COMPENDIUM OF MS4 PERMITTING APPROACHES

PART 2: POST CONSTRUCTION STANDARDS

Office of Wastewater Management
Water Permit Division
November 2016
EPA-810-R-16-017

POST-CONSTRUCTION STANDARDS FOR STORMWATER DISCHARGES FROM NEW DEVELOPMENT AND REDEVELOPMENT

As development occurs, increases in paved surfaces lead to excess discharge of stormwater volume and pollutants, which can harm lakes, rivers, streams, and coastal areas and cause local flooding. Stormwater impacts from development can be mitigated using practices that control stormwater onsite before it is discharged to and affects water bodies downstream. Innovative site designs that reduce imperviousness and use other green infrastructure practices are effective ways to reduce flows and improve water quality.

U.S. Environmental Protection Agency's (EPA) stormwater regulations requires certain municipal separate storm sewer systems (MS4s) to address post-construction stormwater discharges from newly developed and redeveloped sites that disturb, at minimum, one or more acres. This primarily includes developing:

- strategies to implement a combination of structural and non-structural BMPs,
- an ordinance to address post-construction runoff, and
- a program to ensure adequate long-term operation and maintenance of BMPs.

Forty states have developed numeric performance and/or design standards to control post-construction stormwater discharges from newly developed and redeveloped sites. Clear, specific and measurable permit conditions such as performance standards ensure that requirements can be met. There are two types of numeric performance standards for stormwater discharges identified as a treatment standard or a volume-based/retention standard. Treatment standards typically specify an amount of pollutant to be managed (e.g., 80% TSS removal). Volume-based or retention standards typically require the use of infiltration, evapotranspiration or harvest practices to control a specified volume of stormwater onsite and are usually expressed as a volume of rainfall, a percentile storm event or a groundwater recharge volume. This compendium of MS4 permit examples focuses on the latter category. It provides examples from existing MS4 permits from 26 states, Washington D.C. and Puerto Rico that have a numeric, volume-based or retention performance standard.

Volume retention is an effective way to reduce pollutant loads and also reduces erosion of the receiving waterbody. When controlled by green infrastructure practices such as rain gardens, green roofs, pervious pavement, downspout disconnection and cisterns, managing stormwater onsite also provides multiple community benefits by increasing vegetation in urban areas, reducing local flooding and providing a freshwater resource.

In a separate document titled, Summary of State Post-Construction Stormwater Standards, EPA has compiled a comprehensive list of all state post-construction standards not only those in MS4 permits but also standards implemented through state regulations and construction general permits.

EPA notes that this compendium is intended to serve as a snapshot of existing permit provisions in November 2016. EPA anticipates that as permits are reissued in the coming months and years, the information in this compendium will need to be updated to include newer examples or modified information. EPA has an interest in ensuring the accuracy of the information contained in this document, and therefore welcomes input on any aspect of this compendium at any time.

The Agency will update the compendium as needed based on the comments received and new information. EPA notes that the inclusion of any particular permit example should not be read as an Agency endorsement of the entire approach taken in that permit, nor should it be read as EPA's independent determination that the permit terms meet the regulatory requirements. This includes the regulatory requirement for permitted small MS4s "to reduce the discharge of pollutants from [the] MS4 to the maximum extent practicable, to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act."

In addition, this document does not contain or impose any new legally binding requirements on EPA, states, or the regulated community, and does not confer legal rights or impose legal obligations upon any member of the public. EPA made every attempt to ensure the accuracy of the examples included in this document; however, in the event of a conflict between this compendium and any statute, regulation, or permit, the statute, regulation or permit controls.

For more information about the NDPES Stormwater Program visit https://www.epa.gov/npdes/npdes-stormwater-program.

