Educational Fliers for Best Management Practices in Residential Areas

East Fork Creek Watershed

Olson Ecological Solutions, LLC

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Permeable Pavement Parking Lot

Permeable pavement is pavement designs with various percolating layers that filter stormwater. They are especially important in filtering out the first flush pollutants, like car oil, gasoline, heavy metals, litter, suspended solids, and road salt, at the beginning of a storm event.

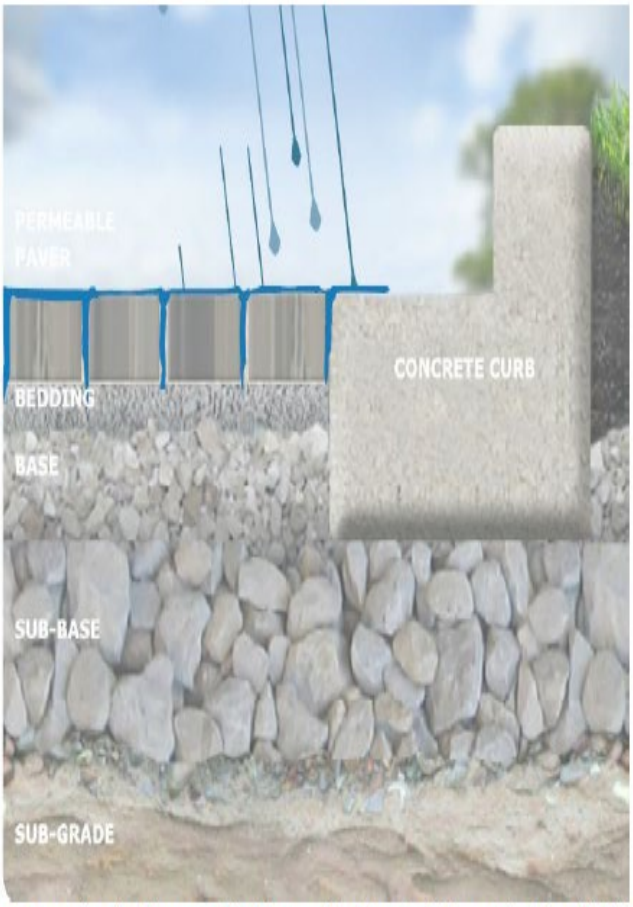

Figure 5.13. Example of a Permeable Paver Parking Lot Cross-Section (APT, 2011)
(MWRD, 2015)

Benefits:

- ✓ decreased surface runoff
- ✓ reduced runoff velocity
- ✓ improved water quality
- ✓ groundwater recharge through more direct infiltration

Applicable locations for implementation: The installation of permeable pavement is recommended for the marina parking lots and new driveways, access roads, sidewalks, and other low traffic impervious surfaces.

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East Fork Creek Watershed
Lake Carroll Best Management Practices

