

2.5 Minimum Requirements

This section describes the minimum requirements for stormwater management at development and redevelopment sites. Section 2.4 should be consulted to determine which requirements apply to any given project. Volumes II through V of this manual present Best Management Practices (BMPs) for use in meeting the Minimum Requirements.

Throughout this Chapter, guidance to meet the requirements of the Puget Sound Water Quality Management Plan is written in bold and supplemental guidelines that serve as advice and other materials are not in bold.

2.5.1 Minimum Requirement #1: Preparation of Stormwater Site Plans

All projects meeting the thresholds in Section 2.4 shall prepare a Stormwater Site Plan for local government review. Stormwater Site Plans shall be prepared in accordance with Chapter 3 of this volume.

Objective

The 2,000 square feet threshold for impervious surfaces and 7,000 square foot threshold for land disturbance are chosen to capture most single family home construction and their equivalent. Note that the scope of the stormwater site plan only covers compliance with Minimum Requirements #2 through #5 if the thresholds of 5,000 square feet of impervious surface or conversion of $\frac{3}{4}$ acre of native vegetation to lawn or landscape, or conversion of 2.5 acres of native vegetation to pasture are not exceeded.

Supplemental guidelines

Projects proposed by departments and agencies within the local government with jurisdiction must comply with this requirement. The local government shall determine the process for ensuring proper project review, inspection, and compliance by its own departments and agencies.

2.5.2 Minimum Requirement #2: Construction Stormwater Pollution Prevention (SWPP)

All new development and redevelopment shall comply with Construction SWPP Elements #1 through #12 below.

Projects in which the new, replaced, or new plus replaced impervious surfaces total 2,000 square feet or more, or disturb 7,000 square feet or more of land must prepare a Construction SWPP Plan (SWPPP) as part of the Stormwater Site Plan (see 2.5.1). Each of the twelve elements must be considered and included in the Construction

SWPPP unless site conditions render the element unnecessary and the exemption from that element is clearly justified in the narrative of the SWPPP.

Projects that add or replace less than 2,000 square feet of impervious surface or disturb less than 7,000 square feet of land are not required to prepare a Construction SWPPP, but must consider all of the twelve Elements of Construction Stormwater Pollution Prevention and develop controls for all elements that pertain to the project site.

Element 1: Mark Clearing Limits

Prior to beginning land disturbing activities, including clearing and grading, all clearing limits, sensitive areas and their buffers, and trees that are to be preserved within the construction area shall be clearly marked, both in the field and on the plans, to prevent damage and offsite impacts.

- **Plastic, metal, or stake wire fence may be used to mark the clearing limits.**

The duff layer, native top soil, and natural vegetation shall be retained in an undisturbed state to the maximum extent practicable. If it is not practicable to retain the duff layer in place, it should be stockpiled on-site, covered to prevent erosion, and replaced immediately upon completion of the ground disturbing activities.

Element 2: Establish Construction Access

- **Construction vehicle access and exit shall be limited to one route, if possible, or two for linear projects such as roadways where more than one access is necessary for large equipment maneuvering.**
- **Access points shall be stabilized with a pad of quarry spalls or crushed rock prior to traffic leaving the construction site to minimize the tracking of sediment onto public roads.**
- **Wheel wash or tire baths should be located on-site, if applicable.**
- **If sediment is tracked off site, public roads shall be cleaned thoroughly at the end of each day, or more frequently during wet weather, if necessary to prevent sediment from entering waters of the state. Sediment shall be removed from roads by shoveling or pickup sweeping and shall be transported to a controlled sediment disposal area. Street washing will be allowed only after sediment is removed in this manner.**

- **Street wash wastewater shall be controlled by pumping back on-site, or otherwise be prevented from discharging into systems tributary to state surface waters.**

Element 3: Control Flow Rates

- **Properties and waterways downstream from development sites shall be protected from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site, as required by local plan approval authority.**
- **Downstream analysis is necessary if changes in flows could impair or alter conveyance systems, stream banks, bed sediment or aquatic habitat. See Chapter 3 for offsite analysis guidance.**
- **Where necessary to comply with Minimum Requirement #7, stormwater retention/detention facilities shall be constructed as one of the first steps in grading. Detention facilities shall be functional prior to construction of site improvements (e.g. impervious surfaces).**
- **The local permitting agency may require pond designs that provide additional or different stormwater flow control if necessary to address local conditions or to protect properties and**
- **waterways downstream from erosion due to increases in the volume, velocity, and peak flow rate of stormwater runoff from the project site.**
- **If permanent infiltration ponds are used for flow control during construction, these facilities should be protected from siltation during the construction phase.**

Element 4: Install Sediment Controls

- **Prior to leaving a construction site, or prior to discharge to an infiltration facility, stormwater runoff from disturbed areas shall pass through a sediment pond or other appropriate sediment removal BMP. Runoff from fully stabilized areas may be discharged without a sediment removal BMP, but must meet the flow control performance standard of Element #3, bullet #1. Full stabilization means concrete or asphalt paving; quarry spalls used as ditch lining; or the use of rolled erosion products, a bonded fiber matrix product, or vegetative cover in a manner that will fully prevent soil erosion. The Local Permitting Authority shall inspect and approve areas stabilized by means other than pavement or quarry spalls.**
- **Sediment ponds, vegetated buffer strips, sediment barriers or filters, dikes, and other BMPs intended to trap sediment on-site shall be constructed as one of the first steps in grading. These**

BMPs shall be functional before other land disturbing activities take place.