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REGION 1

CONNECTICUT

The 2017 Connecticut general permit for stormwater discharges from small MS4s requires the permittee to consider the use of low impact development and runoff reduction site planning and development practices. Specifically, for new development and redevelopment of sites with less than 40% directly connected impervious cover, the developer must design the site to retain the water quality volume for the site. For redevelopment of sites that are currently developed with directly connected impervious cover of 40% or more, a developer shall design the site to retain on-site half the water quality volume for the site. The water quality volume is defined as the volume of runoff general by one inch of rainfall on a site defined in the *Connecticut Stormwater Quality Manual*. Any new MS4 discharge that is within 500 feet of a tidal wetland that is not a fresh-water tidal wetland must discharge through a system designed to retain the water quality volume. See Section 6(a)(5)(A)(i).

The 2013 Phase I City of Stamford, Connecticut, MS4 permit contains the same post-construction retention requirements as 2016 Connecticut general permit discussed above. See Section 6.A.3.a.iii. Permit available upon request: Chris.Stone@ct.gov

MASSACHUSETTS

The 2017 Massachusetts general permit for stormwater discharges from small MS4s requires permittees to follow the guidance of many of the standards in Volume 2 of the Massachusetts Stormwater Handbook. The permit specifically references several standards from the Handbook, including standards to control peak runoff rates, recharge groundwater, and protection of public water supply areas. New development projects are required to retain the volume of runoff equivalent to, or greater than, one inch multiplied by the total post-construction impervious surface area on the site, or remove 90% of the average total suspended solids (TSS) average annual load and 60% of the total phosphorus (TP) average annual load. Redevelopment projects are required to retain 0.8 inches from the total post-construction impervious area, or remove 80% TSS and 50% TP average annual loads. TSS and TP pollutant removal is to be calculated consistent with EPA Region 1's BMP Performance Extrapolation Tool. See Part 2.3.6.

VERMONT

The 2012 Vermont general permit for discharges from small MS4s requires permittees to implement and enforce the requirements in the *2002 Vermont Stormwater Management Manual* for new development and redevelopment. The manual includes a ground water

recharge volume standard that is determined as a function of annual pre-development recharge for a given soil group, average annual rainfall volume, and amount of impervious cover at a site. The ground water recharge standard can be met by one of two methods, or a combination of both. The first is designated as the percent volume method, and is based on infiltrating the recharge volume using one or more approved structural stormwater treatment practices. The second method is designated as the percent area method, and is based on draining runoff from some or all of the site impervious area through one or more approved nonstructural stormwater treatment practices. The manual also includes a water quality treatment standard that requires water quality treatment of 90% of annual storms based on removing total suspended solids (TSS) and total phosphorus (TP). The State of Vermont directly regulates post-construction stormwater runoff from activities that result in creation of new or expansion of existing impervious surface of more than an acre; regardless of whether the site discharges to an MS4 or directly to a waterbody. Consequently, the MS4 program must only regulate those sites that fall below the impervious cover threshold but disturb at least one acre of land or less if it is a part of a common plan of development. See Section IV.H.5.e.

Green Roof in Burlington, VT
Photo Credit: VT SW Program

REGION 2

NEW JERSEY

The 2009 New Jersey general permit for discharges from small MS4s requires permittees to adopt ordinances according to state stormwater management rule, N.J.A.C. 7:8-4, to control stormwater from nonresidential development and redevelopment projects. In addition, the permittee must ensure that any residential development and redevelopment projects that are subject to the Residential Site Improvement Standards for stormwater management (N.J.A.C. 5:21-7) comply with those standards. The New Jersey standard for ground water recharge requires that 100% of the average annual pre-construction ground water recharge volume for the site is maintained. For the purpose of calculating runoff coefficients and ground water recharge, there is a presumption that the pre-construction condition of a site, or portion thereof, is wooded land use with good hydrologic condition. This ground water recharge requirement does not apply to previously developed portions of sites in urban redevelopment areas. The New Jersey standard for water quality provides that stormwater management measures are to be designed to reduce the post-construction load of TSS in stormwater runoff generated from the water quality design storm by 80% of the anticipated load from the developed site, expressed as an annual average. See Part I.F.3.

