

## Chapter 9: Redevelopment Projects

This chapter outlines alternative approaches to stormwater management for redevelopment projects. The approaches set forth in this Chapter comply with the Department's technical standards. The document includes the following sections:

9.1 Introduction

9.2 Purpose

9.3 Scope and Applicability

9.4 How to Apply Alternative Stormwater Practices

9.5 Alternative Stormwater Management Practices Profile Sheets

### Section 9.1 Introduction

Redevelopment of previously developed sites is encouraged from a watershed protection standpoint because it often provides an opportunity to conserve natural resources in less impacted areas by targeting development to areas with existing services and infrastructure. At the same time, redevelopment provides an opportunity to correct existing problems and reduce pollutant discharges from older developed areas that were constructed without effective stormwater pollution controls.

Redevelopment projects are typically located in older, more urban areas, and can range from large-scale redevelopment, where a new town center is created, to much smaller commercial or residential projects. The proposed density of such projects is typically high, resulting in space constraints to implement on-site stormwater controls. Added to this basic space constraint is the need to tie in to the existing drainage infrastructure, which may be at an elevation that does not provide enough head for certain stormwater management practices (SMPs). Other problems encountered in redevelopment include the presence of underground utilities, incompatible surrounding land uses, highly compacted soils that are not suitable for infiltration, and contaminated soils that require mitigation and can drive up project costs.

Because the technical standards contained elsewhere in this Manual were primarily intended for new development projects, compliance with the standards may present a challenge on some redevelopment projects. Therefore, this chapter sets forth alternatives for certain redevelopment projects. Implementation of these alternative controls can result in useful pollutant reductions, particularly when considering the cumulative effect of multiple projects.

For redevelopment projects located in critical environmental areas and other sensitive environmental or regulated areas, however, all attempts should be made to seek compliance with the technical standards set elsewhere in this manual.

**Key Terminology:**

Alternative Sizing Criteria - The sizing criteria that can be achieved in redevelopment projects through a variety of approaches as outlined in this chapter.

Alternative stormwater practices – Stormwater management practices that are outlined in this chapter for potential application in redevelopment scenarios and are designed and implemented in accordance with the recommendations in this chapter.

Disconnected impervious area - Impervious area that is not directly connected to a stream or drainage system, but which directs runoff towards pervious areas where it can infiltrate, be filtered, and slowed down.

Redevelopment - Reconstruction or modification to any existing, previously developed land such as residential, commercial, industrial, institutional or road/highway, which involves soil disturbance. Redevelopment is distinguished from development or new development in that new development refers to construction on land where there had not been previous construction. Redevelopment specifically applies to constructed areas with impervious surface.

Redevelopment Project – A project that undergoes redevelopment. The project area can be entirely under redevelopment or the project area can be a combination of redevelopment and new development.

Standard Practice – a stormwater management practice that appears on Table 5.1 of this Manual, sized in accordance with chapter 4, and designed in accordance with chapter 6 of this Manual.

Stormwater sizing criteria – Criteria comprised of the following four elements: water quality treatment, channel protection, overbank flooding, and control of extreme storms as defined in Chapter 4 of this Manual for standard practices and any other requirements for enhanced treatment.

Total impervious area – This is the total area within the drainage area comprised of all materials or structures on or above the ground surface that prevents water from infiltrating into the underlying soils. Impervious surfaces include, without limitation: paved and/or gravel road surfaces, parking lots, driveways, and sidewalks; compacted dirt surfaced roads; building structures; roof tops and miscellaneous impermeable structures such as patios, pools, and sheds.

## Section 9.2 Purpose

The purpose of this chapter is to provide alternatives to the technical standards contained elsewhere in this Manual that would be acceptable for certain redevelopment projects. The primary focus of this chapter is to identify the alternative practices and their sizing criteria.

Redevelopment projects are generally expected to comply with technical standards contained elsewhere in this Manual. However, under circumstances where one of the redevelopment application criteria set forth in Section 9.3.1 are met and the design utilizes alternative sizing and selection of stormwater management controls defined in this chapter, the stormwater pollution prevention plan (SWPPP) will be considered to be in conformance with the State technical standards.

The SWPPP provides post construction runoff controls for the **disturbed area** including both **pervious and impervious areas**. As with design of any practice, sizing of structures should be based on all areas contributing to the stormwater management practice. Redevelopment, that reconstructs a portion of the site, may choose diversion or flow splitters to be able to size the control structures for the reconstructed area only.