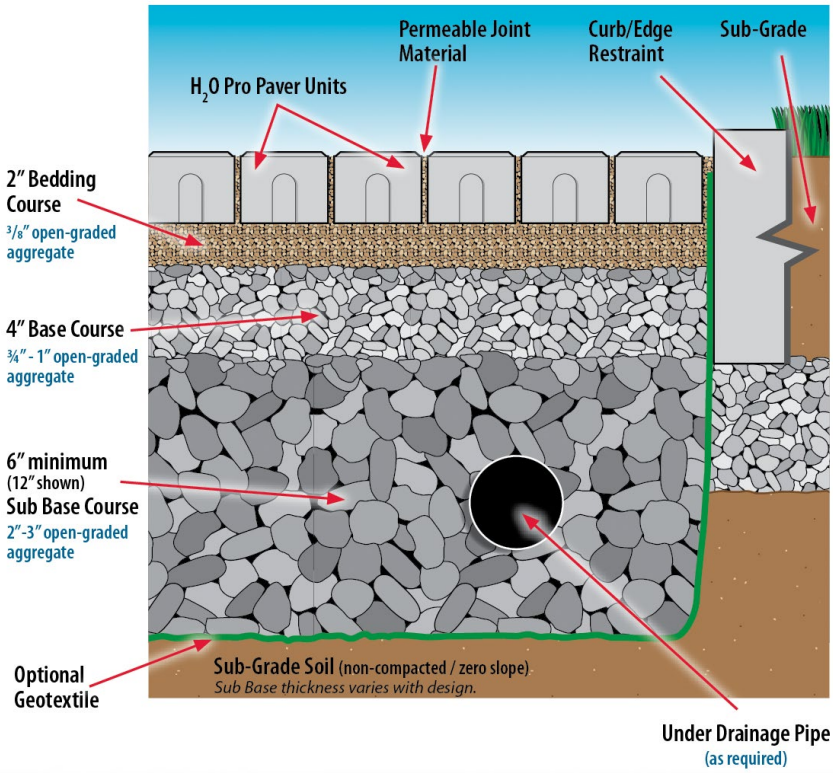
Permeable Pavement Parking Lot

Morton Arboretum, Lisle. Permeable pavers

A recent National Water Quality Inventory reported that runoff from urban areas is the primary source of water quality impairments to tested estuaries and the third-largest source of impairments to surveyed lakes (EPA, *Protecting Water Quality from Urban Runoff*).

Permeable pavements infiltrate, filter, and/or store precipitation where it falls. These pavements are usually installed using permeable interlocking pavers. This best management practice could be cost effective where property values are high and flooding or icing is an issue (EPA, What is Green Infrastructure?).

County Materials



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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Vegetated Swales

Vegetated swales are shallow channels or swales vegetated with deep rooted plants, which filter out pollutants and slow stormwater. Similar to filter strips, vegetated swales intercept stormwater runoff from nearby impervious areas. Their primary function is to filter pollutants and sediment from stormwater runoff.

Benefits:

- ✓ Collect stormwater sediment
- ✓ Filter pollutants
- ✓ Slow stormwater runoff

Permeable paving drains into a vegetated swale at Elmhurst College (Jaffe, M., et al 2010)

Agrecol Native Nursery Swale Mix

Vegetated swales can be applied in most development situations with few restrictions. They are well-suited to treat highway or residential road stormwater runoff due to their linear nature.

Applicable locations: at the end of drains or buildings, adjacent to impervious surfaces such as parking lots and roads

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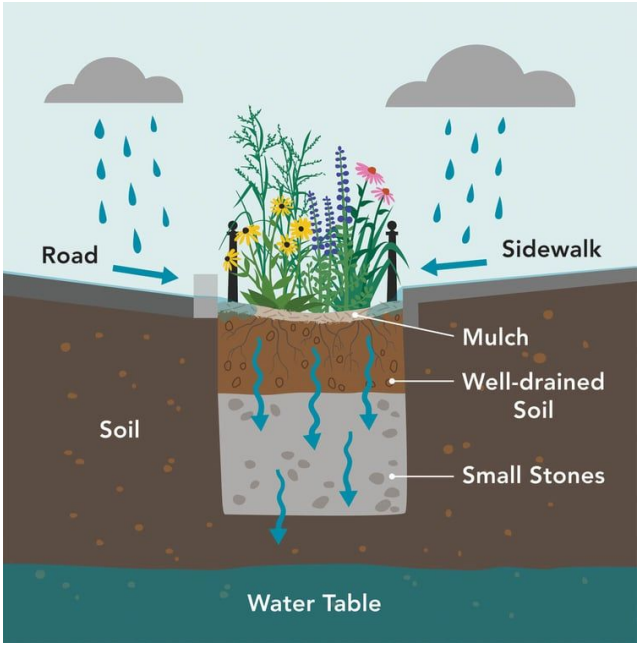
East Fork Creek Watershed
Lake Carroll Best Management Practices:

Vegetated Swales

Vegetated swales must be sized to allow sufficient contact time with the swales, such as shallow water depths and low velocities, in order for adequate pollutant removal to occur. In designing these swales, they also must consider drainage area, soils, and the volume control storage. Swales utilize drainage pipes, well-drained soils, and gravel underneath vegetation to aid in water infiltration.