NEW YORK

The 2015 New York general permit for discharges from small MS4s requires permittees to address stormwater runoff from new development and redevelopment with a combination of structural and non-structure management practices according to standards defined in the most current version of the *New York State Stormwater Management Design Manual* that will reduce the discharge of pollutants to the maximum extent practicable. The New York standard for new development requires runoff reduction be met by infiltration, ground water recharge, reuse, recycle, or evaporation of 100% of the post-development water quality volume unless specific physical site limitations prohibit or limit the use of infiltration or ground water recharge. This runoff reduction requirement is designed to replicate pre-development hydrology by maintaining pre-construction infiltration, peak runoff flow, and discharge volume. The water quality volume is calculated based on the amount of runoff equivalent to 90% rain event and the percent of impervious cover created at a site. This requirement can be accomplished by applying on-site green infrastructure techniques, standard stormwater management practices with runoff reduction capacity, and effective site planning. See Part VII.A.5.

PUERTO RICO

The 2016 Puerto Rico general permit for stormwater discharges from small MS4s requires permittees to implement a program to control stormwater discharges from new development and redevelopment sites that disturb one acre or more. The permit requires, if practicable, the program to include a process to require the implementation of low impact development practices that infiltrate, evapotranspire, or capture for reuse the first 1 inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. See Part 2.4.6.5.

Water from the roof flows from this disconnected downspout into the ground through a filter of pebbles.

REGION 3

WEST VIRGINIA

The 2014 West Virginia general permit for discharges from small MS4s requires permittees to implement and enforce site and neighborhood design elements for new development and redevelopment disturbing one acre or more. The site design standards require management measures that keep and manage on-site the first inch of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation or that provide equal benefits for quality water. This first inch of rainfall must be 100% managed with no discharge to surface waters, unless one of the two alternatives specified in the permit, off-site mitigation and payment in lieu, are met. See Part II.C.7.e.

WASHINGTON, DC

The 2011 District of Columbia Phase I MS4 permit requires the design, construction, and maintenance of stormwater controls to achieve on-site retention of 1.2 inches of stormwater from a 24-hour storm with a 72-hour antecedent dry period through evapotranspiration, infiltration and/or stormwater harvesting and use for all development greater than or equal to 5,000 square feet. The permittee may allow a portion of the 1.2 inches to be compensated for in a program consistent with the permits terms for off-site mitigation and/or free-in lieu programs. See Section 4.1.1.

MARYLAND

Maryland has two general MS4 permits, the 2003 general permit for municipalities and the 2004 general permit for state and federal agencies, for discharges from small MS4s that require that stormwater management for new development and redevelopment be addressed for any proposed project that disturbs 5,000 square feet or more of earth. Because Maryland has a stormwater management program in place that regulates new development and redevelopment projects, the state considers compliance with the state statute to be compliance with this minimum control measure, this general permit, and federal regulations. Permittees shall comply with all state and local laws, regulations, ordinances, and procedures relating to stormwater management. In addition, permittees must implement and comply with the principles, methods, and practices found in the *2000 Maryland Stormwater Design Manual*, Volumes 1 and 2. The manual specifies that environmental site design (ESD) shall be implemented to the maximum extent practicable (MEP) to mimic pre-development conditions. The standard for characterizing pre-development runoff characteristics for new development projects is woods in good hydrologic condition. ESD practices are to be used to the MEP to meet the required water quality volume and the ground water recharge volume. The *water*

quality volume is defined as the runoff volume from the 1-inch rain event in the Maryland Eastern Rainfall Zone and 0.9 inch in the Maryland Western Rainfall Zone. The manual includes a redevelopment policy that provides flexibility and alternative requirements for sites with more than 40% impervious area. See Part III.E.

The Phase I MS4 permits in Maryland [Anne Arundel County (2014), Charles County (2014), Carroll County (2014), Frederick County (2014), Harford County (2014), Howard County (2014), Montgomery County (2010), Prince George's County (2014), City of Baltimore (2013), and Baltimore County (2013)] also require by reference that the permittee implement the stormwater management design policies, principles, methods, and practices found in the *2000 Maryland Stormwater Design Manual* or other innovative stormwater management technologies approved by MDE. See Part III.E.1.