## Section 9.3 Scope and Applicability

The provision of stormwater management practices in redevelopment should follow an approach to balance between 1) maximizing improvements in site design that can reduce the impacts of stormwater runoff, and 2) providing a maximum level of on-site treatment that is feasible given the redevelopment project site constraints.

Under conditions where onsite treatment is not practicable, an appropriate off-site watershed improvement to off set the required level of control may be applied, in the presence of a regulated/permitted municipal stormwater management program. The off-site stormwater

management approach is subject to applicable local agency approval for banking and trading of credits, may not be an acceptable option in all cases, and is not considered to be in full compliance with the standards defined in this Manual.

Requirements for installation of post construction controls set forth in current stormwater regulations do apply to redevelopment projects. Redevelopment sites must first attempt to comply with all the post-construction management requirements outlined elsewhere in this Manual. When physical constraints in a redevelopment situation such as those described in Section 9.3.1 are present, alternatives presented in this chapter may be used. The SWPPP for a redevelopment project, with or without increased impervious area, must clearly state that the redevelopment conditions meet the application criteria in Section 9.3.1 in order to utilize alternative sizing and selection of stormwater management controls defined in this chapter.

The alternative methods described in this chapter are not applicable to areas of the site under new development (e.g. new impervious areas that are constructed over existing pervious areas) in projects that include both redevelopment and new development areas. For the new development areas associated with a redevelopment project, 100% of the stormwater quality and quantity controls contained in Chapters 4, 5 and 6 must be provided. The reconstructed impervious areas, must be subject to treatment equal to the existing treatment or treatment options defined in Section 9.3.2 of this chapter, whichever is more effective.

### **Section 9.3.1 Application Criteria**

This Chapter applies when specific physical constraints are present at a site in reconstruction of an existing impervious area. Where site-specific circumstances do not allow proper sizing and installation of the management practices contained in Chapter 6, a SWPPP must identify the design difficulties that meet redevelopment application criteria and provide documented justification for the use of proposed alternative approaches presented in this chapter. To make such determination, the following criteria must be met:

- (1) An already impervious area is reconstructed, and
- (2) there is inadequate space for controlling stormwater runoff from the reconstructed area, or
- (3) the physical constraints of the site do not allow meeting the required elements of the standard practices.

The physical constraints pertain to soils, water table, and head; details of the constraints are listed in Table 7.2, Physical Feasibility Matrix, of this Manual.

The application criteria are not solely based on the conditions within the disturbed area. In determining the feasibility of siting SMPs, the entire site within the property boundary must be considered.

### Section 9.3.2 Sizing Criteria

**A. Water Quantity** controls can be sized using the following options:

- I- If redevelopment results in no increase of impervious area or changes to hydrology that increases the discharge rate, the **ten-year and hundred-year criteria** do not apply. This is true because the calculated discharge of pre-development versus post-development flows results in zero net increase. This consideration does not mean that **existing quantity controls** may be neglected in planned designs. Existing quantity controls must be maintained in post development flow discharge control.
- II- **Channel protection** for a redevelopment project is not required if there is no increase in impervious area or changes to hydrology that increase the discharge rate. This criterion, as defined in Chapter 4 of this Manual, is not based on a pre versus post development comparison. However, in a redevelopment project this requirement is relaxed. If the hydrology and hydraulic study shows that the post construction 1-year 24 hour discharge rate and velocity remains below the pre-construction discharge rate, 24 hour detention for the 1-year storm to meet the channel protection criteria will not be necessary.
- III- If the redevelopment results in an **increase in the total impervious area** and subsequently increased discharge rate, apply **quantity controls** for the increased discharge. If the redevelopment results in modified hydrology or flow due to discharge to other sub-watersheds, slope change, direct channelization, curb-line modification, etc., apply **quantity controls** for the increased discharge.

**B. Water Quality** Treatment Objective can be achieved using the following options, which at minimum must be equal to the existing treatment system:

- I- The plan proposes a reduction of impervious cover by a minimum of 25% of the existing total site impervious area. A reduction in site imperviousness will reduce the volume of

stormwater runoff, thereby achieving, at least in part, stormwater criteria for both water quality and quantity. The final grading of the site should be planned to minimize runoff contribution from new pervious area onto the impervious cover. Some alternative practices are acceptable means of providing impervious cover reduction, as explained in the profile sheets.