Connecticut Fund for the Environment

City of Columbus, columbus.gov

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Vegetated Filter Strips

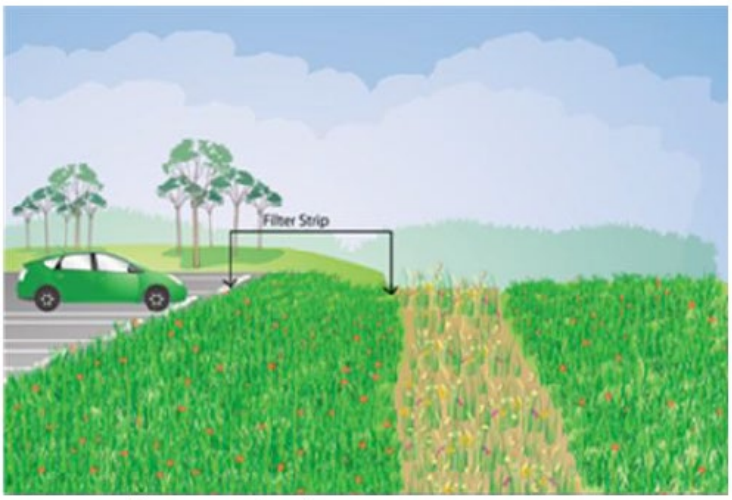

Figure 5.19. Illustration of a Filter Strip (MWRD, 2015)

Filter strips are vegetated sections of land located between impervious surfaces or agricultural fields and the waters to which they drain. When installed next to impervious surfaces, vegetated filter strips slow runoff, enable stormwater to pass through deep-rooted vegetation, and filter out pollutants before emptying into swales or other bodies of water. Filter strips may provide some reduction in stormwater runoff volume, but their primary function is to filter out contaminants in stormwater runoff.

The EPA has estimated the following load reductions in nitrogen (N), phosphorous (P), biochemical oxygen demand (BOD), and sediment in water sources when vegetated filter strips are in use.

BMP & Efficiency	N	P	BOD	Sediment
Vegetated Filter Strips	**40%**	**45%**	**51%**	**73%**

(EPA Region 5 Model for Estimating Load Reductions, 2018)

Nitrogen and phosphorous naturally occur as nutrients in aquatic systems; however, human activities have greatly increased the amounts that occur. Too much of these nutrients cause significant jumps in algae growth, which negatively impacts water quality, reduces or eliminates oxygen within the water, harms food resources, degrades aquatic habitats, and can eventually cause algal blooms. Some algal blooms produce toxins and promote bacteria growth, which can harm humans who come in contact with the water (EPA, “Nutrient Pollution: The Problem”).