- **Earthen structures such as dams, dikes, and diversions shall be seeded and mulched according to the timing indicated in Element #5.**
- **BMPs intended to trap sediment on site must be located in a manner to avoid interference with the movement of juvenile salmonids attempting to enter off-channel areas or drainages, often during non-storm events, in response to rain event changes in stream elevation or wetted area.**

Element 5: Stabilize Soils

- **All exposed and unworked soils shall be stabilized by application of effective BMPs that protect the soil from the erosive forces of raindrop impact and flowing water, and wind erosion.**
- **From October 1 through April 30, no soils shall remain exposed and unworked for more than 2 days. From May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days. This condition applies to all soils on site, whether at final grade or not. These time limits may be adjusted by the local permitting authority if it can be shown that the average time between storm events justifies a different standard.**
- **Soils shall be stabilized at the end of the shift before a holiday or weekend if needed based on the weather forecast.**
- **Applicable practices include, but are not limited to, temporary and permanent seeding, sodding, mulching, plastic covering, soil application of polyacrylamide (PAM), the early application of gravel base on areas to be paved, and dust control.**
- **Soil stabilization measures selected should be appropriate for the time of year, site conditions, estimated duration of use, and potential water quality impacts that stabilization agents may have on downstream waters or ground water.**
- **Soil stockpiles must be stabilized from erosion, protected with sediment trapping measures, and when possible, be located away from storm drain inlets, waterways and drainage channels.**
- **Linear construction activities, including right-of-way and easement clearing, roadway development, pipelines, and trenching for utilities, shall be conducted to meet the soil stabilization requirement. Contractors shall install the bedding materials, roadbeds, structures, pipelines, or utilities and re-stabilize the disturbed soils so that:**

- from October 1 through April 30 no soils shall remain exposed and unworked for more than 2 days; and
- from May 1 to September 30, no soils shall remain exposed and unworked for more than 7 days.

Element 6: Protect Slopes

- Cut and fill slopes shall be designed and constructed in a manner that will minimize erosion.
- Consider soil type and its potential for erosion.
- Reduce slope runoff velocities by reducing the continuous length of slope with terracing and diversions, reduce slope steepness, and roughen slope surface.
- Off-site stormwater (run-on) shall be diverted away from slopes and disturbed areas with interceptor dikes and/or swales. Off-site stormwater should be managed separately from stormwater generated on the site.
- At the top of slopes, collect drainage in pipe slope drains or protected channels to prevent erosion. Temporary pipe slope drains shall handle the peak flow from a 10 year, 24 hour event assuming a Type 1A rainfall distribution. Alternatively, the 10-year and 25-year, 1-hour flow rates indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used. Consult the local drainage requirements for sizing permanent pipe slope drains.
- Provide drainage to remove ground water intersecting the slope surface of exposed soil areas.
- Excavated material shall be placed on the uphill side of trenches, consistent with safety and space considerations.
- Check dams shall be placed at regular intervals within channels that are cut down a slope.
- Stabilize soils on slopes, as specified in Element #5.

Element 7: Protect Drain Inlets

- All storm drain inlets made operable during construction shall be protected so that stormwater runoff shall not enter the conveyance system without first being filtered or treated to remove sediment.
- All approach roads shall be kept clean. All sediment and street wash water shall not be allowed to enter storm drains without prior and adequate treatment unless treatment is provided before the storm drain discharges to waters of the State.
- Inlets should be inspected weekly at a minimum and daily during storm events. Inlet protection devices should be cleaned or

removed and replaced when sediment has filled one-third of the available storage (unless a different standard is specified by the product manufacturer).

Element 8: Stabilize Channels and Outlets

- All temporary on-site conveyance channels shall be designed, constructed and stabilized to prevent erosion from the expected peak 10 minute velocity of flow from a Type 1A, 10- year, 24-hour frequency storm for the developed condition. Alternatively, the 10-year, 1-hour flow rate indicated by an approved continuous runoff model, increased by a factor of 1.6, may be used.
- Stabilization, including armoring material, adequate to prevent erosion of outlets, adjacent stream banks, slopes and downstream reaches shall be provided at the outlets of all conveyance systems.

Element 9: Control Pollutants

- All pollutants, including waste materials and demolition debris, that occur on-site shall be handled and disposed of in a manner that does not cause contamination of stormwater. Woody debris may be chopped and spread on site.
- Cover, containment, and protection from vandalism shall be provided for all chemicals, liquid products, petroleum products, and non-inert wastes present on the site (see Chapter 173-304 WAC for the definition of inert waste). On-site fueling tanks shall include secondary containment.
- Maintenance and repair of heavy equipment and vehicles involving oil changes, hydraulic system drain down, solvent and de-greasing cleaning operations, fuel tank drain down and removal, and other activities which may result in discharge or spillage of pollutants to the ground or into stormwater runoff must be conducted using spill prevention measures, such as drip pans. Contaminated surfaces shall be cleaned immediately following any discharge or spill incident. Emergency repairs may be performed on-site using temporary plastic placed beneath and, if raining, over the vehicle.
- Wheel wash or tire bath wastewater, shall be discharged to a separate on-site treatment system or to the sanitary sewer.
- Application of agricultural chemicals, including fertilizers and pesticides, shall be conducted in a manner and at application rates that will not result in loss of chemical to stormwater runoff. Manufacturers' recommendations for application rates and procedures shall be followed.
- BMPs shall be used to prevent or treat contamination of stormwater runoff by pH modifying sources. These sources

include, but are not limited to, bulk cement, cement kiln dust, fly ash, new concrete washing and curing waters, waste streams generated from concrete grinding and sawing, exposed aggregate processes, and concrete pumping and mixer washout waters. Stormwater discharges shall not cause or contribute to a violation of the water quality standard for pH in the receiving water.