- II- The plan proposes that a minimum of 25 % of the water quality volume (WQv) from the **disturbed area** is captured and treated by the implementation of standard practices. For all sites that utilize structural stormwater management practices, these practices should be targeted to treat areas with the greatest pollutant generation potential (e.g. parking areas, service stations, etc.). If redevelopment results in the creation of additional impervious area, treatment would be required for 25% of the existing impervious area, plus 100% of the additional impervious area. As with design of any practice, sizing of structures should be based on all areas contributing to the stormwater management practice. Redevelopment, which reconstructs a portion of the site, may choose diversion or flow splitters to be able to size the control structures for the reconstructed area only.
- III- The plan proposes the use of alternative practices to treat 75 % of the water quality volume from the disturbed area as well as any additional runoff from tributary areas that are not within the disturbed area. The use of alternative practices is discussed in Section 9.3.3 of this chapter. The alternative practices in Table 1 are effective when site impervious cover is broken up in diffuse treatment areas that can be managed by these practices. The sizing criteria presented in the profile sheets provide a means of quantifying this effect in terms of water quality volume or impervious cover reduction.
- IV- The plan proposes a combination of impervious cover (IC) reduction and standard or alternative practices that provide a weighted average of at least two of the above methods. The plan may provide a combination of the above options using the following calculation:

$$(25 - (\% \text{ IC reduction} + \% \text{ WQv treatment by Standard practice})) * 3 = \% \text{ WQv treatment by Alternative practice}$$

For example, water quality volume for the alternative practice for the following scenarios can be computed as follows:

- 5% IC reduction, 20% Standard practice, 0% Alternative practice
- 5% IC reduction, 0% Standard practice, 60% Alternative practice
- 0% IC reduction, 10% Standard practice, 45% Alternative practice
- 5% IC reduction, 15% Standard practice, 15% Alternative practice

### Section 9.3.3 Performance Criteria

The practices described in this chapter are to be used for redevelopment projects only. If a site meets the eligibility requirements for alternative practices referenced in this chapter, then the applicant may select from a list of practices outlined in this chapter and described in detail in the following profile sheets. These practices are collectively referred to as “alternative stormwater practices” and include the following:

Rain gardens

Cisterns

Green roofs

Stormwater planters

Permeable paving (including modular block)

Select proprietary products (hydrodynamic practices, etc.)

It should be noted that these practices differ (except porous pavement and proprietary products) from the non-standard or supplemental practices listed in Section 5.2 of the Manual. The non-standard practices in Section 5.2 are primarily meant for pretreatment or water quantity control purposes. By contrast, the alternative stormwater practices represent a group of practices that recently have been receiving a lot of attention in the field of stormwater management. By and large, these practices have associated research that indicates they have water quality benefits that begin to approach the water quality performance criteria identified in Chapter 5 of the Manual. However, research is limited to only a handful of studies, which lends enough uncertainty to not want to consider these practices as standard practices at this time.

### Section 9.4 How to Apply Alternative Stormwater Practices

Meeting water quality control criteria in redevelopment scenarios is achieved by applying the sizing criteria in Section 9.3.2 to one of the alternative practices in Section 9.3.3.

For practices such as rain gardens, cisterns, some stormwater planters, and proprietary practices, where runoff from impervious areas are directed to the practice for treatment, a sizing approach based on impervious area treated is used. For example, a cistern that captures and manages runoff from a

1,000 square foot roof should be sized to be able to capture and temporarily hold the water quality volume (WQv) from that area to meet the total required water quality volume. Runoff that results from contributing areas must be addressed by additional measures if necessary.

In addition to meeting water quality performance goals, proprietary practices must be sized to capture and treat the WQv resulting from the contributing drainage area depending on whether it uses a volume-based or a rate-based sizing approach. For practices with a volume-based sizing approach, the practice must be sized to capture and treat 75 % of the WQv as defined in Chapter 4 of the Manual. For flow through practices, the practice must be sized to treat the peak rate of runoff as defined in Chapter 4 and Appendix B of this Manual. For off-line practices, the installation must include flow diversion that protects the practice from exceeding design criteria.

## **Section 9.5 Alternative Stormwater Management Practices Profile Sheets**

Profile sheets follow that provide information on the practices listed in Section 9.3.3, including:

Practice Description

Recommended Application of the Practice

Benefits

Feasibility/Limitations of Practice

Sizing and Design Guidance

Environmental/Landscaping Considerations

Maintenance

Cost

References