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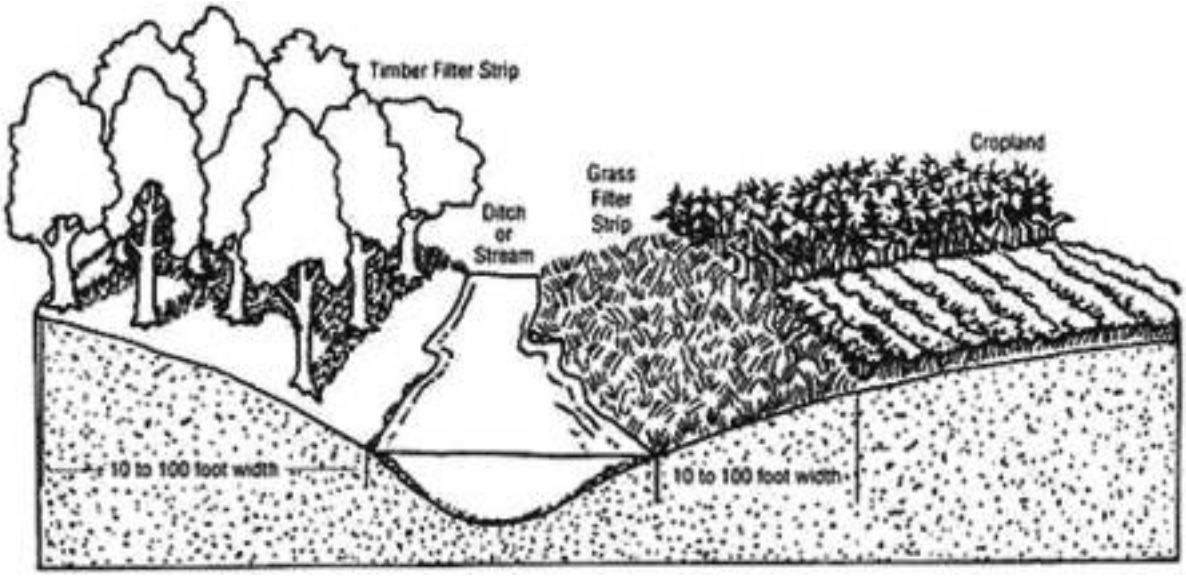
East Fork Creek Watershed
Lake Carroll Best Management
Practices:

Vegetated Filter Strips

Vegetated filter strips include various types of vegetation, including timber filter strips, grassway filter strips, or native plant filter strips.



(NRCS USDA)

It is suggested that the Lake Carroll Association continue to plant native vegetation around lake shores and inlets in order to filter incoming pollutants. The more land near water that is covered with native plant vegetation, the more likely it is for pollutants (i.e. organic matter, sediments, heavy metals, bacteria, garbage, gasoline, chemicals, etc.) to be filtered out of water runoff before it hits fresh surface water. It is recommended for each strip of native vegetation to be as wide as the space will allow, with a 15-foot minimum (OES, 2014).

Applicable Locations: downslope of any area that produces large amounts of stormwater runoff

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Riparian Buffer Restoration

Riparian Buffer Restoration is the process of creating a small plant habitat situated above the banks of lakes, streams, or ponds by installing hydrophilic plants, which grow in or near water and can tolerate various levels of saturation.

Figure 6.13. Examples of Riparian and Non-riparian Environments

Benefits:

- ✓ Reduces flood flow rates, velocities, and volumes
- ✓ Minimizes erosion and promotes bank stability of streams, lakes, ponds, or wetland shorelines
- ✓ Helps to control sediment from upland areas by filtering and assimilating nutrients discharged from surrounding uplands
- ✓ Enhances wildlife habitat
- ✓ Overhanging vegetation within buffer helps to cool stream flow
- ✓ Provides nutrient uptake that may reduce algal blooms and subsequent depressed levels of dissolved oxygen in-stream.
- ✓ Enhances natural aesthetics of water bodies

(MWRD, 2015)

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Riparian Buffer Restoration

Native plant buffers (riparian buffers) should be at least 10 feet of dense native plants grown along the water's edge to allow pollutants to filter out and the banks to stabilize (Lake County Stormwater Management Commission, 2018).

Riparian buffer restoration above rip rap shoreline protection would detract geese and filter pollutants from stormwater running from lawns, parking lots, and other land uses next to the shoreline. Steep terrain leading to the lake heightens the need for riparian buffers because these buffers help to stabilize the land just next to the lake and provide erosion control.

Applicable locations: There are opportunities to install riparian buffers above the rip rap that envelops the shorelines at Lake Carroll.

