

## CHAPTER 4.5: POST-CONSTRUCTION CONTROLS

### 4.5 Post-Construction Controls

#### Regulatory Requirements

EPA's federal regulations for the stormwater Phase I and Phase II NPDES MS4 regulations are listed at right. NPDES MS4 permits must address these requirements and often include more specific requirements.

#### General Permits

As described above, stormwater Phase I and Phase II permittees must implement a SWMP that includes a post-construction component that addresses stormwater runoff at the completion of construction of new or redevelopment sites that disturb at least one acre.

#### Common Activities

#### Ordinance/Legal Authority

The ordinance should have language requiring that all new development and significant redevelopment projects incorporate stormwater management BMPs and submit a plan that complies with design standards, zoning codes and comprehensive or master plans. Some permittees review required construction general permit SWPPPs, while others require the development and submittal of a separate post-construction plan to address local stormwater requirements. In addition, some permittees require that projects smaller than one acre implement post-construction stormwater controls. These requirements should be detailed in an ordinance to establish legal authority. Ideally, the ordinance will outline the contents of an approvable plan and responsibilities for operation and maintenance of approved BMPs. The operation and maintenance section should also describe who is responsible for inspections and maintenance (e.g., the homeowner, homeowners' association, permittee, etc.).

#### Comprehensive or Master Planning

Often, when the MS4 is a municipality, the permittees address stormwater management using the established local comprehensive or master planning process. Comprehensive or master planning typically is required by state law and is to be used as guide in decision-making about the built and natural environment by the governing body of the permittee (i.e., city council, planning commission, county board). A comprehensive plan contains long-term planning recommendations for the community and often addresses water quality issues either directly with specific water quality goals or indirectly through the encouragement of land use practices that minimize impervious surface (i.e., high density "villages") or encourage open space.

The inclusion of water quality-related goals in the comprehensive plan could assist local planners and policymakers to institutionalize the stormwater principles necessary to implement an effective SWMP.

#### Federal NPDES

#### Regulations

NPDES MS4 permits must address these requirements and often include more specific state requirements:

- ✓ Phase I MS4 Regulations  
40 CFR 122.26(d)(2)(iv)(D)
- ✓ Phase II MS4 Regulations  
40 CFR 122.23(b)(5)  
40 CFR 122.23(b)(5)

#### Resources

- ✓ Menu of BMPs  
[www.epa.gov/npdes/stormwater/menuofbmps](http://www.epa.gov/npdes/stormwater/menuofbmps)
- ✓ California Stormwater Quality Association's New Development and Redevelopment Handbook  
<http://www.cabmphandbooks.com/Development.asp>
- ✓ Georgia Quality Growth Program  
[www.georgiaqualitygrowth.com](http://www.georgiaqualitygrowth.com)
- ✓ EPA Smart Growth Web site  
[www.epa.gov/dced/](http://www.epa.gov/dced/)
- ✓ Smart Growth Online  
[www.smartgrowth.org/](http://www.smartgrowth.org/)
- ✓ EPA Low Impact Development Resource Center  
[www.epa.gov/owow/nps/lid/](http://www.epa.gov/owow/nps/lid/)
- ✓ Low Impact Development Center  
[www.lowimpactdevelopment.org](http://www.lowimpactdevelopment.org)

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However, the comprehensive plan is not a substitute for a SWMP Plan because it cannot be changed or updated readily and does not include necessary implementation details of the stormwater program.

### Post-Construction BMP Standards

While the legal authority described above should require the installation of BMPs at sites, a permittee should also have additional specifications or guidance on what types of BMPs are expected or required. Ideally, the ordinance will include language that refers to a guidance manual for BMP design and implementation. The recommended manual should contain sizing criteria, performance criteria, and guidance on selection and location of BMPs. The manual and preferred BMPs should be available to project applicants early in the planning phase of a project. The standards should include guidance for proper district or subarea design (e.g., a redevelopment district), proper site design (e.g., sending gutter water into landscaping), source control (e.g., covering trash cans), and stormwater treatment BMPs (e.g., sand filters).

