Redevelopment

Before

After

Practice Description

Redevelopment occurs in areas that have previously been developed for another use. These sites are likely to be highly impervious and of limited value to the stormwater management system. The definitions of development and redevelopment vary in stormwater guidance documents and National Pollution D- E- S- stormwater permits. In some states and localities, development and redevelopment are subject to the same stormwater management requirements. Redevelopment of already impervious surfaces, however, can be a key strategy for reducing net increases in impervious surfaces and associated degradation to receiving waters. By recycling these sites and granting them new life, governments reap the broader benefits of development on an existing property by reusing impermeable surface and mitigating developmental impacts on a green field site. Because redevelopment will take advantage of existing roadways and building sites, it is likely to follow many of the Better Site Design principles associated with street width and length. Its primary advantage for stormwater management, however, is that it provides opportunities for conserving natural areas in the surrounding community that might otherwise be subject to greater development pressure (CWP, 1998).

Planning Considerations

Redevelopment can be accomplished on a site-by-site basis, but it can also be part of a larger local or regional effort to spur investment and development activity. Many jurisdictions create redevelopment districts, such as business improvement districts, Main Street programs for older downtowns, brownfields programs, vacant property campaigns, and efforts to revive older, underperforming shopping malls. The transfer of development rights can help spur redevelopment by directing development demand to existing activity centers. In established development districts, infrastructure upgrades associated with redevelopment can be used for repairs such as replacing deteriorating pipes that are contributing to water quality impairments.

In districts with multiple redevelopment-ready properties, economic factors, such as location near amenities and proximity to transit, guide which properties are redeveloped

first. Because these properties may or may not be the ones that will deliver the highest succession of stormwater benefits, it is helpful to prioritize areas that can provide the greatest opportunities for detention facilities or other desired BMPs.

Although redevelopment can just maintain the current level of stormwater runoff, by employing a strategic series of BMPs, this new development may actually lead to a net improvement in regional stormwater.

Design Criteria

Design of redevelopment projects will vary considerably with land variations. Common land constraints include irregularly shaped properties, small lots, legacy contamination, and noncompliant building features/footprints. Water quality considerations can also influence the selection of structural BMPs used to manage the project's stormwater. In some cases, the main factor may be flow reduction, while in others cases the focus will be the filtration of nutrients or heavy metals.

Stormwater Retrofit

In areas with degraded waterways, redevelopment activity can complement efforts to improve the quality and reduce the quantity of stormwater runoff. The BMPs chosen for redevelopment, however, need to consider the unique circumstances of the redevelopment project. Micro-detention, urban forestry techniques and structured soils are often recommended for urban areas. Green building techniques and green roofs may also be good choices. As noted above, cities and counties will want to coordinate infrastructure repair and upgrades with redevelopment efforts so that water and wastewater capacity are not barriers to redevelopment.

Implementation

Redevelopment is highly useful in urban areas, especially where the area is fully built out. Some of the strategies for redevelopment are described below.

Green Roofs

Green roofs help reduce the urban "heat island" effect as well as peak stormwater flows by absorbing stormwater on-site. The vegetated cover also helps protect and insulate the roof, extending its life and reducing heating and cooling costs. See more discussion on green roofs in the *Site Design* section of this chapter.

Micro-Detention

Micro-detention techniques seek to absorb some or all stormwater runoff on the development site. Since the entire volume of stormwater generated on-site is rarely entirely infiltrated, micro-detention is typically only one of a series of BMPs. Common landscaping features, such as small garden areas, tree grates, perimeter hedges, and even rain gardens (also known as *Bioretention*) can enhance stormwater handling and micro-detention. In urban buildings with basements and underground garages, infiltration may occasionally not be an option. Pollutants that might be carried with infiltrating water should also be considered; hence, infiltrating techniques are not recommended for stormwater hotspots.

Alternative Pavers and Porous Pavement

Alternative pavers, porous asphalt, and permeable concrete reduce stormwater flows by allowing water to infiltrate their porous surfaces and soak into the ground beneath. Pervious pavers can reduce runoff volumes at a considerably lower cost than traditional storm drain systems.

Infrastructure Upgrades

Storm sewer overflows and leaking older pipes (referred to as inflow and outflow) can be significant environmental problems in urban areas. Redevelopment offers an opportunity, through enhanced tax revenues resulting from increased economic activity, to upgrade storm grates and pipes. However, capacity at wastewater treatment plants may be a barrier to redevelopment. In addition, the condition of receiving waters and total maximum daily limits can be hurdles to any development activity in an urban area.

In-pipe and Small Structural Devices

A growing number of devices are coming on the market that provide a range of mitigation functions. These devices commonly work to separate large debris collected in runoff, intercept sediments, and improve water quality. They range in size, cost, and maintenance needs. They can be included in the suite of structural and nonstructural BMPs chosen for redevelopment projects and districts.

Common Problems

As a stormwater strategy, redevelopment can require larger regional cooperation. To growing rural districts, a redevelopment strategy for established commercial centers might not be viewed as advantageous.

The BMPs required for redevelopment need to be compared to BMPs required for new development. Watersheds that choose redevelopment as a stormwater strategy should make sure the BMP cost and permit review requirements for redevelopment are comparable to those required for new development. Because redevelopment is often more complex than new development, design and building costs can be higher. Where infrastructure upgrades are needed, the costs can be considerable, particularly where treatment capacity or aging infrastructure is the limiting factor. However, in many cases, redevelopment projects can command a premium price, and some or all of the costs can be recovered.