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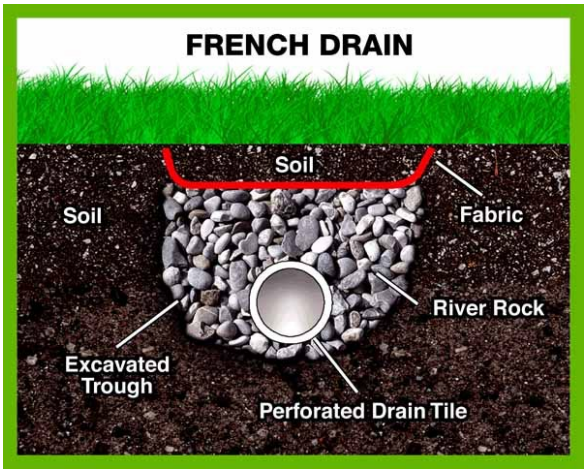
East Fork Creek Watershed
Lake Carroll Best Management Practices:

Bury Downspouts & Install French Drains

Professional Gutter & Drain



A French drain is a perforated drainage pipe buried within a gravel-filled trench that collects and redirects Stormwater away from a structure or area. French drains disperse stormwater and prevent flooding. The perforated pipes allow for stormwater to leech into the groundwater as is flows through the pipe to allow for gradual infiltration and reduce potential for flooding and erosion. Homeowners could either bury downspouts and run stormwater into French drains themselves or hire a landscape contractor to do so.

Benefits:

- ✓ Eliminates standing water in low-lying areas of yards
- ✓Absorbs excessive amounts of water into soil
- ✓Reduces erosion
- ✓Reduces flooding near foundation of homes

Photo Credit: Carroll's Building Materials

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Bury Downspouts & Install French Drains

There are limitations to the French drain and various factors to take into consideration that could effect the efficiency of the French drain. It is important to examine certain yard characteristics, including soil type, slope, proximity to your home, and tree root interference to the drains. Existing conditions of the yard's landscape and grading can effect the French drain's performance. If the downspout system is being connected to the French drain system, it is important that the connection is made at least 10-15 feet away from the foundation of the home to ensure that basement and crawlspace flooding does not occur (Professional Gutter & Drain Ltd.)

Fairfax Contracter

KG Landscape

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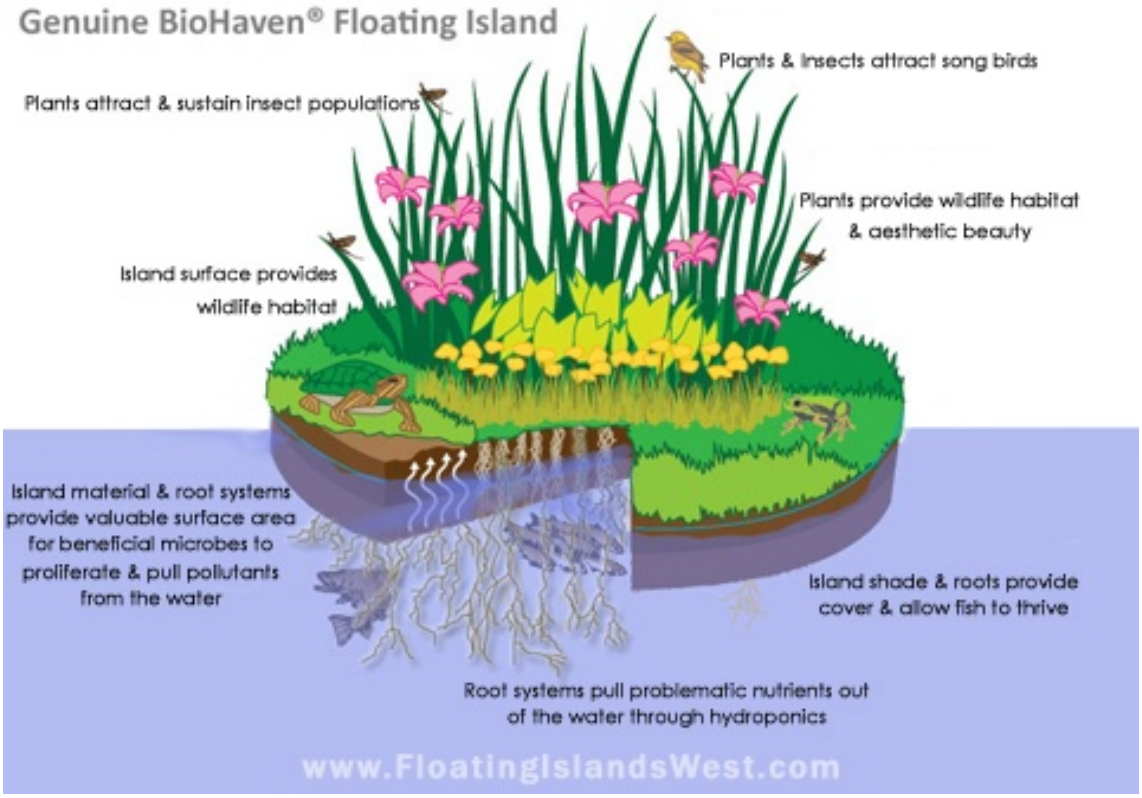
East Fork Creek Watershed
Lake Carroll Best Management Practices:

