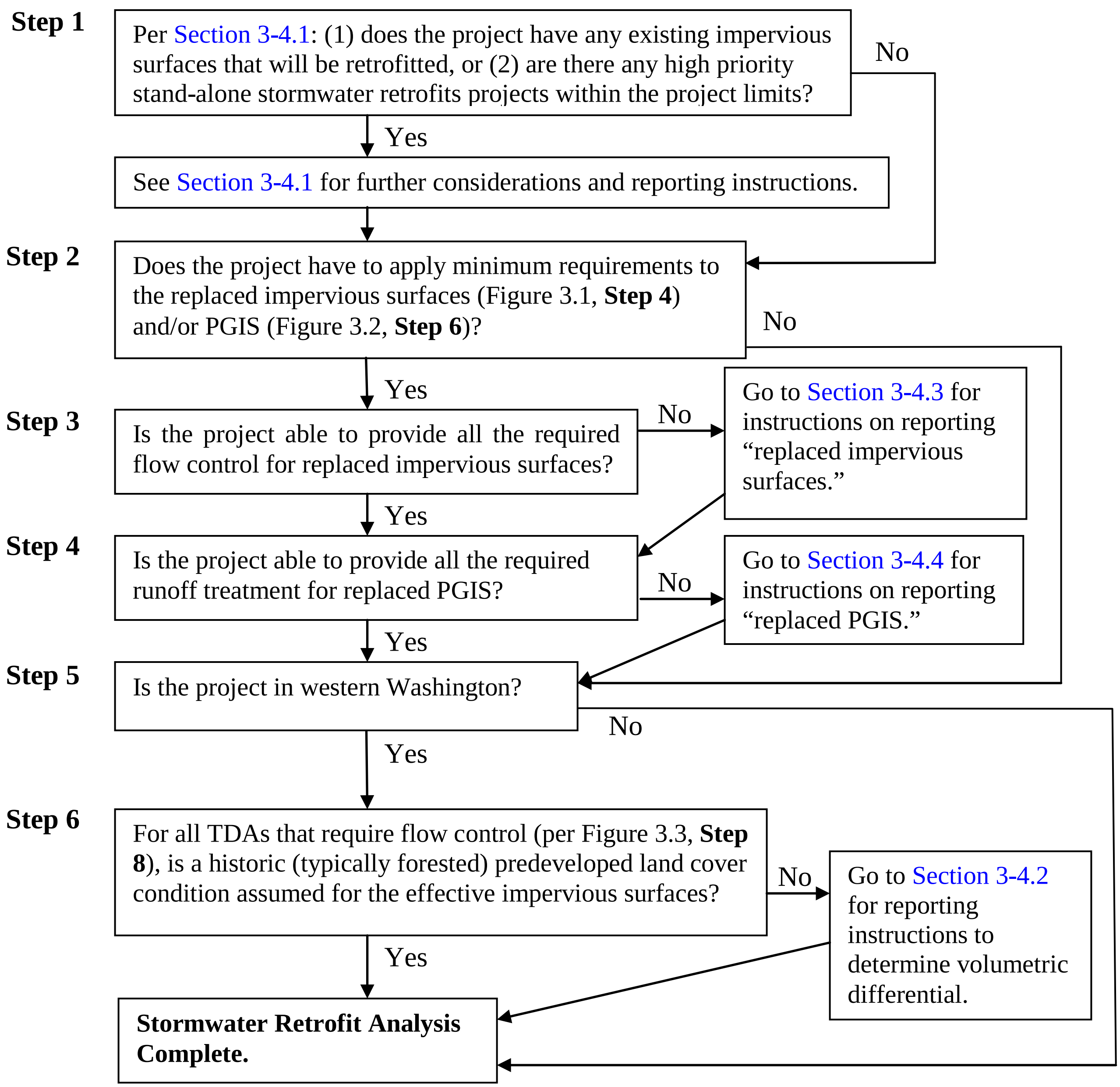


Figure 3.4 Stormwater Retrofit Analysis for WSDOT projects.