- Construction sites with significant concrete work shall adjust the pH of stormwater if necessary to prevent violations of water quality standards.

Element 10: Control De-Watering

- Foundation, vault, and trench de-watering water, which has similar characteristics to stormwater runoff at the site, shall be discharged into a controlled conveyance system prior to discharge to a sediment trap or sediment pond. Channels must be stabilized, as specified in Element #8.
- Clean, non-turbid de-watering water, such as well-point ground water, can be discharged to systems tributary to state surface waters, as specified in Element #8, provided the de-watering flow does not cause erosion or flooding of receiving waters. These clean waters should not be routed through a stormwater sediment pond.
- Highly turbid or otherwise contaminated dewatering water, such as from construction equipment operation, clamshell digging, concrete tremie pour, or work inside a cofferdam, shall be handled separately from stormwater.
- Other disposal options, depending on site constraints, may include: 1) infiltration, 2) transport off-site in a vehicle, such as a vacuum flush truck, for legal disposal in a manner that does not pollute state waters, 3) Ecology-approved on-site chemical treatment or other suitable treatment technologies, 4) sanitary sewer discharge with local sewer district approval, if there is no other option, or 5) use of a sedimentation bag with outfall to a ditch or swale for small volumes of localized dewatering.

Element 11: Maintain BMPs

- All temporary and permanent erosion and sediment control BMPs shall be maintained and repaired as needed to assure continued performance of their intended function. All maintenance and repair shall be conducted in accordance with BMP specifications.
- All temporary erosion and sediment control BMPs shall be removed within 30 days after final site stabilization is achieved or after the temporary BMPs are no longer needed. Trapped sediment shall be removed or stabilized on site. Disturbed soil

areas resulting from removal of BMPs or vegetation shall be permanently stabilized.

Element 12: Manage The Project

- **Phasing of Construction - Development projects shall be phased where feasible in order to prevent soil erosion and, to the maximum extent practicable, the transport of sediment from the site during construction. Revegetation of exposed areas and maintenance of that vegetation shall be an integral part of the clearing activities for any phase.**
- **Clearing and grading activities for developments shall be permitted only if conducted pursuant to an approved site development plan (e.g., subdivision approval) that establishes permitted areas of clearing, grading, cutting, and filling. When establishing these permitted clearing and grading areas, consideration should be given to minimizing removal of existing trees and minimizing disturbance/compaction of native soils except as needed for building purposes. These permitted clearing and grading areas and any other areas required to preserve critical or sensitive areas, buffers, native growth protection easements, or tree retention areas as may be required by local jurisdictions, shall be delineated on the site plans and the development site.**
- **Seasonal Work Limitations - From October 1 through April 30, clearing, grading, and other soil disturbing activities shall only be permitted if shown to the satisfaction of the local permitting authority that silt-laden runoff will be prevented from leaving the site through a combination of the following:**
 1. **Site conditions including existing vegetative coverage, slope, soil type and proximity to receiving waters; and**
 2. **Limitations on activities and the extent of disturbed areas; and**
 3. **Proposed erosion and sediment control measures.**

Based on the information provided and/or local weather conditions, the local permitting authority may expand or restrict the seasonal limitation on site disturbance. The local permitting authority shall take enforcement action - such as a notice of violation, administrative order, penalty, or stop-work order under the following circumstances:

- **If, during the course of any construction activity or soil disturbance during the seasonal limitation period, sediment leaves the construction site causing a violation of the surface water quality standard; or**

- **If clearing and grading limits or erosion and sediment control measures shown in the approved plan are not maintained.**

The following activities are exempt from the seasonal clearing and grading limitations:

- 1. Routine maintenance and necessary repair of erosion and sediment control BMPs;**
 - 2. Routine maintenance of public facilities or existing utility structures that do not expose the soil or result in the removal of the vegetative cover to soil; and**
 - 3. Activities where there is one hundred percent infiltration of surface water runoff within the site in approved and installed erosion and sediment control facilities.**
- **Coordination with Utilities and Other Contractors - The primary project proponent shall evaluate, with input from utilities and other contractors, the stormwater management requirements for the entire project, including the utilities, when preparing the Construction SWPPP.**

Inspection and Monitoring - All BMPs shall be inspected, maintained, and repaired as needed to assure continued performance of their intended function. Site inspections shall be conducted by a person who is knowledgeable in the principles and practices of erosion and sediment control. The person must have the skills to 1) assess the site conditions and construction activities that could impact the quality of stormwater, and 2) assess the effectiveness of erosion and sediment control measures used to control the quality of stormwater discharges.