Floating Islands

Many best management practices for water quality focus on preventing pollutants from entering local fresh water sources, i.e. preventative measures. There is a best management practice that focuses on filtering out pollutants that still entered the targeted bodies of water. Floating wetlands, or islands, can further reduce pollutants in the lake as a long-term solution: 82% reduction in total phosphorous, 70% reduction in total nitrogen, and 45% reduction in BOD (biological oxygen demand).



Floating Treatment wetlands are manmade floating wetlands that when installed mimic naturally occurring wetlands in a concentrated capacity. 250 square feet of island translates to the equivalent filtering capacity of 1 acre of wetland. Natural wetlands are nature's water filters. Wetlands remove nitrates, filter excessive nutrients and sediment, recharge groundwater, and aid in erosion and flood control (Floating Islands West).

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

Floating Islands

Floating islands have seen successful implementation in various waterways with a diverse wealth of benefits: habitat enhancement, wetland and lake restoration, water quality improvement, stormwater treatment, and recreational use. BioHaven floating islands use marine-grade, non-toxic materials. These islands have also been shown to remove heavy metals, nutrients and other pollutants at removal rates of 63%-98%.

Floating islands in Levings Lake, Rockford, IL

Floating islands allow filtering plants and good bacteria to float on the water in a constructed island, introducing a filtration capability where there wasn't an opportunity before. Floating islands are recommended in addition to preventative measures in areas where pollutant reduction goals cannot be met using preventative measures alone, or where other benefits such as fish habitat are desired.

Applicable locations for installation: The Association could put floating Islands in strategic coves and areas of the lake.

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East Fork Creek Watershed
Lake Carroll Best Management Practices:
Native Plantings

Plants native to the region provide benefits to water quality, streambank stabilization, erosion control, animal and insect habitat, and aesthetic appeal. Many native plants have much deeper roots than cultivated or invasive plants.

