State of Oregon Department of Environmental Quality
Clean Water State Revolving Fund

Guide 4: Site Planning to Manage Post Construction Stormwater

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The Clean Water State Revolving Fund offers below-market loans for all phases of stormwater management, from planning to construction. This guide provides resources for Clean Water State Revolving Fund applicants and borrowers.

The resources below are intended to assist planners, public works staff and consultants to identify barriers in existing land use development standards and provides several examples of how to integrate nonstructural controls into local codes. The loan program offers a comprehensive guide to stormwater water management on the program website.

When planning a new development or redevelopment project, developers need to account for and mitigate changes to stormwater runoff that occur when impervious surfaces are created or changed. Regrading and compaction from construction equipment also can affect the amount and timing of stormwater discharges, and these changes can cause erosion and reduce water quality in streams, lakes, and other receiving waters. A suite of stormwater management tools is available to developers to evaluate their site and determine the optimal combination of source controls, treatment controls and site retrofitting options to achieve stormwater management performance goals.

Source controls

Source controls minimize the amount of pollutants picked up by stormwater and should be used before stormwater treatment controls. Source controls differ from treatment controls in that they do not remove pollutants from stormwater but rather prevent pollutants from reaching stormwater. Examples include proper outdoor storage of solid wastes or requirements that automobiles are only serviced in covered garages. Helpful resources include:

- Chapter 4 of the Portland Stormwater Management Manual
- The City of Salem's codified source control requirements for all properties and for certain pollutant generating activities in the administrative rules for the Salem Department of Public Works
- Volume IV Source Control Best Management Practices of the Washington Department of Ecology's "Stormwater Management Manual for Western Washington" focuses on source control best management practices with an extensive list for commercial activities
- The California Stormwater Quality Association's series of Best Management Practices Handbooks focusing on industrial, commercial, municipal, and new/redevelopment projects with each of the handbooks containing recommended source controls.

Stormwater treatment controls

After the development of retention requirements in the site performance standard and source controls, the next step is selection of stormwater treatment controls, also referred to as structural controls, to remove pollutants. Some treatment controls, such as those referred to as green infrastructure, not only remove pollutants but also reduce the volume of stormwater discharged from a site, while others manage the timing of stormwater flows. Because treatment controls are typically more costly to implement than source controls, the site designer should first investigate source controls. Green infrastructure is given priority over conventional stormwater treatment controls if site constraints allow. Source controls, by themselves, may not achieve the retention requirement; however, they can reduce the number, size and costs of the treatment controls needed.

Site retrofits for existing development

Stormwater source and treatment controls can be implemented in developed areas, although space is limited and modifying built surfaces and existing infrastructure may not be cost-effective. Stormwater treatment controls in physically constrained locations may not adequately be able to remove priority pollutants; for example, a catch basin with a sump could effectively remove sediment from stormwater, but that control would be ineffective for bacteria removal. Given the constraints often present in developed areas, EPA developed a fact sheet, Stormwater Retrofit Techniques for Restoring Urban Drainages, identifying examples of stormwater retrofit goals, such as:

- The correction of prior design or performance deficiencies
- Flood mitigation
- Disconnecting impervious areas
- Improving recharge and infiltration performance
- Addressing pollutants of concern
- Demonstrating new technologies
- Supporting stream restoration activities
- Meeting TMDL pollutant reduction targets

The Center for Watershed Protection published Urban Stormwater Retrofit Practices, which provides guidance on where and what type of retrofits are most commonly incorporated into a stormwater management system. Some of the challenges of retrofitting identified in the document include:

- Greater cost for both design and construction of retrofits
- Many retrofits are installed on public land and publically maintained
- Retrofits must be located around existing development and acceptable to neighbors
- Retrofits often connected to existing stormwater conveyance system due to space constraints