- **For construction sites one acre or larger that discharge stormwater to surface waters of the state, a Certified Erosion and Sediment Control Specialist shall be identified in the Construction SWPPP and shall be on-site or on-call at all times. Certification may be obtained through an approved training program that meets the erosion and sediment control training standards established by Ecology.**

Whenever inspection and/or monitoring reveals that the BMPs identified in the Construction SWPPP are inadequate, due to the actual discharge of or potential to discharge a significant amount of any pollutant, appropriate BMPs or design changes shall be implemented as soon as possible.

- **Maintaining an Updated Construction SWPPP - The Construction SWPPP shall be retained on-site or within reasonable access to the site.**

The SWPPP shall be modified whenever there is a significant change in the design, construction, operation, or maintenance at the construction site that has, or could have, a significant effect on the discharge of pollutants to waters of the state.

The SWPPP shall be modified, if during inspections or investigations conducted by the owner/operator, or the applicable local or state regulatory authority, it is determined that the SWPPP is ineffective in eliminating or significantly minimizing pollutants in stormwater discharges from the site. The SWPPP shall be modified as necessary to include additional or modified BMPs designed to correct problems identified. Revisions to the SWPPP shall be completed within seven (7) calendar days following the inspection.

Objective

To control erosion and prevent sediment and other pollutants from leaving the site during the construction phase of a project.

Supplemental Guidelines

If a Construction SWPPP is found to be inadequate (with respect to erosion and sediment control requirements), then the Plan Approval Authority¹ within the Local Government should require that other BMPs be implemented, as appropriate.

The Plan Approval Authority may allow development of generic Construction SWPPP's that apply to commonly conducted public road activities, such as road surface replacement, that trigger this minimum requirement.

2.5.3 Minimum Requirement #3: Source Control of Pollution

All known, available and reasonable source control BMPs shall be applied to all projects. Source control BMPs shall be selected, designed, and maintained according to this manual.

Objective

The intention of source control BMPs is to prevent stormwater from coming in contact with pollutants. They are a cost-effective means of reducing pollutants in stormwater, and, therefore, should be a first consideration in all projects

¹ The Plan Approval Authority is defined as that department within a local government that has been delegated authority to approve stormwater site plans.

Supplemental Guidelines

An adopted and implemented basin plan (Minimum Requirement #9) or a Total Maximum Daily Load (TMDL, also known as a Water Clean-up Plan) may be used to develop more stringent source control requirements that are tailored to a specific basin.

Source Control BMPs include Operational BMPs and Structural Source Control BMPs. See Volume IV for design details of these BMPs. For construction sites, see Volume II, Chapter 4.

Structural source control BMPs should be identified in the stormwater site plan and should be shown on site plans submitted for local government review.

2.5.4 Minimum Requirement #4: Preservation of Natural Drainage Systems and Outfalls

Natural drainage patterns shall be maintained, and discharges from the project site shall occur at the natural location, to the maximum extent practicable. The manner by which runoff is discharged from the project site must not cause a significant adverse impact to downstream receiving waters and downgradient properties. All outfalls require energy dissipation.

Objective

To preserve and utilize natural drainage systems to the fullest extent because of the multiple stormwater benefits these systems provide; and to prevent erosion at and downstream of the discharge location.

Supplemental Guidelines

Creating new drainage patterns results in more site disturbance and more potential for erosion and sedimentation during and after construction. Creating new discharge points can create significant stream channel erosion problems as the receiving water body typically must adjust to the new flows. Diversions can cause greater impacts than would otherwise occur by discharging runoff at the natural location.

Where no conveyance system exists at the adjacent downgradient property line and the discharge was previously unconcentrated flow or significantly lower concentrated flow, then measures must be taken to prevent downgradient impacts. Drainage easements from downstream property owners may be needed and should be obtained prior to approval of engineering plans.

The following discharge requirement is recommended:

Where no conveyance system exists at the abutting downstream property line and the natural (existing) discharge is unconcentrated, any runoff concentrated by the proposed project must be discharged as follows:

- a) If the 100-year peak discharge is less than or equal to 0.2 cfs under existing conditions and will remain less than or equal to 0.2 cfs under developed conditions, then the concentrated runoff may be discharged onto a rock pad or to any other system that serves to disperse flows.
- b) If the 100-year peak discharge is less than or equal to 0.5 cfs under existing conditions and will remain less than or equal to 0.5 cfs under developed conditions, then the concentrated runoff may be discharged through a dispersal trench or other dispersal system, provided the applicant can demonstrate that there will be no significant adverse impact to downhill properties or drainage systems.
- c) If the 100-year peak discharge is greater than 0.5 cfs for either existing or developed conditions, or if a significant adverse impact to downgradient properties or drainage systems is likely, then a conveyance system must be provided to convey the concentrated runoff across the downstream properties to an acceptable discharge point (i.e., an enclosed drainage system or open drainage feature where concentrated runoff can be discharged without significant adverse impact).

Stormwater control or treatment structures should not be located within the expected 25-year water level elevations for salmonid-bearing waters. Such areas may provide off-channel habitat for juvenile salmonids and salmonid fry. Designs for outfall systems to protect against adverse impacts from concentrated runoff are included in Volume V, Chapter 4.