DELAWARE

The 2013 New Castle County, Delaware, MS4 permit requires permittees to implement a program to address stormwater from post-development sites as prescribed under the Delaware Sediment and Stormwater regulations (updated in 2016). In general, the Delaware Sediment and Stormwater regulations require stormwater controls sized according to the Resource Protection Event. The design parameter for the Resource Protection Event shall be the annualized runoff volume (RPv) produced by a storm having a 99% probability of occurring annually (i.e., the 1-year event) based on post-developed conditions. For new development, the RPv shall be reduced to an equivalent 0% effective imperviousness. Runoff from redeveloped areas within the project limit of disturbance that were wooded or meadow in the existing condition shall be reduced to an equivalent wooded condition using runoff reduction practices. All remaining redeveloped areas within the project limit of disturbance shall employ runoff reduction practices to achieve a 30% reduction in the effective imperviousness based on the existing condition. The Department may require an offset as an alternative to full or partial compliance with the Resource Protection Event requirements. See Part II.A.4.

Photo Credit: Alisha Goldstein, EPA

PENNSYLVANIA

The 2018 Pennsylvania small MS4 general permit allows permittees to rely on Pennsylvania Department of Environmental Protection's state-wide program for issuing NPDES permits for construction activity to meet their post-construction standard requirements. The NPDES construction stormwater permit requires development of a Post-Construction Stormwater Management Plan in accordance with 25 Pa. Code §102.8 and best management practices as listed in the Pennsylvania Stormwater Best Management Practices Manual. In the Manual, volume control guideline 1 is recommended where site conditions offer the opportunity to reduce the increase in runoff volume as follows:

- Do not increase the post-development total runoff volume for all storms equal to or less than the 2-year/24-hour event.
- Existing (pre-development) non-forested pervious areas must be considered meadow (good condition) or its equivalent.
- Twenty (20) percent of existing impervious area, when present, shall be considered meadow (good condition) in the model for existing conditions for redevelopment

REGION 4

MISSISSIPPI

The 2016 Mississippi general permit for discharges from small MS4s requires the regulated entity to develop site design standards to infiltrate, evapotranspire, harvest and/or use, at a minimum, the first inch of every rainfall preceded by 72 hours of no measurable precipitation. For projects on private property, the MS4 may opt to have controls installed on that private property, in the public right-of-way, or a combination of both. See Act 5(5).

TENNESSEE

The 2016 Tennessee general permit for discharges from small MS4s requires new development and redevelopment projects to be designed to remove pollutants to the maximum extent practicable (MEP). Controls that rely on infiltration, evapotranspiration or capture/reuse of the water quality treatment volume (WQTV) that approach 100% pollutant removal constitute MEP where site conditions allow. The WQTV is defined as the runoff generated from impervious surfaces during the first inch of a rainfall event. Reductions to the WQTV, off-site mitigation or payment into a Public Stormwater Fund are allowed based on permit conditions. See Section 4.2.5.

The 2011 Phase I City of Chattanooga and the 2012 Phase I City of Nashville, TN MS4 permits include runoff reduction standards which require, in combination or alone, management measures that are designed, built, and maintained to infiltrate, evapotranspire, harvest, and/or use, at a minimum, the first inch of every rainfall event preceded by 72 hours of no measurable precipitation. The permittee may develop incentive standards for redevelopment to increase use of green infrastructure while allowing flexibility, subject to certain criteria and may not exceed a maximum reduction of 50% of the required volume. For projects that cannot meet 100% of the runoff reduction requirement, the remainder must be treated prior to discharge with a technology documented to remove 80% TSS. See Section 3.2.5.2.

KENTUCKY

The 2011 Phase I Louisville and Jefferson County, Kentucky, MS4 permit requires the development of an ordinance that requires water quality control measures to infiltrate, evapotranspirate, harvest, and reuse at least the equivalent runoff produced from an 80th percentile storm (e.g., 0.75 inches). See Part II.B.5.

