Chapter 9 – Stormwater Retrofits

Introduction

This chapter provides guidance for retrofitting sites that are already developed to reduce the adverse impacts of existing stormwater runoff. A “retrofit” is a project that modifies an existing developed site for the primary purpose of improving the quality of and reducing the quantity of stormwater discharge. This is primarily achieved through disconnecting, and therefore reducing, Directly Connected Impervious Area (DCIA), as defined in Chapter 2 - Stormwater Impacts. Stormwater retrofits can be used to disconnect DCIA by converting impervious surfaces to pervious surfaces, redirecting runoff from impervious surfaces to adjacent pervious areas, and adding new or modifying existing structural stormwater Best Management Practices (BMPs) to infiltrate or reuse stormwater runoff from impervious areas.

This chapter describes the reasons for and benefits of stormwater retrofits, various retrofit approaches and types, identification and design of stormwater retrofits, quantifying retrofit benefits (i.e., crediting), and common retrofit applications. Additional guidance on stormwater retrofits can be found in the information resources at the end of this chapter.

Why Retrofit? – Objectives and Benefits of Stormwater Retrofits

The objective of stormwater retrofitting is to improve the water quality mitigation functions of existing developed sites either lacking or having insufficient stormwater controls. In Connecticut, prior to the 1970s, site drainage design did not require stormwater detention for controlling

What’s New in this Chapter?

- Consistency with stormwater retrofit requirements in the CT DEEP stormwater general permits
- New guidance on retrofit planning approaches
- Updated information on stormwater retrofit types and applications
- Use of stormwater retrofits for DCIA disconnection and reduction
- Use of EPA stormwater BMP performance curves for retrofit sizing and crediting
- Updated information on other resources and tools for stormwater retrofit planning and design

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66 Impervious area with a direct hydraulic connection to a storm drainage system or a waterbody via continuous paved surfaces, gutters, drainpipes, or other conventional conveyance and detention structures that do not reduce runoff volume is referred to as “Directly Connected Impervious Area (DCIA).” DCIA includes impervious surfaces that contribute stormwater runoff to a stream, other waterbody, or wetland. Impervious areas that are not directly connected to a storm drainage system, receiving waterbody, or wetland are considered “disconnected” and therefore not considered DCIA. DCIA can be disconnected through retrofits that retain and/or treat the appropriate portion of the Water Quality Volume as described in Chapter 4 - Stormwater Management Standards and Performance Criteria.
post-development peak flows. As a result, drainage, flooding, and erosion problems are common in many older developed areas. Furthermore, local and state stormwater regulatory requirements and the resulting stormwater designs in the 1980s and 1990s focused on detention and controlling peak rates of runoff, without regard for the quality of runoff, runoff volume, groundwater recharge, or other hydrologic impacts. Therefore, much of the existing, older development in Connecticut still lacks adequate stormwater controls.

Retrofits can be used to achieve stormwater and water quality objectives such as reducing pollutant loads to impaired water bodies and meeting pollutant load reduction targets in Total Maximum Daily Loads (TMDLs). Other related benefits of stormwater retrofits, particularly those that incorporate green infrastructure and Low Impact Development (LID) techniques, include:

- Recharging groundwater to support streamflow and drinking water supplies.
- Reducing flood risk by reducing runoff volumes.
- Mitigating impacts of climate change (increased precipitation, flooding, drought, and higher temperatures).
- Providing habitat.
- Improving community aesthetics and overall quality of life.

The CT DEEP MS4 General Permit requires regulated municipalities, CTDOT, and other state and federal entities to implement stormwater retrofits to disconnect and reduce DCIA and track the progress of their DCIA reduction efforts relative to specific reduction goals. Permit holders and/or municipalities can also identify stormwater retrofits as part of an off-site mitigation program for new development and redevelopment projects that are unable to fully comply with stormwater management requirements on-site.

## Retrofit Approaches

There are two major approaches to implementing stormwater retrofits – the opportunistic approach and the retrofit planning approach (SNEP Network, 2022). The two approaches can be used together in a complementary fashion to develop and implement a successful retrofit program.

### Opportunistic Approach

The opportunistic approach involves integrating stormwater retrofits into already planned construction projects. Retrofits are generally more cost-effective when implemented in conjunction with planned infrastructure upgrades since construction of the retrofit can be coupled with other planned site disturbance and improvements. An example of an opportunistic retrofit is incorporation of bioretention planters, roadside bioswales, infiltrating catch basins, or underground infiltration chambers into a planned roadway improvement project. This approach

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