2.5.5 Minimum Requirement #5: On-site Stormwater Management

Projects shall employ On-site Stormwater Management BMPs to infiltrate, disperse, and retain stormwater runoff onsite to the maximum extent feasible without causing flooding or erosion impacts. Roof Downspout Control BMPs, functionally equivalent to those described in Chapter 3 of Volume III, and Dispersion and Soil Quality BMPs, functionally equivalent to those in Chapter 5 of Volume V, shall be required to reduce the hydrologic disruption of developed sites.

Objective

To use inexpensive practices on individual properties to reduce the amount of disruption of the natural hydrologic characteristics of the site.

Supplemental Guidelines

“Flooding and erosion impacts” include impacts such as flooding of septic systems, crawl spaces, living areas, outbuildings, etc.; increased ice or algal growth on sidewalks/roadways; earth movement/settlement, increased landslide potential; erosion and other potential damage.

Recent research indicates that current techniques in residential, commercial, and industrial land development cause gross disruption of the natural hydrologic cycle with severe impacts to water and water-related natural resources. Based upon gross level applications of continuous runoff modeling and assumptions concerning minimum flows needed to maintain beneficial uses, watersheds must retain the majority of their natural vegetation cover and soils, and developments must meet the Flow Control Minimum Requirement of this chapter, in order to avoid significant natural resource degradation in lowland streams.

The Roof Downspout Control BMPs described in Section 3.1 of Volume III, and the Dispersion and Soil Quality BMPs in Section 5.3.1 of Volume V are insufficient to prevent significant hydrologic disruptions and impacts to streams and their natural resources. Therefore, local governments should look for opportunities to encourage and require additional BMPs such as those in Appendix C in Volume III and Section 5.3.1 of Volume V through updates to their site development standards, critical areas ordinances, and land use plans.

2.5.6 Minimum Requirement #6: Runoff Treatment

Thresholds

The following require construction of stormwater treatment facilities (see Table 2.1):

- **Projects in which the total of effective, pollution-generating impervious surface (PGIS) is 5,000 square feet or more in a threshold discharge area of the project, or**
- **Projects in which the total of pollution-generating pervious surfaces (PGPS) is three-quarters (3/4) of an acre or more in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site.**

Table 2.1 Treatment Requirements by Threshold Discharge Area				
	< 3/4 acres of PGPS	≥ 3/4 acres PGPS	< 5,000 sf PGIS	≥ 5,000 sf PGIS
Treatment Facilities		✓		✓
Onsite Stormwater BMPs	✓	✓	✓	✓

PGPS = pollution-generating pervious surfaces
 PGIS = pollution-generating impervious surfaces
 sf = square feet

Treatment Facility Sizing

Water Quality Design Storm Volume: The volume of runoff predicted from a 24-hour storm with a 6-month return frequency (a.k.a., 6-month, 24-hour storm). Wetpool facilities are sized based upon the volume of runoff predicted through use of the Natural Resource Conservation Service curve number equations in Chapter 2 of Volume III, for the 6-month, 24-hour storm. Alternatively, the 91st percentile, 24-hour runoff volume indicated by an approved continuous runoff model may be used.

Water Quality Design Flow Rate:

- ***Preceding Detention Facilities or when Detention Facilities are not required:*** The flow rate at or below which 91% of the runoff volume, as estimated by an approved continuous runoff model, will be treated. Design criteria for treatment facilities are assigned to achieve the applicable performance goal at the water quality design flow rate (e.g., 80% TSS removal).
- ***Downstream of Detention Facilities:*** The full 2-year release rate from the detention facility.

Alternative methods can be used if they identify volumes and flow rates that are at least equivalent.

That portion of any development project in which the above PGIS or PGPS thresholds are not exceeded in a threshold discharge area shall apply On-site Stormwater Management BMPs in accordance with Minimum Requirement #5.

Treatment Facility Selection, Design, and Maintenance

Stormwater treatment facilities shall be:

- **selected in accordance with the process identified in Chapter 4 of Volume I,**
- **designed in accordance with the design criteria in Volume V, and**
- **maintained in accordance with the maintenance schedule in Volume V.**

Additional Requirements

Direct discharge of untreated stormwater from pollution-generating impervious surfaces to ground water is prohibited, except for the discharge achieved by infiltration or dispersion of runoff from residential sites through use of On-site Stormwater Management BMPs.

Objective

The purpose of runoff treatment is to reduce pollutant loads and concentrations in stormwater runoff using physical, biological, and chemical removal mechanisms so that beneficial uses of receiving waters are maintained and, where applicable, restored. When site conditions are appropriate, infiltration can potentially be the most effective BMP for runoff treatment.

Supplemental Guidelines

See Volume V for more detailed guidance on selection, design, and maintenance of treatment facilities. The water quality design storm volume and flow rates are intended to capture and effectively treat about 90-95% of the annual runoff volume in western Washington. See Appendix I-B for background on their derivation.

Volume V includes performance goals for Basic, Enhanced, Phosphorus, and Oil Control treatment, and a menu of facility options for each treatment type. Treatment facilities that are selected from the appropriate menu and designed in accordance with their design criteria are presumed to meet the applicable performance goals.