### Plan Review and Approval Procedures

The review of post-construction plans should be based on formal review specifications, a checklist, or similar criteria. Plan review staff should document the BMPs considered, whether they were addressed on the plans, and any identified deficiencies. Some permittees use contract staff to review some or all plans. Be sure to review plans completed by contractual as well as permittee staff.

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#### **TIP:**

Review several types of recent development projects that have gone through the review process. Include small residential and large commercial development projects as well as both new development and redevelopment projects, if applicable.

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### Post-Construction BMP Inventory

The permittee should maintain inventory detailing the types and locations of planned and installed post-construction BMPs projects. There may be two types of inventories: (1) a traditional database for site-level structural BMPs, and (2) a tracking system for planning or development practices BMPs. Ideally, both types of information would be managed in a database and linked to a GIS for optimum tracking. Structural post-construction BMPs must be inspected and maintained to remain effective. Tracking the locations, conditions, ages of the structural BMPs as well as the inspection findings is critical to ensuring the proper maintenance occurs for the life of the BMP. For planning-related BMPs, tracking systems may be linked to code revisions or development permits. Note that some revisions may occur with State or regional codes or standards, which might require a separate tracking system.

### BMP Inspection and Maintenance

Proper BMP installation, operation, and maintenance are critical to optimizing the effectiveness of post-construction BMPs. If BMPs are not maintained, they can become concentrated sources of pollutants themselves. Comprehensive “as built” inspections are necessary at the conclusion of a project to ensure the BMP has been built properly and regular inspections are critical to ensure the BMP is being maintained as needed. Permittees may inspect private BMPs or require that the owners/operators of the facility inspect them through maintenance agreements or other mechanisms. Often, permittees require that facility owner/operators submit documentation detailing inspection dates and maintenance performed.

### Enforcement

Legal authority is needed to require owner/operators to maintain BMPs. This can be outlined in a maintenance agreement or other binding contract, but it must be included in municipal code or regulation as well. The permittee should have available enforcement actions to require the owner/operator to perform necessary inspections and maintenance. Some permittees have authority to abate problem facilities (i.e., maintain the facility and charge the owner/operator) if necessary.

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### Public Construction Projects

Municipal permittees must apply the same local requirements to public construction projects as is required of private projects. Some municipal permittees develop and design public construction projects in-house without direct involvement from the department that reviews most private construction projects; therefore, it is important that the public project designers are trained and proficient in stormwater BMPs as well. If the permittee hires outside designers for public projects, stormwater guidelines should be provided to them to ensure compliance with local and general permit requirements. Permittees should have an inventory of publicly owned stormwater management and treatment facilities and should have an inspection and maintenance program established.

### Training and Education

Permittees should provide training to plan review and BMP inspection staff (if applicable). This training should include classroom presentations and in-field training as well as follow-up evaluations to demonstrate that the training was effective.

### Evaluating Post-Construction Programs

Development can significantly alter landscapes by increasing imperviousness (e.g., roofs, driveways, parking lots) and changing drainage patterns, thereby increasing the volume and velocity of runoff from the site. Increased volume leads to degradation of receiving waters and increased flood frequency. Stormwater from newly developed impervious areas can also contain a variety of pollutants that are detrimental to water quality, such as sediment, nutrients, road salts, heavy metals, pathogenic bacteria, and petroleum hydrocarbons. Two groups of BMPs can minimize the impacts of stormwater from new development and redevelopment projects: nonstructural site design or source control measures, which prevent or reduce the generation of pollutants, and structural treatment BMPs that detain and treat stormwater to control the volume of runoff and reduce pollutant loading to receiving waters.

Postconstruction stormwater impacts are not likely to be controlled entirely with site-level BMPs. Thus regional, district and subarea planning is increasingly recognized as a means to control overall imperviousness. Postconstruction BMP standards are likely to include many interlinking requirements that affect common land development practices, such as street design, community layout, and land use mix. The aim of such standards is to revise building practices that drive impervious surface generation within a watershed to reduce the effects of the built environment at a meaningful scale. Note that this approach to stormwater management is new, so an evaluation of this area may address future planning activities in addition to current activities.