3-4.1 Retrofitting Existing Impervious Surfaces and Stand-Alone Priority Stormwater Retrofit Projects Outside the Puget Sound Basin

3-4.1.1 Existing Impervious Surfaces

As described in Section 1-2.3, the ultimate goal is to provide practicable stormwater management for runoff from existing impervious surfaces that do not have treatment or flow control or for which treatment or flow control is substandard. As designers scope (or revise the scope of) affected projects, they will need to determine whether it is cost-effective to provide stormwater management retrofits beyond what is called for under the HRM's minimum requirements. In making this decision, WSDOT needs to follow an approach that ensures it does not circumvent the Legislature's authority to determine where to invest financial resources. At the same time, the department's goal is to retrofit existing impervious surfaces where a significant amount of pavement is added on a project.

WSDOT has adopted a departmental budget structure with a specific category for retrofitting existing impervious surfaces in order to meet one of the requirements of WAC 173-270-060. This budget structure allows the department to include the work from one project category in another category if it does not add significant cost to the project. In accordance with this guideline, the HQ Strategic Planning and Programming Office has established the following guidelines when making decisions about adding stormwater retrofits of existing impervious surfaces into new improvement and preservation projects:

1. Mobility projects (I-1 subprogram) can always consider including the cost of retrofitting existing impervious surfaces.
2. Safety projects (I-2 subprogram) can include the retrofitting of existing impervious surfaces only if the cost to retrofit all existing impervious surfaces does not exceed an additional 20% of the cost of treating new impervious surfaces. The region may request a variance from this limit for extenuating circumstances.
3. Economic Initiatives (I-3 subprogram, *except for* Four-Lane Trunk projects) can include the retrofitting of existing impervious surfaces only if the cost to retrofit all existing impervious surfaces does not exceed an additional 20% of the cost of treating new impervious surfaces. The region may request a variance from this limit for extenuating circumstances.
4. Four-Lane Trunk projects in the I-3 subprogram can always consider including the retrofitting of existing impervious surfaces.
5. Environmental Retrofit projects (I-4 subprogram, *except for* the Stormwater Retrofit category) do not add new impervious surfaces and cannot retrofit existing impervious surfaces. The region may request a variance from this limit for extenuating circumstances.

6. For those safety and economic initiative projects that exceed the 20% limit, and where the HQ Project Control and Reporting Office and region concur, the region can submit a request for funding from the I-4 Stormwater Retrofit category. These requests will be prioritized with the other stormwater retrofit needs already identified for funding by the Legislature.

7. Paving projects (P-1 subprogram) can only consider retrofitting existing impervious surfaces for projects involving the total replacement of existing concrete lanes. On projects that only replace the existing asphalt shoulder with concrete, retrofitting is not required.

Questions on applying the above guidelines should be directed through the Region Program Management Office, with backup (if needed) to the HQ Strategic Planning and Programming Systems' Analysis and Program Development Office. Finally, budget implications and Ecology-approved basin plan status must be considered prior to including retrofit as part of a project's scope.

Associated costs for providing flow control for all the runoff from new, replaced, and existing impervious areas must be recorded in the project's Hydraulic Report. The extent and type of any stormwater retrofit activity needs to be documented in the Hydraulic Report and the Stormwater Design Documentation Spreadsheet at:
www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm

3-4.1.2 I-4 Subprogram Environmental Retrofit Stormwater Projects

I-4 subprogram environmental retrofit stormwater projects located within the project limits must be evaluated for incorporation by the project office.

3-4.2 Retrofitting Existing Impervious Surfaces and Stand-Alone Priority Stormwater Retrofit Projects Within the Puget Sound Basin

Highway projects in the Puget Sound basin that add 5,000 square feet or more of new impervious surfaces, and are located in medium- to high-priority locations for stormwater retrofit, shall retrofit all existing impervious surfaces within the project limits for both flow control and runoff treatment if feasible and cost-effective.

Retrofitting is feasible if there are no physical site limitations such as geographic or geologic constraints, steep slopes, soil instability, proximity to water bodies, presence of significant cultural resources, shallow water tables, or other applicable factors contained in Appendix 2A, Engineering and Economic Feasibility for Construction of Stormwater Management Facilities.

Retrofitting for stormwater treatment and flow control is cost-effective if the cost to retrofit all the existing impervious surfaces does not exceed 20% of the cost to meet stormwater treatment and flow control requirements for the new impervious surfaces. The WSDOT region may request a variance to exceed this limit for extenuating circumstances such as the project is in a high-priority location for retrofit, the project has realized reduced costs in other project elements, and/or the cost is not significantly above 20% (see Figure 3.5).

The feasibility and cost-effectiveness exercises above do not apply to any project-triggered retrofit requirements needed to comply with Section 3.2 (see examples listed on the HRM website: www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm).