An adopted and implemented basin plan (Minimum Requirement #9), or a Total Maximum Daily Load (TMDL - also known as a Water Clean-up Plan) may be used to develop runoff treatment requirements that are tailored to a specific basin. However, treatment requirements shall not be less than that achieved by facilities in the Basic Treatment Menu (see Volume V, Chapter 3).

Treatment facilities applied consistent with this manual are presumed to meet the requirement of state law to provide all known available and reasonable methods of treatment (RCW 90.52.040, RCW 90.48.010). This technology-based treatment requirement does not excuse any discharge from the obligation to apply whatever technology is necessary to comply with state water quality standards, Chapter 173-201A WAC; state ground water quality standards, Chapter 173-200 WAC; state sediment management standards, Chapter 173-204 WAC; and the underground injection control program, Chapter 173-218 WAC. Additional treatment to meet those standards may be required by federal, state, or local governments.

Infiltration through use of On-site Stormwater Management BMPs can provide both treatment of stormwater, through the ability of certain soils to remove pollutants, and volume control of stormwater, by decreasing the amount of water that runs off to surface water. Infiltration through engineered treatment facilities that utilize the natural soil profile can also be very effective at treating stormwater runoff, but pretreatment must be applied and soil conditions must be appropriate to achieve effective treatment while not impacting ground water resources. See Chapter 6 of Volume V for design details.

Discharge of pollution-generating surfaces into a dry well, after pretreatment for solids reduction, can be acceptable if the soil conditions provide sufficient treatment capacity. Dry wells into gravelly soils are not likely to have sufficient treatment capability. They must be preceded by at least a basic treatment BMP. See Volume V, Chapters 2 and 7 for details.

Impervious surfaces that are “fully dispersed” in accordance with BMP T5.30 in Volume V are not considered effective impervious surfaces. PGIS surfaces that are “dispersed” in accordance with the BMPs in Section 5.1 of Volume V are considered effective impervious surfaces. Porous pavers and Modular grid pavements are assigned a lower curve number (if using single event hydrology to size wetpools) and lower surface runoff calibrations (if using continuous runoff modeling). See Volume III for a more complete description of hydrologic credits for Onsite Stormwater Management BMPs.

2.5.7 Minimum Requirement #7: Flow Control

Applicability

Projects must provide flow control to reduce the impacts of stormwater runoff from impervious surfaces and land cover conversions. The requirement below applies to projects that discharge stormwater directly, or indirectly through a conveyance system, into a fresh water - except for projects that discharge to a

water in Appendix I-E - Flow Control-Exempt Receiving Waters in accordance with the following restrictions:

- **Direct discharge to the exempt receiving water does not result in the diversion of drainage from any perennial stream 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 BMP’s 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 BMP’s 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 BMP’s that deliver flow to category IV wetlands will also be designed using continuous hydrologic modeling to preserve pre-project 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 manmade conveyance elements (e.g., pipes, ditches, outfall protection, etc.) and extends to the ordinary high water line of the exempt receiving water; and**
- **The conveyance system between the project site and the exempt receiving water shall have sufficient hydraulic capacity to convey discharges from future build-out conditions (under current zoning) of the site, and the existing condition from non-project areas from which runoff is or will be collected; and**
- **Any erodible elements of the manmade conveyance system must be adequately stabilized to prevent erosion under the conditions noted above.**

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 #8 apply.

Local governments may petition Ecology to exempt projects in additional areas. A petition must justify the proposed exemption based upon a hydrologic analysis that demonstrates 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.

Thresholds

The following require construction of flow control facilities and/or land use management BMPs that will achieve the standard requirement for western Washington (see Table 2.2):

- Projects in which the total of effective impervious surfaces is 10,000 square feet or more in a threshold discharge area, or
- Projects that convert $\frac{3}{4}$ acres or more of native vegetation to lawn or landscape, or convert 2.5 acres or more of native vegetation to pasture in a threshold discharge area, and from which there is a surface discharge in a natural or man-made conveyance system from the site, or
- Projects that through a combination of effective impervious surfaces and converted pervious surfaces cause a 0.1 cubic feet per second increase in the 100-year flow frequency from a threshold discharge area as estimated using the Western Washington Hydrology Model or other approved model.

That portion of any development project in which the above thresholds are not exceeded in a threshold discharge area shall apply Onsite Stormwater Management BMPs in accordance with Minimum Requirement #5.

Table 2.2 Flow Control Requirements by Threshold Discharge Area		
	Flow Control Facilities	On-site Stormwater Management BMPs
< $\frac{3}{4}$ acres conversion to lawn/landscape, or < 2.5 acres to pasture		✓
$\geq \frac{3}{4}$ acres conversion to lawn/landscape, or ≥ 2.5 acres to pasture	✓	✓
< 10,000 square feet of effective impervious area		✓
$\geq 10,000$ square feet of effective impervious area	✓	✓
≥ 0.1 cubic feet per second increase in the 100-year flood frequency	✓	✓

Standard Requirement

The following requirement applies to the geographic areas west of the Cascades, including all of the following counties:

Clallam	Jefferson	Pacific	Snohomish
Clark	King	Pierce	Thurston
Cowlitz	Kitsap	San Juan	Wahkiakum
Grays Harbor	Lewis	Skagit	Whatcom
Island	Mason	Skamania	

Stormwater discharges shall match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 50% of the 2-year peak flow up to the full 50-year peak flow. The pre-developed condition to be matched shall be a forested land cover unless:

1) reasonable, historic information is provided that indicates the site was prairie prior to settlement (modeled as “pasture” in the Western Washington Hydrology Model); or,

2) the drainage area of the immediate stream and all subsequent downstream basins have had at least 40% total impervious area since 1985. In this case, the pre-developed condition to be matched shall 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 pre-developed condition assumption shall be the “historic” land cover condition, or a land cover condition commensurate with achieving a target flow regime identified by an approved basin study.

