

Retrofit Selection

While some form of retrofitting is possible on most sites, existing developed sites often have characteristics that can limit the type of stormwater retrofits and structural stormwater BMPs that are possible and their overall effectiveness. [Table 9- 1](#) lists site-specific factors to consider in determining the appropriateness of stormwater retrofits for a particular site.

Table 9- 1 Site Considerations for Determining the Appropriateness of Stormwater Retrofits

Factor	Consideration
Retrofit Purpose	<ul style="list-style-type: none"> ➤ What are the primary and secondary (if any) purposes of the retrofit project? ➤ Are the retrofits designed primarily for DCIA and pollutant reduction, stormwater quantity control, or a combination of both? ➤ Will the retrofit project meet or make cost-effective progress towards goals? ➤ Will the retrofit accomplish other goals/benefits (e.g., flood reduction, habitat creation, community enhancements)?
Space	<ul style="list-style-type: none"> ➤ Is there adequate space and setback distances for new surface-based stormwater BMPs?
Existing Drainage Patterns and Storm System Configuration	<ul style="list-style-type: none"> ➤ Are existing catch basins located adjacent to and at a higher elevation than nearby green space? ➤ Does the existing configuration of the storm drainage system allow for use of the existing catch basins as overflow structures or are new overflow devices and flow diversion structures required, which would increase cost?
Contributing Drainage Area	<ul style="list-style-type: none"> ➤ Is the retrofit compatible with the size of the contributing drainage area? ➤ Can the retrofit be sized with sufficient storage to meet the retention/treatment standards? ➤ Is the drainage area sufficient to maintain the required hydrology and vegetation for wet practices?
Site Slope	<ul style="list-style-type: none"> ➤ Is the site topography consistent with the recommended slope limitations of the proposed retrofit?

Factor	Consideration
Subsurface Conditions	<ul style="list-style-type: none"> ➤ Are the subsurface conditions at the site (soil infiltration capacity, depth to the seasonal high groundwater table, and depth to bedrock) consistent with the proposed retrofit? ➤ Does site contamination present a conflict for the proposed retrofits?
Utilities	<ul style="list-style-type: none"> ➤ Do the locations of existing utilities (including private wells and on-site wastewater systems) present conflicts with the proposed retrofits or require relocation or design modifications?
Conflicting Land Uses	<ul style="list-style-type: none"> ➤ Are the retrofits compatible with existing uses of the site and adjacent land uses of nearby properties?
Wetlands, Sensitive Receiving Waters, and Vegetation	<ul style="list-style-type: none"> ➤ How do the retrofits affect adjacent or downgradient wetlands, sensitive receiving waters, and vegetation? ➤ Do the retrofits minimize or mitigate impacts where possible?
Construction/Maintenance Access	<ul style="list-style-type: none"> ➤ Does the site have adequate construction and maintenance access and sufficient construction staging area? ➤ Are maintenance responsibilities for the retrofits clearly defined and who will be performing the maintenance? ➤ Is the owner aware of and willing to take responsibility for O&M costs? ➤ What is the required inspection and maintenance frequency? ➤ Are there special maintenance equipment needs?
Permits and Approvals	<ul style="list-style-type: none"> ➤ Which local, state, and federal regulatory agencies have jurisdiction over the proposed retrofit project? ➤ Can regulatory approvals be obtained for the retrofits?
Public Safety	<ul style="list-style-type: none"> ➤ Does the retrofit increase the risk to public health and safety?
Cost	<ul style="list-style-type: none"> ➤ What are the capital and long-term maintenance costs associated with the stormwater retrofits? ➤ Are the retrofits cost-effective in terms of anticipated benefits?

Source: Adapted from Claytor, Center for Watershed Protection, 2000.⁶⁹

Physical constraints that are common on existing developed sites can present design challenges that limit the ability of stormwater retrofits to fully meet the stormwater management standards, performance criteria, and BMP-specific design guidance presented in this Manual. For example,

⁶⁹ Claytor, R.A. Center for Watershed Protection. 2000. *The Practice of Watershed Protection*. Ellicott City, Maryland.

the minimum recommended horizontal setback distance between a proposed infiltration retrofit and an existing building may not be feasible, although a groundwater mounding analysis or use of an impermeable liner may mitigate the risk of water intrusion into the building foundation. Similarly, conversion of an existing dry detention basin to an infiltration basin may not fully meet the required Required Retention Volume, given the need to preserve storage for peak flow attenuation, but the modification would provide substantial retention of stormwater as compared to existing conditions while providing adequate stormwater quantity control.

Retrofitted facilities may not be as effective in reducing pollutant loads as newly designed and installed facilities. However, in most cases, some improvements in pollutant reduction, runoff reduction, groundwater recharge, and stormwater quantity control are possible even if the retrofit does not fully meet all the management standards, performance criteria, and design guidance due to site constraints. Research and recent practice have shown that retrofits designed for less-than-optimal conditions can still provide significant pollutant reduction and hydrologic benefits. This approach to stormwater retrofitting is based on the following rationale:

- Implementing small-scale retrofits is better than not retrofitting.
- Providing some retention and infiltration is better than none.
- Where retention/infiltration is not possible, providing some pretreatment and treatment is better than none.
- Any impervious surface disconnection is an improvement over existing condition.

Rather than preclude the use of retrofits that cannot fully meet the management standards, performance criteria, and design guidance, this Manual promotes the use of retrofits whenever possible by providing flexibility in retrofit sizing and crediting, as discussed in the following section.

For retrofits involving the addition of new structural stormwater BMPs or upgrades to existing stormwater BMPs, the guidance provided in [Chapter 8 - Selection Considerations for Stormwater BMPs](#) should be consulted to screen out unsuitable retrofits and help select the most appropriate retrofits for a given site.