If retrofitting is not feasible or cost-effective, one of the following must occur:

1. Retrofit the amount of existing impervious surface within the project limits that can be retrofitted for the amount of money equal to 20% of the cost to meet stormwater requirements for the new impervious surfaces, as outlined in the paragraphs above.
2. Retrofit an equivalent amount of existing impervious surface off-site, at a high- or medium-priority location, at a cost of up to 20% of the cost to meet stormwater requirements for the new impervious surfaces as outlined in the paragraphs above.
3. Transfer an amount of money, equal to 20% of the cost to meet stormwater requirements for the new impervious surfaces, as outlined in the paragraphs above, to fund stand-alone stormwater retrofit projects (I-4 Stormwater Retrofit Program).

Highway projects in the Puget Sound basin that add more than 5,000 square feet of new impervious surface, and are located in low-priority locations for stormwater retrofit, shall transfer an amount of money, as specified below, to the stand-alone stormwater retrofit program. The amount of money for flow control shall be based on 20% of the cost to meet stormwater requirements for the new impervious surfaces. For runoff treatment, the amount of money shall be based on 20% of the cost to meet stormwater requirements for the new PGIS.

When retrofitting all existing areas is deemed either infeasible per Appendix 2A or not cost-effective, or if the money is transferred to fund stand-alone retrofit projects, the cost information developed to ensure compliance with this requirement shall be included in the *Stormwater Design Documentation Spreadsheet*.

Contact the HQ ESO Stormwater and Watersheds Program for a list of high-, medium-, or low-priority stormwater retrofit locations.