The Center for Watershed Protection has a document titled An Eight-Step Approach to Stormwater Retrofitting: How to Get Them Implemented. To encourage retrofitting in redevelopments, a municipality may want to consider providing developers with credits or off-sets. For additional information, refer to the following:

- Selection and monitoring of best management practices for an ultra-urban setting, see: Federal Highway Administration Stormwater Best Management Practices in an Ultra-Urban Setting: Selection and Monitoring
- Stormwater retrofitting in industrial areas, see the Port of Portland's Stormwater Retrofit Strategy

Additionally, the Chesapeake Stormwater Network's Stormwater Retrofits Webpage has several resources to identify retrofit opportunities, explain the process behind finding potential retrofit opportunities and describe challenges for municipalities. The Portland Stormwater Manual requires stormwater retrofits to meet the full stormwater requirements in some circumstances and partial requirements in others. The Central Oregon Stormwater Manual does not require existing stormwater management facilities on redevelopment sites to be retrofitted to meet the design standards in the manual if they remain hydraulically isolated from the redevelopment area. Determining what is appropriate will depend on factors such as the stormwater requirements the community is addressing, the level of development within the community, available open space near existing development and available resources.

Site evaluation tools for developers

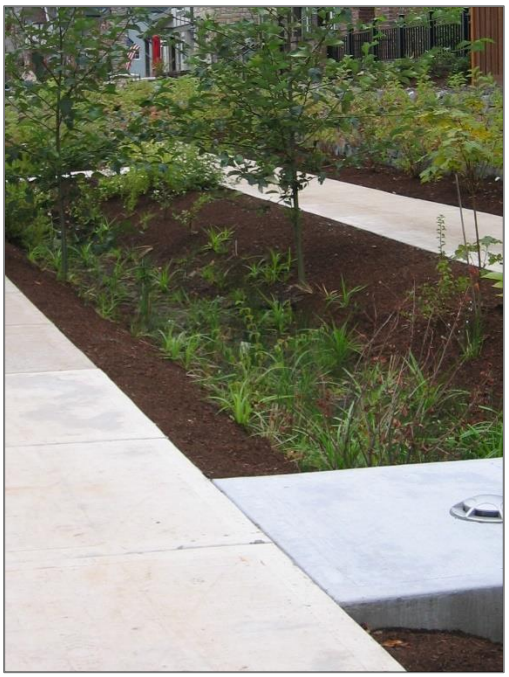
There are various tools to evaluate alternatives in selecting an approach that achieves local stormwater retention and treatment standards while meeting the developer's goals in the most cost-effective manner, including:

Street trees

Stormwater to Street Trees – Engineering Urban Forests for Stormwater Management, an EPA report that explores using street trees for management and disposal of stormwater in the urban environment.

Upper Neuse Site Evaluation Tool

The Upper Neuse Site Evaluation Tool is a simple model developed to assess the effects of development, including sediment and nutrient loading, on a site scale. The program allows for the definition of pre- and post-development land use as well as for multiple drainage areas and various combinations of practices. Structural and nonstructural practices can be represented giving the user a suite of options for evaluation. The tool predicts pre- and post-development annual stormwater volume and associated pollutant loads for sediment, nitrogen and phosphorus.



Tree roots take up soil moisture, increasing runoff storage potential

Delaware Urban Runoff Management Model

The Delaware Department of Natural Resources and Environmental Control created the Delaware Urban Runoff Management Model to provide a more rigorous hydrological design tool for what the department refers to as green technology best management practices. These best management practices include the following: conservation site design, impervious area disconnection, conveyance of runoff through swales and biofiltration swales, filtration through filter strips, terraces and bioretention facilities and recharge through infiltration facilities.

For additional information, contact DEQ Clean Water State Revolving Fund circuit rider Chris Bayham Tel. 541-687-7356.

Alternative formats

DEQ can provide documents in an alternate format or in a language other than English upon request. Call DEQ at 800-452-4011 or email deqinfo@deq.state.or.us