E-3. Retrofits

Image: Impervious disconnection, Town of Carrboro

Image: Bioretention cell in mall parking lot, Wilmington NC State project

Design Objective

Stormwater retrofits are SCMs that provide nutrient and/or sediment loading reduction from existing development that is currently untreated or is inadequately treated by an existing SCM. Besides providing stormwater treatment, retrofits can also help alleviate flooding and erosion problems and some can become an attractive community amenity.

Retrofits are typically not associated with North Carolina's post-construction stormwater requirements. They are generally used to satisfy requirements associated with TMDL watershed plans, NPDES-MS4 permits, Nutrient Sensitive Waters strategies, and consent decrees stemming from enforcement actions associated with sanitary sewer overflows and sewage discharges from combined sewers.

Retrofits of existing SCMs can take the form of either conversions or enhancements. Examples of conversions include converting a dry detention basin to a wet pond or wetland, or converting a small pond to a bioretention area or pocket wetland. Examples of enhancements include enlarging the size of an SCM, adding floating wetlands to a wet pond, or directing additional runoff from impervious surfaces to an adequately-sized existing SCM.

In cases where retrofits cannot be designed or incorporated into a site such that they completely satisfy minimum requirements, keep in mind that providing some level of stormwater control is better than nothing. Designers should consult with the permitting authority on flexibility and available credit for alternative designs.

Important Links

15A NCAC 2B .0266 – Jordan Water Supply Nutrient Strategy: Stormwater Management for Existing Development

15A NCAC 02B .0278 -- Falls Water Supply Nutrient Strategy: Stormwater Management for Existing Development

RECOMMENDATION 1: PRIORITIZE RETROFIT OPPORTUNITIES

Opportunities for installing stormwater retrofits can be limited by multiple factors including cost, land availability, soil contamination, drainage system capacity, site elevation or physical obstacles such as utilities or mature trees. Researching potential retrofit opportunities in targeted areas that have known water quality or flooding issues will allow you to identify the projects that will have the most bang-for-the-buck in terms of resolving those issues.

Existing SCMs Be creative in researching opportunities for retrofits. The focus doesn't need to be entirely on sites without any existing stormwater treatment. Most communities have an inventory of existing, older SCMs that are in need of repair, maintenance, or updating to meet current standards. These may be higher on the priority list because additional land area is likely not needed to retrofit an existing SCM.

It can be less expensive and more practical to modify existing SCMs for improved performance such as converting a dry pond to a wet pond/wetland or adding floating wetlands to a wet pond. Retrofits can also include enhancements such as redesigning an old dry pond to increase treatment volume, prevent short circuiting, or extend hydraulic residence time.

Public Lands In some cases, it can make sense to consider locating retrofits on publicly-owned land such as parks and schools. These can be cost effective alternatives to acquiring new property. They can also provide an educational and attractive amenity to the community.

Future Municipal/County Construction The planning stage of a future local government construction project can be a prime opportunity to include the integration of smaller SCMs into the project. For example, retrofits can be incorporated into capital improvement projects such as road widening, streetscaping, and neighborhood revitalization.

RECOMMENDATION 2: TIME RETROFIT CONSTRUCTION WITH OTHER MAJOR SITE MODIFICATIONS

Retrofit construction is often more expensive than standard SCM construction. Significant savings can be realized by timing the construction of a retrofit with construction of other site modifications such as demolition of a structure, removal of trees, or the repaving of a parking

lot. It is important that designers, contractors, and site operators work together to determine how the SCM retrofit can constructed while minimizing impacts to ongoing operations.

RECOMMENDATION 3: USE UNDERGROUND SCMS FOR DIFFICULT SITES
Because retrofits are often needed most in areas where water quality is degraded due to intense development, locating adequate space for the retrofit is challenging. In some instances, underground SCMs such as sand filters may be a viable option for a tight site.

RECOMMENDATION 4: CONSIDER LOW IMPACT DEVELOPMENT AND GREEN INFRASTRUCTURE PRACTICES
Low impact development (LID) practices and green infrastructure, or other such site scale dispersed stormwater management practices are often easier and less expensive to incorporate into existing sites than larger traditional SCMs; however, multiple smaller scale practices may require more frequent maintenance than larger centralized stormwater controls.

RECOMMENDATION 5: BE CLEAR ABOUT GOAL OF RETROFIT
It is important to be clear from the beginning of the process about what you plan to achieve with the retrofit project. Is the goal the reduction in nutrient loading? Sediment removal? Runoff reduction? The goal of the project will influence the type of SCM most suitable. For example, if stormwater treatment is the goal, choose an SCM that uses settling or filtering through sand or other media such as wet ponds*, wet swales, constructed wetlands, or sand filters. If runoff reduction is the goal, choose SCMs that rely on infiltration, storage, and slow release of stormwater such as permeable pavement, green roofs, infiltration basins, dry swales, or bioretention cells.

*Adding a floating treatment wetland to an existing wet pond can enhance nutrient reduction.