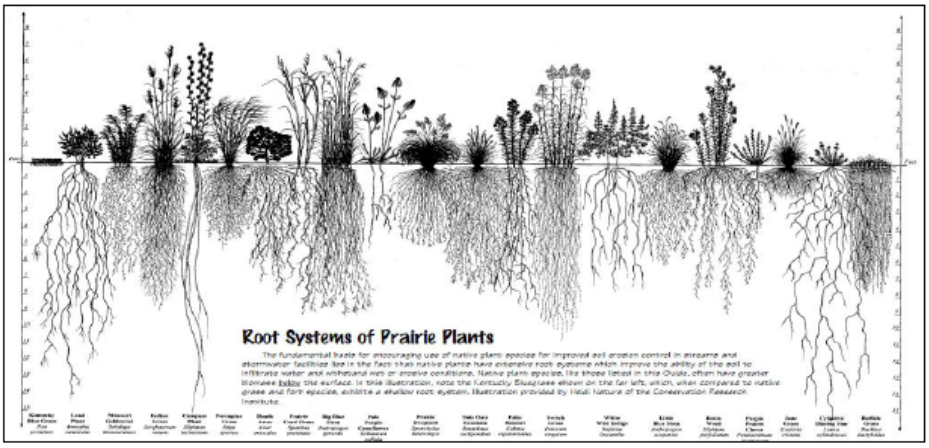

Figure 5.16. Root Systems of Grass and Prairie Plants (Source: Heidi Natura, CRI, 1995).
(MWRD, 2015)

Deep-rooted plants can trap suspended sediment and incorporate excessive nutrients into their biomass as polluted water flows through the vegetation. Deep roots also stabilize water shorelines, decrease erosion, and prevent sediment from entering water bodies. Sediment is considered a pollutant to water quality because it alters the volume capacity that a lake or steam can hold, thus eliminating potential habitat, and fluctuates water temperatures, which negatively impacts aquatic life and water quality. By increasing natural areas planted with native plants, Lake Carroll also increases habitat for birds, mammals, butterflies, and amphibians.

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East Fork Creek Watershed
Lake Carroll Best Management Practices:

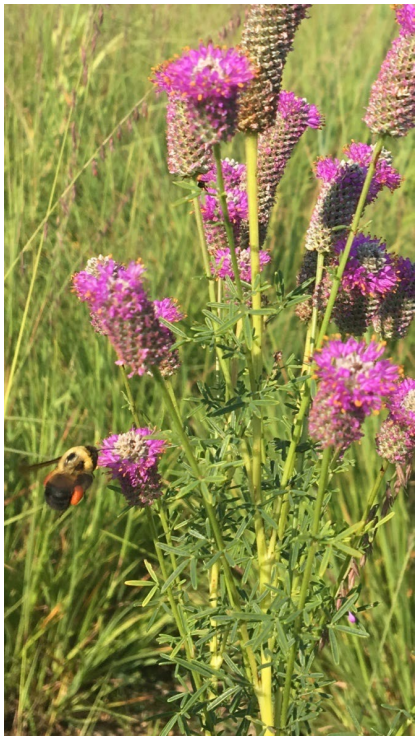
Native Plantings

In 2015 the Metropolitan Water Reclamation District compared the runoff coefficient between impervious surfaces (ie. asphalt parking lots, concrete sidewalks, etc.) to other permeable surfaces like native plantings and porous pavement. The runoff coefficient (C) relates the amount of runoff to the amount of precipitation. A larger value in C means lower infiltration rates and higher runoff. They found that while impervious surfaces have a runoff coefficient of .90, areas planted with native plants has a much lower C of .15.

Table 5-2. Runoff Coefficients (C Values) for the Rational Method

Surface Type	Runoff Coefficient, C
Impervious area (Roads, roofs, sidewalks, etc.)	0.90
Pervious Area	0.45
Gravel (loose, unbound)	0.75
Water Surface (open water)	1.00
Native Plantings	0.15
Wetlands	0.79
Synthetic Turf Fields	0.75
Green Infrastructure:	
Pervious Surfaces (Porous Asphalt, Pervious Concrete, Permeable Pavers)	0.75
Bioswale	0.10
Rain Garden	0.10
Green Roof	(Refer to Table 5-9)

(MWRD, 2015)



Native plants can be utilized in many of the recommended best management practices for Lake Carroll, including vegetated swales, vegetated filter strips, riparian buffer restoration, and floating islands. Native plantings help the East Fork Creek watershed plan goals no matter where they are planted, but they are most beneficial when planted within the path of stormwater.

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