REGION 5

MINNESOTA

The 2013 Minnesota general permit for discharges from small MS4s requires permittees to develop and implement a post-construction stormwater management program that requires new development projects to meet a standard of no net increase from pre-project conditions of stormwater discharge volume, TSS, and TP. Redevelopment projects are required to meet a standard of a net reduction from pre-project conditions of stormwater discharge volume, TSS, and TP. See Part III.D.5.

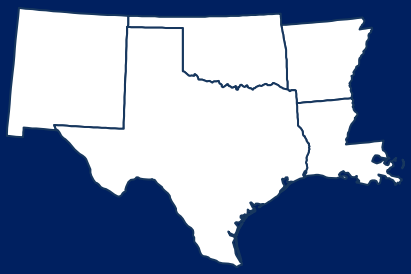
WISCONSIN

The 2014 Wisconsin general permit for discharges from small MS4s requires permittees to implement a program for new development and redevelopment that includes an ordinance or other regulatory mechanism that establishes post-construction performance standards equivalent to those contained in Wisconsin's administrative code NR 151.122 through 151.126, and 151.242 through 151.246. The infiltration performance standard in Wisconsin's code is based on the imperviousness of the site. Sites with less than 40% connected imperviousness such as parks, cemeteries, and low-density residential development, must infiltrate sufficient runoff volume so that the post-development infiltration volume shall be at least 90% of the pre-development infiltration volume, based on an average annual rainfall. For sites with 40%–80% connected imperviousness, such as medium- and high-density residential, multi-family development, industrial and institutional development, and office parks, the post-development infiltration volume shall be at least 75% of the pre-development infiltration volume. For sites with greater than 80% connected imperviousness, such as commercial strip malls, shopping centers, and commercial downtowns, the post-development infiltration volume shall be at least 60% of the pre-development infiltration volume. See Section 2.5.

Parking lot tree pit in Maplewood, MN
Photo Credit: Alisha Goldstein

MICHIGAN

The State of Michigan is reissuing Phase I and Phase II MS4 permits on a rotating watershed basis, and is basing MS4 permits on a Storm Water Discharge Permit Application that specifies the stormwater management program (SWMP) and BMP requirements that must be included in each permit application. The application offers two options for a water quality treatment performance standard: Treat the first inch of runoff from the entire project site and/or treat the runoff generated from 90 percent of all runoff-producing storms for the project site. The application also includes a channel protection performance standard that requires the post-construction runoff rate and volume of discharge to not exceed the pre-development rate and volume for all storms up to the 2-year/24-hour storm at the project site. Pre-development is defined as the last land use. See MS4 Permit Application, questions 36 – 39.



REGION 6

NEW MEXICO

The 2014 Middle Rio Grande Watershed Based MS4 permit requires the implementation and enforcement, via ordinance and/or other enforceable mechanism(s), of a design standard that manages on-site the 90th percentile storm event discharge volume for new development and 80th percentile storm event discharge volume for redevelopment through stormwater controls. The permit lists different options for implementing the design standard, including rainfall harvesting, engineered infiltration, bioretention, permeable pavement, and other practices. See Part I.D.5.b.

Photo Credit: Alisha Goldstein, EPA

REGION 8

COLORADO

The 2016 Colorado general permit for discharges from small MS4s requires control measures for applicable development sites to meet one of several design standards, including the treatment and/or infiltration of the Water Quality Capture Volume (WQCV) which is equal to volume equivalent to the runoff from an 80th percentile storm. Other design standards include a pollutant removal standard to treat at a minimum the 80th percentile storm event and reduce event mean concentrations of total suspended solids (TSS) to a median value of 30 mg/L or less. Another design standard requires control measure(s) designed to infiltrate into the ground where site geology permits, evaporate, or evapotranspire a quantity of water equal to 60% of what the calculated WQCV would be if all impervious area for the applicable development site discharged without infiltration. Details on all design standards can be found in Part I.E.4.