There are several approaches permittees may use to implement planning-level BMPs, each of which is appropriate in different development settings and offers a unique set of benefits. Four of these approaches or frameworks—redevelopment, infill, compact design, and conservation development—are described below and may be found in a comprehensive plan or SWMP:

- *Redevelopment*: Under this framework, a permittee is looking to redevelop already impervious districts and lots. Programs to support redevelopment include downtown redevelopment plans, vacant property reforms, brownfields redevelopment, and corridor redevelopment plans. These

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### TIP:

A review of existing codes and land development regulations can be extensive. The following are previous efforts to evaluate development codes that may be helpful in this process:

Center for Watershed Protection Codes and Ordinances worksheet  
[http://www.cwp.org/COW\\_worksheet.htm](http://www.cwp.org/COW_worksheet.htm)

EPA list of smart growth scorecards  
[www.epa.gov/smartgrowth/scorecards/project.htm](http://www.epa.gov/smartgrowth/scorecards/project.htm)

King County Washington "Built Green" Checklists  
<http://www.builtgreen.net/checklists.html>

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programs are typically more successful when supported by financial programs (e.g., tax incentives and grants), policy support (e.g., priority infrastructure), and technical assistance and staffing support.

- *Infill*: Infill development, like redevelopment, takes place in areas supported by existing road, water, and sewer infrastructure. Infill development tends to have a smaller footprint than conventional new development projects. Infill sites, whether individual lots or larger parcels, are generally undeveloped and may be able to manage stormwater flows onsite. The policies described above for redevelopment would apply to infill development, as well as any policies to mitigate flows from infill.
- *Compact Design*: Compact designs seek to meet development needs on a smaller footprint to achieve both development and conservation goals. These designs can be used in redevelopment (e.g., transit-oriented development) or new development (e.g., cluster housing or rural or urban villages) situations and are suitable in urban, urbanizing, and rural settings. The key to successful designs lies in coordinating interlinking aspects of transportation, land use, and open spaces. This framework is particularly amenable to design guidelines for a district, including stormwater management.
- *Conservation Development*: This framework, typically used in rural areas or along the urbanizing fringe, is targeted for the lowest impact development. Successful programs will be tied to specific conservation objectives (e.g., habitat preservation, groundwater recharge) and will link the rural development scheme with rural economic development objectives.

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### TIP:

When permittees review development codes to identify areas where stormwater benefits can be incorporated, the following are typically examined:

- ✓ Review of parking demand or indications of overly high parking ratios
- ✓ Overlarge setbacks from the street or other lot lines
- ✓ Minimum lot size requirements in urbanizing areas
- ✓ Highly separated uses embedded in codes
- ✓ Subdivision and street requirements
- ✓ A review of barriers to low impact development, redevelopment or other land efficient forms, including State or institutional barriers and standards

When evaluating the post-construction, new and redevelopment component of a SWMP, it is helpful to discuss the process chronologically in the order that a project would occur. Ask the permittee's planning staff to walk you through the process as if you were a developer proposing a project. Discuss what post-construction stormwater BMPs are required for new and redevelopment projects, how and when developers are informed of the stormwater requirements in the initial planning stages, how plans are reviewed for stormwater standards, on what legal authority requirements and standards are based, what is required for plan approval, how the BMPs are inspected during and after construction, and how the permittee ensures that BMPs are adequately operated and maintained.

Typically, an on-site evaluation for post-construction BMPs will involve interviewing planning and engineering staff. Planners usually work with developers to determine what is required for plan submittal, but engineering staff may actually review the plans and verify design calculations.