This standard requirement is waived for sites that will reliably infiltrate all the runoff from impervious surfaces and converted pervious surfaces.

Western Washington Alternative Requirement

An alternative requirement may be established through application of watershed-scale hydrological modeling and supporting field observations. Possible reasons for an alternative flow control requirement include:

- **Establishment of a stream-specific threshold of significant bedload movement other than the assumed 50% of the 2-year peak flow;**
- **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; or**
- **A duration control standard is not necessary for protection, maintenance, or restoration of designated beneficial uses or Clean Water Act compliance.**

Additional Requirement

Flow Control BMPs shall be selected, designed, and maintained according to a local government manual deemed equivalent to this manual.

Objective

To prevent increases in the stream channel erosion rates that are characteristic of natural conditions (i.e., prior to disturbance by European settlement). The standard intends to maintain the total amount of time that a receiving stream exceeds an erosion-causing threshold based upon historic rainfall and natural land cover conditions. That threshold is assumed to be 50% of the 2-year peak flow. Maintaining the naturally occurring erosion rates within streams is vital, though by itself insufficient, to protect fish habitat and production.

Supplemental Guidelines

Reduction of flows through infiltration decreases stream channel erosion and helps to maintain base flow throughout the summer months. However, infiltration should only be used where ground water quality is not threatened by such discharges.

Volume III includes a description of the Western Washington Hydrology Model. The model provides credits for use of certain Onsite Stormwater Management BMPs described in Volume V, and other low impact development techniques described in Appendix C of Volume III. Using those BMPs and LID techniques reduces the size of the required flow control facilities.

Application of sufficient types of Onsite Stormwater Management BMPs can result in reducing the effective impervious area and the converted pervious areas such that a flow control facility is not required. Application of “Full Dispersion”, BMP T5.30, also results in eliminating

the flow control facility requirement for those areas that are “fully dispersed.”

See the supplemental guidelines for Minimum Requirement #8 and directions concerning use of the Western Washington Hydrology Model for information about tracking wetland hydrologic conditions.

Diversions of flow from perennial streams and from wetlands can be considered if significant existing (i.e., pre-project) 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 should not be considered as 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 should not exacerbate other water quality/quantity problems such as inadequate low flows or inadequate wetland water elevations.

The existing problems and their solution or mitigation as a result of the direct discharge should be documented by a stormwater engineer or scientist 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 an exempt receiving water are applicable in these situations. Approvals by all regulatory authorities with relevant permits applicable to the project are necessary.

In regard to implementation of the revised flow control requirement for highly urbanized basins, the Dept. of Ecology hopes to publish a listing of total impervious area for basins in western Washington. Lists will be developed from satellite images taken in 1990, 1995, and 2000. Images from 2005 may be available for TIA evaluation in 2006. Local governments will have to use historical records to estimate TIA for basins in 1985. Local governments can use these information sources to identify basins that meet the 40% TIA/20 year criterion.

The Dept. of Ecology hopes to publish guidance concerning basin studies to develop basin-specific flow control strategies intended to stabilize stream channels and provide flows intended to protect and restore beneficial uses such as fish resources. Until such guidance is published, the reader can review procedures used in the Des Moines Creek basin plan. The recommendations made in basin plans should be consistent with the requirements and intent of the federal Clean Water Act, the State Water Pollution Control Act, and any other applicable natural resources statutes, such as the Federal Endangered Species Act.

2.5.8 Minimum Requirement #8: Wetlands Protection

Applicability

The requirements below apply only to projects whose stormwater discharges into a wetland, either directly or indirectly through a conveyance system. These requirements must be met in addition to meeting Minimum Requirement #6, Runoff Treatment.

Thresholds

The thresholds identified in Minimum Requirement #6 – Runoff Treatment, and Minimum Requirement #7 – Flow Control shall also be applied for discharges to wetlands.

Standard Requirement

Discharges to wetlands shall maintain the hydrologic conditions, hydrophytic vegetation, and substrate characteristics necessary to support existing and designated uses. The hydrologic analysis shall use the existing land cover condition to determine the existing hydrologic conditions unless directed otherwise by a regulatory agency with jurisdiction. A wetland can be considered for hydrologic modification and/or stormwater treatment in accordance with Guide Sheet 1B in Appendix I-D.

Additional Requirements

The standard requirement does not excuse any discharge from the obligation to apply whatever technology is necessary to comply with state water quality standards, Chapter 173-201A WAC, or state ground water standards, Chapter 173-200 WAC. Additional treatment requirements to meet those standards may be required by federal, state, or local governments.

Stormwater treatment and flow control facilities shall not be built within a natural vegetated buffer, except for:

- necessary conveyance systems as approved by the local government; or
- as allowed in wetlands approved for hydrologic modification and/or treatment in accordance with Guidesheet 1B.