MONTANA

The 2015 Montana general permit for discharges from small MS4s requires, for new development and redevelopment projects greater than or equal to one acre, the program shall include a process, where such practices are practicable, to require implementation of low impact development practices that infiltrate, evapotranspire, or capture for reuse the runoff generated from the first 0.5 inches of rainfall from a 24-hour storm preceded by 48 hours of no measurable precipitation. See Part II.B.5.

UTAH

The 2016 Utah general permit for discharges from small MS4s requires, for new development and redevelopment projects that disturb greater than or equal to one acre, to manage rainfall on-site and prevent the off-site discharge of the precipitation from all rainfall events less than or equal to the 90th percentile rainfall event. This objective must be accomplished by the use of practices that are designed, constructed, and maintained to infiltrate, evapotranspire and/or harvest and reuse rainwater. If meeting the retention standard is technically infeasible, the permit requires a rationale for the use of alternative design criteria. The project must document and quantify that infiltration, evapotranspiration and rainwater harvesting have been used to the maximum extent technically feasible and that full employment of these control are infeasible due to site constraints. See Part 4.2.5.

REGION 9

HAWAII

The 2015 Honolulu Phase I MS4 individual permit requires the City to continue implementing standards that require on-site management of the first inch of rainfall within a 24-hour period. The permit also requires the City apply the standard in all areas within its authority jurisdiction and requires that treat and release practices treat 1.5 times the water quality volume.
See Part D.1.e. Contact State for permit.

ARIZONA

The 2010 City of Glendale Phase I MS4 individual permit (and other Phase I MS4 permits in Arizona) requires the permittee to continue to implement the requirement for new facilities to install and maintain on-site detention for the 100-year, 2-hour storm event in all areas of Glendale except those exempted by law or excluded under the technical appeals process. When possible, the city must require exempted facilities to install stormwater control measures. See Appendix C, Section VII.

CALIFORNIA

The 2013 California general permit for discharges from small MS4s requires that new development and redevelopment projects are designed to evapotranspire, infiltrate, harvest and use, and biotreat stormwater to meet at least one of the following hydraulic sizing design criteria: volumetric criteria (approximately the 85th percentile 24-hour storm runoff event or the volume of annual runoff required to achieve 80% or more capture) or flow-based criteria (the flow of runoff produced from a rain event equal to at least 0.2 inches per hour intensity; or the flow of runoff produced from a rain event equal to at least two times the 85th percentile hourly rainfall intensity). See Section E.12.e.ii.c.

The 2015 Los Angeles County MS4 permit requires that each permittee shall require applicable new development and redevelopment projects to retain on-site the stormwater quality design volume defined as the runoff from: (1) the 0.75-inch, 24-hour rain event or (2) the 85th percentile, 24-hour rain event, whichever is greater. When evaluating the potential for on-site retention, each permittee shall consider the maximum potential for evapotranspiration from green roofs and rainfall harvest and use. Alternative compliance measures are allowed where meeting the standard is shown to be technically infeasible or where a project has been determined to provide an opportunity to replenish regional groundwater supplies at an off-site location. Alternative compliance measures include on-site biofiltration, off-site infiltration, a proposed ground water replenishment project, an off-site retrofit project such as green streets,

parking lot retrofits, green roofs, and rainfall harvest and use, or participate in a regional stormwater mitigation program. The permittee must also require applicable new development and redevelopment projects within natural drainage systems to implement hydrologic control measures, to minimize changes in post-development hydrologic stormwater runoff discharge rates, velocities, and duration. This shall be achieved by maintaining the project's pre-project stormwater runoff flow rates and durations. See Part VI.D.7.c.

