STORMWATER RETROFITS

Stormwater retrofits are implemented to treat both the water quality and quantity at existing developed sites. These retrofits are chosen based on the pollutants requiring treatment as well as the amount of additional stormwater storage needed at a particular site. A multitude of options are available to businesses looking to reduce their impact on our stormwater and environment.

Why do businesses retrofit?

Fix past mistakes and maintenance problems
Solve chronic flooding problems
Stormwater demonstration and education
Trap trash and floatables
Reduced runoff volume to combined sewers
Renovate the stream corridor
Reduce pollutants of concern
Systematically reduce downstream erosion
Support stream restoration
Comprehensive watershed restoration

Bioretention cells retrofit in Madison Township, OH

Summary of Two Common Types of Stormwater Retrofits

Classification	***Storage retrofit***	***On-site retrofit***
Service area	5-500 acres	0.1-5 acres
Constructed on	Public land	Private land
Assessment scale	Subwatershed	Catchment/neighborhood
Cost per impervious acre treated	Moderate	High
Feasibility for ultra urban areas	Impractical	Practical
Permitting requirements	Extensive	Few
Stormwater targets reached	All	Recharge and water quality
Practices	Extended detention, wet pond, wetlands, etc.	Bioretention, filtering, infiltration, swales, etc.
Most common locations	Existing ponds, above roadway culverts, below outfalls, in a conveyance system, in road right of ways, near large parking lots	Hot spot operations, small parking lots, individual streets, individual rooftops, little retrofits, hardscapes and landscapes, underground

For more information on BMPs, stormwater management, green infrastructure, retrofitting locations, or more, contact Tinker's Creek Watershed Partners!

Babette Gowda, Watershed Coordinator
babette@tinkerscreekwatershed.org
330-963-6243

Tinker's Creek WATERSHED PARTNERS
Rediscover • Respect • Revitalize

Northeast Ohio Regional Sewer District

The Northeast Ohio Regional Sewer District leads effective wastewater and stormwater management that protects the health and environment of the region while enhancing quality of life for more than 1 million residents.

Existing Ponds

Add water quality treatment storage to an existing pond that lacks it by excavating new storage on the pond bottom, raising the height of the embankment, modifying riser elevations/dimensions, converting unneeded quantity control storage into water quality treatment storage and/or installing internal design features to improve performance.

Design Issues		**Stormwater Treatment Provided**	
Ease to find from desktop	Easy	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Rarely
Ease of getting permits	Moderate	**Channel protection**	Full
Treatment cost	Low	**Flood control**	Rarely

Owen Park Ponds in Madison, WI

Above Roadway Culverts

Culvert

Provide water quality storage immediately upstream of an existing road culvert that crosses a low gradient, non-perennial stream without wetlands. Free storage is created by adding wetland and/or extended detention treatment behind a new embankment just upstream of the existing roadway embankment.

Design Issues		**Stormwater Treatment Provided**	
Ease to find from desktop	Easy	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Rarely
Ease of getting permits	Hard	**Channel protection**	Full
Treatment cost	Low	**Flood control**	Partial

Below Outfalls

Flows are split from an existing storm drain or ditch and are diverted to a stormwater treatment area on public land in the stream corridor. Works best for storm drain outfalls in the 12- to 36- inch diameter range that are located near large open spaces, such as parks, golf courses and floodplains.

Design Issues		**Stormwater Treatment Provided**	
Ease to find from desktop	Moderate	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Partial
Ease of getting permits	Moderate	**Channel protection**	Partial
Treatment cost	Moderate	**Flood control**	Partial

Stormwater outfall in Baltimore County, MD

Near Large Parking Lots

Parking lot retrofits in St. Charles, IL

Provide stormwater treatment in open spaces near the downgradient outfall of large parking lots (5 acres plus).

Design Issues		**Stormwater Treatment Provided**	
Ease to find from desktop	Easy	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Partial
Ease of getting permits	Moderate	**Channel protection**	Full
Treatment cost	Moderate	**Flood control**	Partial

In a Conveyance System

Investigate the upper portions of the existing stormwater conveyance system to look for opportunities to improve the performance of existing swales, ditches and non-perennial streams. This can be done either by creating in-line storage cells that filter runoff through swales and wetlands or by splitting flows to off-line treatment areas in the stream corridor.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Partial
Ease of getting permits	Moderate	**Channel protection**	Partial
Treatment cost	Moderate	**Flood control**	Partial

Regenerative stormwater conveyance system in Baltimore County, MD

In Road Right of Ways

Green Street in Los Angeles, CA

Direct runoff to a depression or excavated stormwater treatment area within the right of way of a road, highway, transport or power line corridor. Prominent examples include highway cloverleaf, median and wide right of way areas.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Easy	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Partial
Ease of getting permits	Moderate	**Channel protection**	Full
Treatment cost	Low	**Flood control**	Partial

Hot Spot Operations

Install filtering or bioretention treatment to remove pollutants from confirmed or severe stormwater hotspots discovered during field investigation.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Full
Simplicity of design	Moderate	**Runoff reduction**	Rarely
Ease of getting permits	Easy	**Channel protection**	Rarely
Treatment cost	High	**Flood control**	Rarely

Dumpster leaking directly into a storm sewer

Small Parking Lots

Silver Lake Beach parking lot in Wilmington, MA

Insert stormwater treatment within or on the margins of small parking lots (less than five acres). In many cases, the parking lot is delineated into a series of smaller on-site treatment units.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Moderate	**Water quality**	Full
Simplicity of design	Moderate	**Runoff reduction**	Full
Ease of getting permits	Easy	**Channel protection**	Partial
Treatment cost	Moderate	**Flood control**	Rarely

Individual Rooftops

Disconnect, store and treat stormwater runoff generated from residential and commercial rooftops close to the source.
R = Residential; NR = Nonresidential

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Partial
Simplicity of design	Simple[R] Moderate[NR]	**Runoff reduction**	Full
Ease of getting permits	Easy[R] Moderate[NR]	**Channel protection**	Rarely
Treatment cost	Moderate[R] High[NR]	**Flood control**	Rarely

Green roof at West Creek Reservation's Watershed Stewardship Center in Parma, OH

Little Retrofits

Curbless street with infiltration strip in MN

Convert or disconnect isolated areas of impervious cover and treat runoff in an adjacent pervious area using low tech approaches such as a filter strip. "Little retrofits" refers to the size of the available retrofitting area as well as the size of the impervious area.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Full
Simplicity of design	Simple	**Runoff reduction**	Full
Ease of getting permits	Easy	**Channel protection**	Rarely
Treatment cost	Low	**Flood control**	Rarely

Hardscapes and Landscapes

Reconfigure the plumbing of high visibility urban landscapes, plazas and public spaces to treat stormwater runoff with landscaping and other urban design features.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Full
Simplicity of design	Simple	**Runoff reduction**	Partial
Ease of getting permits	Easy	**Channel protection**	Rarely
Treatment cost	Moderate	**Flood control**	Rarely

Main Street Stormwater Retrofit Demonstration in Painesville, OH

Underground

Hinkson Creek in Boone County, MO

Provide stormwater treatment in an underground location when no surface land is available for surface treatment. Use this as a last resort at dense ultra-urban sites.

Design Issues		Stormwater Treatment Provided	
Ease to find from desktop	Hard	**Water quality**	Full
Simplicity of design	Complicated	**Runoff reduction**	Partial
Ease of getting permits	Moderate	**Channel protection**	Rarely
Treatment cost	High	**Flood control**	Rarely