### Before the Program Evaluation

To prepare for the post-construction program evaluation, you should review or obtain the following information:

- ◆ **NPDES MS4 permit provisions.** Review the permit requirements for the post-construction program to identify any

### Pre-Evaluation Checklist

- ✓ MS4 permit provisions
- ✓ SWMP provisions
- ✓ Most recent annual report
- ✓ Comprehensive plans
- ✓ Economic development

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specific requirements (such as a design standard for post-construction controls). The NPDES permit will serve as the primary basis for the program evaluation.

- ◆ **SWMP provisions.** The permittee’s SWMP planning document(s) will describe the activities and BMPs the permittee has committed to implement and include measurable goals that provide deadlines for program implementation.
- ◆ **Latest annual report.** The annual report should be reviewed to identify past activities and help the inspector become familiar with the permittee’s program.

### Records Review

The following records might help in evaluating the compliance and performance of the permittee’s post-construction program. Ask for copies of relevant information where it will help in writing a report or documenting a permit violation.

Documentation	What to Look For
Local ordinances	<p>One or more of the following ordinances may be used by a permittee to regulate post-construction BMPs</p> <ul style="list-style-type: none"> <li>▫ Grading ordinance</li> <li>▫ Stormwater ordinance</li> <li>▫ Landscaping ordinance</li> <li>▫ Other portions of the code used by code enforcement staff to enforce aesthetic concerns</li> <li>▫ Zoning codes or land development regulations (where the permittee chooses to amend existing codes to implement post-construction improvements)</li> <li>▫ Economic development and capital improvement plans that support the district or comprehensive planning goals</li> <li>▫ Design guidelines for larger development areas (e.g. subdivisions, mixed use districts, downtown redevelopment programs)</li> <li>▫ Local and district open space and park plans that serve to support the post-construction program</li> </ul>
Comprehensive or General Plans	Review for language that requires consideration of water quality concerns when evaluating development projects
Design standards, BMP manuals, or fact sheets	These can be state or local standards or be taken from a non-regulatory source
Post-construction plans reviewed and approved by the permittee	Where possible, try to review the plans for projects that you will also visit during the field portion of the evaluation
Post-construction BMP tracking system	Database or other system used to track the location of post-construction BMPs that have been installed and the maintenance performed or required for each BMP

### Elements to Address During the Program Evaluation

Although not specified in detail in NPDES regulations, a successful post-construction program will generally be composed of the following elements:

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- ◆ Ordinance/legal authority
- ◆ Comprehensive or master planning
- ◆ Post-construction BMP standards
- ◆ Plan Review and approval procedures
- ◆ Post-construction BMP inventory
- ◆ BMP inspections
- ◆ Enforcement
- ◆ Public construction projects
- ◆ Training and education

The common program elements are the key issues to consider during the review. For each of the elements listed above, this Guidance presents common program activities and questions to consider during the program evaluation. The questions are suggested for you to address each program component. Of course, a comprehensive program evaluation must be tailored to the specific issues associated with each permittee and should include more specific questions regarding the permittee's permit structure and management challenges.

### ORDINANCE/LEGAL AUTHORITY

- ✓ What legal authority does the permittee have to require post-construction BMPs on development sites and to ensure maintenance?
- ✓ Does the permittee's legal authority address post-construction requirements for all projects disturbing one acre or more?
- ✓ Does the legal authority require site design, source control, and stormwater treatment BMPs?
- ✓ What exemptions does the ordinance or other legal authority allow?
- ✓ What procedures for alternative compliance (i.e., planning-level BMPs and other non-structural controls) are allowed?
- ✓ Does the legal authority authorize the permittee to require stormwater management plans to address post-construction impacts?

### COMPREHENSIVE OR MASTER PLANNING

- ✓ Does the comprehensive or master plan include elements encouraging the control of water quality or quantity (e.g., flooding) from existing or new developments?
- ✓ Does the plan include elements to encourage protection of natural features (such as wetlands, buffer strips, etc.)?
- ✓ Does the comprehensive or master plan include elements to encourage minimization of impervious surfaces?
- ✓ Does the comprehensive plan include elements to encourage open space?