The 2015 San Francisco Bay Regional Water Board Municipal Permit requires permittees to require applicable new development and redevelopment projects to treat 100% of the design storm runoff with LID treatment measures (harvesting and reuse, infiltration, evapotranspiration, or biotreatment) on-site or with LID treatment measures at an alternate stormwater treatment facility. The design storm is defined to meet at least one of the following hydraulic sizing design criteria: (1) volume hydraulic design basis (treat stormwater runoff equal to approximately the 85th percentile 24-hour storm runoff event or the volume of annual runoff required to achieve 80% or more capture); (2) flow hydraulic design basis (treat (a) 10% of the 50-year peak flowrate; (b) the flow of runoff produced by a rain event equal to at least two times the 85th percentile hourly rainfall intensity; or (c) the flow of runoff resulting from a rain event equal to at least 0.2 inches per hour intensity); or (3) combination flow and volume design basis (treat at least 80% of the total runoff over the life of the project). See Sections C.3.c and C.3.d.

The 2013 San Diego Regional MS4 permit requires the permittee to require applicable new development and redevelopment projects to implement LID BMPs that are designed to retain (i.e. intercept, store, infiltrate, evaporate, and evapotranspire) on-site the pollutants contained in the volume of stormwater runoff produced from a 24-hour, 85th percentile storm event (design capture volume), with the potential to implement off-site alternative compliance projects that will have a greater overall water quality benefit for the watershed than if the project were to implement structural BMPs on-site. In addition, the permittee must require implementation of on-site BMPs to manage hydromodification that may be caused by stormwater runoff discharged from a project as follows: (1) post-project runoff conditions (flow rates and durations) must not exceed pre-development runoff conditions by more than 10% (for the range of flows that result in increased potential for erosion, or degraded instream habitat downstream of the project); and (2) avoid critical sediment yield areas, or implement measures that allow critical coarse sediment to be discharged to receiving waters, such that there is no net impact to the receiving water. See Part II.E.3.c.

REGION 10

ALASKA

The 2015 Anchorage, Alaska, individual MS4 permit requires that for new development and redevelopment projects that result in a land disturbance of 10,000 square feet or more, management measures that treat and manage the runoff generated from the first 0.52 inches of rainfall from a 24-hour event preceded by 48 hours of no measureable precipitation. Runoff treatment can be achieved by green infrastructure and LID such as canopy interception, soil amendments, evapotranspiration, rainfall harvesting, engineered infiltration, extended filtration, and/or any combination of such practices. The ordinance or regulatory mechanism must require that the first 0.52 inches of rainfall be 100% treated with LID, except when the permittee chooses to implement alternatives described in the permit. See Part II.B.2.

WASHINGTON

The 2013 Western Washington general permit for discharges from small MS4s and the 2013 Washington Phase I MS4 permit require permittees to implement LID performance standards for certain newly developed and redeveloped sites. The standard requires that stormwater discharges match developed discharge durations to pre-developed durations for the range of pre-developed discharge rates from 8% of the 2-year flow to 50% of the 2-year flow. See Appendix I, Section 4.5.

Street side swale and pervious concrete sidewalk, Seattle, WA

OREGON

The 2011 Phase I Portland, Oregon, MS4 permit requires new development and redevelopment projects that create or replace 500 square feet of impervious surface to capture and treat 80% of the annual average runoff volume, based on a documented local or regional rainfall frequency and intensity. The program must prioritize and include LID, green infrastructure, or equivalent design and construction approaches. See Schedule A.4.f.

The 2010 Phase I Salem, 2010 Phase I Gresham/Fairview, 2010 Phase I Multnomah, 2011 Phase 1 Eugene, and the 2012 Phase I Clackamas County, Oregon, MS4 permits have the same standard, but it applies to new development and redevelopment projects of varying site size thresholds.

IDAHO

The 2013 City of Boise, Idaho (with copermittees) Phase I MS4 individual permit requires permittees to implement and enforce a program to control storm water runoff from new development and redevelopment projects that result in land disturbance of 5,000 square feet or more, excluding individual one or two family dwelling development or redevelopment. The permit requires each permittee to update their ordinance to include site design standards that require stormwater management measures that keep and manage onsite the runoff generated from the first 0.6 inches of rainfall from a 24-hour event preceded by 48 hours of no measureable precipitation. The first 0.6 inches of rainfall must be 100% managed with no discharge to surface waters, except when the permittee has a program for offsite mitigation within the same subwatershed. See Part II.B.2.a.