Stormwater Retrofit Analysis for WSDOT Projects in the Puget Sound Basin

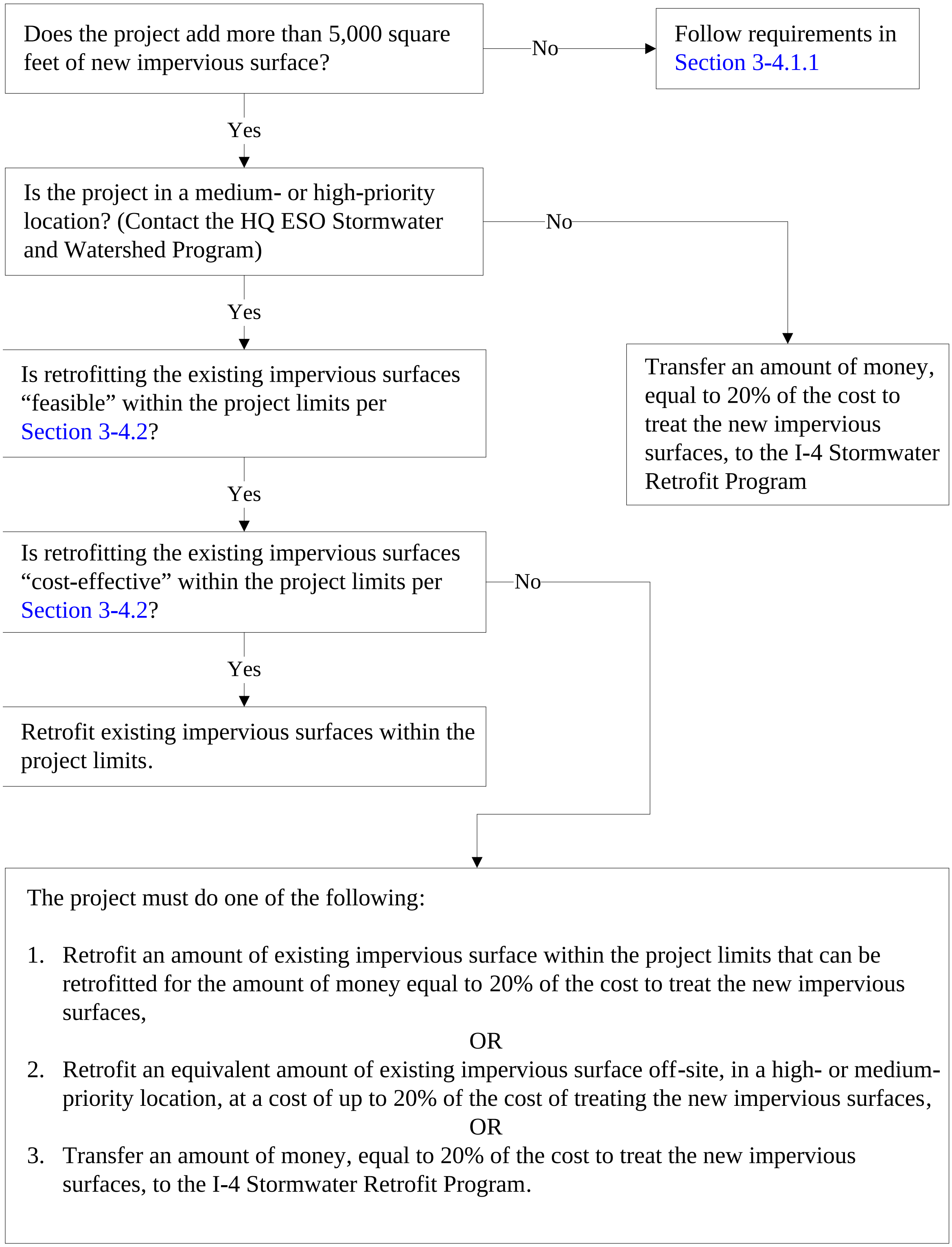


Figure 3.5 Stormwater Retrofit Process for Projects Within the Puget Sound Basin.

3-4.3 Effective Impervious Surface in Western Washington

For every TDA that requires flow control per Figure 3.3, Step 8, the predeveloped conditions for the effective impervious surfaces need to be examined. Where the predeveloped condition for the effective impervious surfaces is considered to be an "existing land cover" (usually pasture or grass) and not assumed to be a "historic land cover," a flow control volumetric difference needs to be determined and documented between the two conditions.

Using MGSFlood or other Ecology-approved continuous simulation model, the designer should perform two analyses to determine the required flow control volumes for the two different predeveloped conditions in the TDA. Subtracting the two volumes will give the volumetric difference between using "existing land cover" conditions and "historic land cover" conditions for the TDA. This number needs to be recorded as part of the Stormwater Retrofit Analysis. The designer must record the quantity in cubic feet on the Stormwater Design Documentation Spreadsheet at:
www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm

This volumetric difference constitutes a stormwater retrofit obligation for the project that can be met off-site by providing an equivalent volume of detention in a targeted stormwater retrofit priority location. Contact the HQ ESO Stormwater and Watersheds Program for assistance in identifying eligible highway segments to meet this off-site retrofit obligation.

3-4.4 Replaced Impervious Surface

If thresholds in Figure 3.1, Step 4**,** are exceeded and for each TDA that exceeds thresholds in Figure 3.3, Step 8, after providing as much flow control as possible on the project site, the designer must record the amount of replaced impervious surface that does not receive flow control. The designer must record quantities by using the Stormwater Design Documentation Spreadsheet at:
www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm. The area must be recorded to the nearest tenth of an acre.

The amount of replaced impervious surface that does not received flow control constitutes a stormwater retrofit obligation for the project that can be met off-site by retrofitting an equivalent area of state highway for flow control in a targeted stormwater retrofit priority location. Contact the HQ ESO Stormwater and Watersheds Program for assistance in identifying eligible highway segments to meet this off-site retrofit obligation.

3-4.5 Replaced PGIS

If thresholds in Figure 3.2, Step 6**,** are exceeded and for each TDA that exceeds thresholds in Figure 3.3, Step 7, after providing as much runoff treatment as possible on the project site, the designer must record the amount of replaced PGIS that does not receive runoff treatment. Designers must record quantities using the Stormwater Design Documentation Spreadsheet at: www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm.

The area must be recorded to the nearest tenth of an acre. The type of treatment needed in the TDA must also be recorded along with the TDA's projected ADT and other information supporting the required runoff treatment type (basic, enhanced, phosphorous control, and/or oil control).

The extent and type of any stormwater retrofit activity needs to be documented in the Hydraulic Report and the Stormwater Design Documentation Spreadsheet at:
www.wsdot.wa.gov/Environment/WaterQuality/Runoff/HighwayRunoffManual.htm

The amount of replaced PGIS that does not received runoff treatment constitutes a stormwater retrofit obligation for the project that can be met off-site by retrofitting an equivalent area of state highway for runoff treatment in a targeted stormwater retrofit priority location. Contact the HQ ESO Stormwater and Watersheds Program for assistance in identifying eligible highway segments to meet this off-site retrofit obligation.