### POST-CONSTRUCTION BMP STANDARDS

- ✓ What technical guidance (e.g., BMP manual) does the permittee use as the standard for design and selection of post-construction BMPs? It is not necessary to do a thorough review of the

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manual or standards used by the permittee. Question the planners regarding the following key items:

- Are project proponents required to follow the technical manual?
- Does the guidance provide siting and use criteria for the BMPs to ensure proper and adequate BMPs are being selected and implemented?
- Does the guidance provide siting and use criteria for BMP selection based on the development context (i.e., BMP selection appropriate for ultra urban-areas versus those more appropriate for more rural settings with larger parcels)?
- Are pollutants of concern that are typically generated by the proposed development type considered when selecting or approving BMPs?
- Does the technical manual provide guidance on sizing, performance, and location of BMPs?
- When was the BMP manual last updated?
- ✓ Does the permittee have different requirements or standards for different types of developments (e.g., specific post-construction requirements for gas stations or automobile repair facilities)?
- ✓ Does the permittee have design manuals related to land-efficient site designs (e.g. better site design, better models for large retailers)?
- ✓ Does the permittee promote source control and site design standards to reduce the generation of pollutants in addition to treatment BMPs?
- ✓ Does the permittee include in standards and manuals specifications for innovative site design practices, such as low-impact development and other techniques that manage runoff on-site?
- ✓ Are project applicants encouraged or required to use vegetative BMPs that promote infiltration, such as swales, biofiltration practices, etc., where possible?
- ✓ Does the permittee offer financial incentives to support post-construction stormwater goals (e.g., programs to support redevelopment, such as enterprise zones, or stormwater utility credits)?

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### TIP:

Select 2 to 3 approved projects with post-construction BMPs to review with the permittee. Try to choose different project types (residential, commercial) and sizes. Also review at least one public project plan to see if the permittee is applying adequate standards to municipal developments.

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### PLAN REVIEW AND APPROVAL PROCEDURES

- ✓ What is the project size threshold for the permittee to require post-construction BMPs?
- ✓ Does the permittee apply standard conditions that incorporate post-construction installation and maintenance requirements into its plan review process?
  - Obtain a copy of the standard conditions. Do they specifically address post-construction stormwater management?
- ✓ Do plan reviewers use specific criteria or a checklist when reviewing plans?
- ✓ Does the permittee consider pollutants of concern or whether the project discharges to a 303(d) listed impaired water when determining which BMPs are required?

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- ✓ Does the permittee consider such regional concerns as smart growth initiatives, watershed master plans, and other larger-scale planning efforts to ensure that each new development and redevelopment plan is consistent with the goals of these initiatives?
- ✓ When reviewing plans approved by the permittee:
  - Look for whether adequate BMPs are included on plans, details, and drawings, what types of standard conditions or notes are included, whether maintenance requirements are specified, and whether the location of BMPs would hinder maintenance.
  - Look for BMPs that may not be easily characterized, in particular the comprehensive planning and land-efficient planning BMPs.
  - For commercial/industrial projects, review whether adequate source control BMPs are required on plans.
  - Were comments provided by the permittee to the project proponent reasonable and appropriate?
- ✓ What types of projects must be reviewed by the permittee for post-construction stormwater controls? Does the permittee have a process to identify priority projects identified in the MS4 NPDES permit?
- ✓ What types of standards or technical guidance do the permittee's reviewers use to review projects?
- ✓ Does the permittee condition improvements to existing developments with requirements for post-construction stormwater controls? How are these redevelopment requirements triggered?

### POST-CONSTRUCTION BMP INVENTORY

- ✓ How does the permittee track the installation and maintenance of post-construction BMPs?
- ✓ What information is collected?
  - Location
  - Owner/operator
  - Recommended maintenance schedule
  - Inspection findings

### BMP INSPECTION AND MAINTENANCE

- ✓ Does the permittee require maintenance agreements for all projects with post-construction BMPs?
- ✓ Are "as-built" inspections required at the conclusion of a development project?
  - Do staff conduct these inspections or are they self-certified?
- ✓ Does the permittee inspect private facilities or require inspections by owner/operators?
- ✓ If the permittee performs the inspections, how often are they performed?
- ✓ If owner/operators are required to inspect and maintain their BMPs, how is this authorized? Through a MOU? Through conditions of approval? Through another type of agreement?
- ✓ How does the permittee ensure inspections are occurring?
  - Does the permittee send reminder notices?