An adopted and implemented basin plan (Minimum Requirement #9), or a Total Maximum Daily Load (TMDL, also known as a Water

Clean-up Plan) may be used to develop requirements for wetlands that are tailored to a specific basin.

Objective

To ensure that wetlands receive the same level of protection as any other waters of the state. Wetlands are extremely important natural resources which provide multiple stormwater benefits, including ground water recharge, flood control, and stream channel erosion protection. They are easily impacted by development unless careful planning and management are conducted. Wetlands can be severely degraded by stormwater discharges from urban development due to pollutants in the runoff and also due to disruption of natural hydrologic functioning of the wetland system. Changes in water levels and the frequency and duration of inundations are of particular concern.

Supplemental Guidelines

Appendix I-D, "Wetlands and Stormwater Management Guidelines" is an amended version of Chapter 14 of the publication, "Wetlands and Urbanization, Implications for the Future", the final report of the Puget Sound Wetland and Stormwater Management Research Program, 1997. It should be used for discharges to natural wetlands and wetlands constructed as mitigation. The amendments were added to Guidesheets 1A, 2B, and 2C to improve clarity of intent and to make them compatible with the updated manual. While it is always necessary to pre-treat stormwater prior to discharge to a wetland, there are limited circumstances where wetlands may be used for additional treatment and detention of stormwater. These situations are considered in Guide Sheet 1B of the guidelines.

Note that if selective runoff bypass is an alternative being considered to maintain the hydroperiod, the hydrologic analysis must consider the impacts of the bypassed flow. For instance, if the bypassed flow is eventually directed to a stream, the flow duration standard, Minimum Requirement #7, applies to the bypass.

2.5.9 Minimum Requirement #9: Basin/Watershed Planning

Projects may be subject to equivalent or more stringent minimum requirements for erosion control, source control, treatment, and operation and maintenance, and alternative requirements for flow control and wetlands hydrologic control as identified in Basin/Watershed Plans. Basin/Watershed plans shall evaluate and include, as necessary, retrofitting urban stormwater BMPs into existing development and/or redevelopment in order to achieve watershed-wide pollutant reduction and flow control goals that are

consistent with requirements of the federal Clean Water Act. Standards developed from basin plans shall not modify any of the above minimum requirements until the basin plan is formally adopted and implemented by the local governments within the basin, and approved or concurred with by Ecology.

Objective

To promote watershed-based planning as a means to develop and implement comprehensive, water quality protection measures. Primary objectives of basin planning are to reduce pollutant loads and hydrologic impacts to surface and ground waters in order to protect beneficial uses.

Supplemental Guidelines

Though Minimum Requirements #1 through #8 establish general standards for individual sites, they do not evaluate the overall pollution impacts and protection opportunities that could exist at the watershed level. In order 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 responsibilities under the plan and
- all ordinances or regulations called for by the plan must be in effect.

This is what is meant by an adopted and implemented basin plan.

Basin planning provides a mechanism by which the minimum requirements and implementing BMP's can be evaluated and refined based on an analysis of an entire watershed. Basin plans are especially well suited to develop control strategies to address impacts from future development and to correct specific problems whose sources are known or suspected. Basin plans can be effective at addressing both long-term cumulative impacts of pollutant loads and short-term acute impacts of pollutant concentrations, as well as hydrologic impacts to streams, wetlands, and ground water resources. The USGS has developed software called "GenScn" (Generation and Analysis of Model Simulation Scenarios) that can facilitate basin planning. The program is a Windows-based use of HSPF that predicts water quality and quantity changes for multiple scenarios of land use and water management within a basin.

Examples of how Basin Planning can alter the minimum requirements of this manual are given in Appendix I-A.

2.5.10 Minimum Requirement #10: Operation and Maintenance

An operation and maintenance manual that is consistent with the provisions in Volume V of this manual shall be provided for all proposed stormwater facilities and BMPs, and the party (or parties) responsible for maintenance and operation shall be identified. At private facilities, a copy of the manual shall be retained onsite or within reasonable access to the site, and shall be transferred with the property to the new owner. For public facilities, a copy of the manual shall be retained in the appropriate department. A log of maintenance activity that indicates what actions were taken shall be kept and be available for inspection by the local government.

Objective

To ensure that stormwater control facilities are adequately maintained and operated properly.

Supplemental Guidelines

Inadequate maintenance is a common cause of failure for stormwater control facilities. The description of each BMP in Volumes II, III, and V includes a section on maintenance. Chapter 4 of Volume V includes a schedule of maintenance standards for drainage facilities. Local governments should consider more detailed requirements for maintenance logs, such as a record of where wastes were disposed.

2.6 Optional Guidance

The following guidance is offered as recommendations to local governments. Ecology considers their use to be in the best interest of the general public and the environment but will not make their implementation a requirement for manual equivalency.

2.6.1 Optional Guidance #1: Financial Liability

Performance bonding or other appropriate financial guarantees shall be required for all projects to ensure construction of drainage facilities in compliance with these standards. In addition, a project applicant shall post a two-year financial guarantee of the satisfactory performance and maintenance of any drainage facilities that are scheduled to be assumed by the local government for operation and maintenance.

Objective

To ensure that development projects have adequate financial resources to fully implement stormwater management plan requirements and that liability is not unduly incurred by local governments.