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- Does the permittee require the owner/operator to submit inspection reports?

### ENFORCEMENT

- ✓ How does the permittee require proper maintenance and repair after the inspection?
- ✓ What types of enforcement actions are provided by ordinance (e.g., notices of violation, abatement)?
- ✓ Is the permittee's enforcement authority limited (e.g., limits on the dollar amount of fines, inability to issue civil penalties)?

### PUBLIC CONSTRUCTION PROJECTS

- ✓ Does the permittee use post-construction BMPs for public projects?
- ✓ Has the permittee instituted a pilot program to test and showcase innovative BMPs on public property or in public buildings?
- ✓ Are they tracking the location, inspection history, and condition of the BMPs?
- ✓ Who inspects them? How often?

### TRAINING AND EDUCATION

#### *Training for staff*

- ✓ Are plan reviewers trained on post-construction BMPs and requirements?
- ✓ What type of training do staff performing "as built" and post-construction inspections receive?
- ✓ How often are the trainings conducted?
- ✓ How many staff have been trained?
- ✓ What type of training or education does the permittee provide to city-contracted developers and engineers on post-construction requirements?

#### *Developer and plan designer education*

- ✓ What types of educational materials have been developed and distributed to developers and designers regarding post-construction BMPs and application requirements?
- ✓ How are the materials distributed? At the permit desk? During inspections?
- ✓ What type of training does the permittee provide or advertise to local developers and designers?
  - How often is this training conducted?
  - How many developers and designers have been trained?
- ✓ Are they required to attend?

#### In-Field Program Evaluation Activities

In-field evaluation activities primarily focus on verifying that structural and source control BMPs approved by the permittee were installed and are being maintained properly in the field. Select several completed projects that were subject to post-construction requirements. Take along the approved plans so that the locations and types of BMPs can be verified.

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Note whether BMPs are installed as designed or if BMPs have been modified or removed after the project has been completed. For example, trash storage areas could have been modified after installation, slopes might have become destabilized, or storm drain stenciling could have been removed or become illegible.

In addition, in-field evaluation activities should include inspections of publicly owned stormwater BMPs, such as detention basins, to verify that they are being adequately maintained.

### Common Issues Identified During Program Evaluations

The following are some areas where past on-site evaluations have found problems in post-construction programs. These areas should be closely considered during evaluations:

- ✓ The plan review staff lack training on design requirements for development standards and conditioning of new development projects.
- ✓ The permittee lacks review criteria, checklists, or a formal plan review process to assist plan review staff in reviewing development projects.
- ✓ The permittee does not assess BMPs for effectiveness at more than one scale (e.g., at both the site and watershed scales).
- ✓ The permittee institutes blanket BMP requirements (i.e., those that apply to all projects) that do not take into account the development setting.
- ✓ The permittee institutes BMP requirements that act as unintended barriers to better models for development and redevelopment.
- ✓ The permittee developed its program from a “Menu of BMPs” that has resulted in BMPs that are easy to administer but are not the most effective or do not address target stressors.
- ✓ The permittee does not consistently condition plans with post-construction stormwater controls.
- ✓ The permittee does not require inspection and maintenance of post-construction controls.
- ✓ The permittee lacks a system to track approved structural and source control BMPs for inspections and ongoing maintenance.
- ✓ The permittee’s BMP tracking system is based on conventional, structural measures that are more readily quantified than non-structural techniques that work on a watershed basis, such as comprehensive planning or improved street designs.
- ✓ The permittee has not updated approved BMP lists to reflect advances in low impact development or comprehensive planning-related BMPs.