Educational Fliers for Best Management Practices in Rural Areas

East Fork Creek Watershed

Olson Ecological Solutions, LLC

This report was prepared using United States Environmental Protection Agency funds under Section 319 of the Clean Water Act distributed through the Illinois Environmental Protection Agency. The findings and recommendations contained herein are not necessarily those of the funding agencies.

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East Fork Creek Watershed:
Rural Best Management Practices
Grassed Waterways

Grassed waterways, either natural or constructed, are shaped or graded channels that are planted with suitable vegetation for runoff conveyance without causing channel erosion. (EPA BMP Descriptions for STEPL and Region 5 Model 2018).

Clean Water Iowa

Benefits:

- ✓ Conveys runoff from terraces, diversions, and other water concentrations without flooding or erosion
- ✓ Prevents gully formation
- ✓ Protects and improves water quality
- ✓ Provide wildlife habitat, corridor connections, and vegetative diversity

NRCS Wisconsin

With a life span of ten years, some waterways are maintained and improved each year. Existing grassed waterways within the watershed can be improved in order to handle larger storm events. The watershed-based plan will recognize the efforts being taken to maintain these grassed waterways, and implementation projects may include match funding for repairs.

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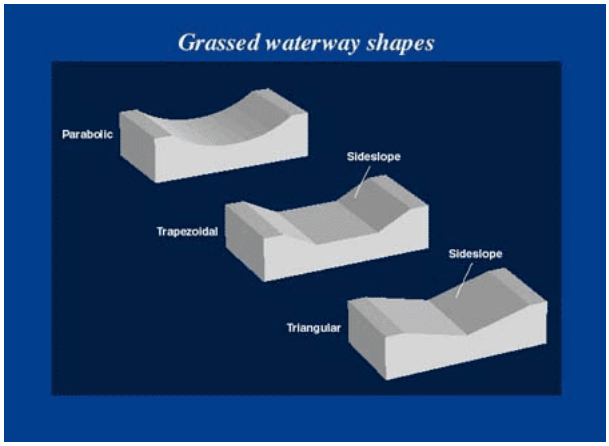
Grassed Waterways

When designing grassed waterways, one must consider slope, vegetative cover, soil conditions and erodibility, channel shape and maintenance (US EPA Agricultural Management Practices for Water Quality Protection). Generally farmers use one of three grassed waterway shapes: parabolic, trapezoidal, or triangular. Many favor the parabolic shape as it is the shape naturally taken in watercourses, an easier shape to visualize and build, and easiest shape to cross with farm equipment. However, small water flows are less likely to meander in parabolic waterways (University of Illinois Extension, *This Land*).



University of Illinois Extension, This Land

Important Resources for planning and designing:

NRCS National Handbook of Conservation Practices
NRCS Engineering Field Handbook

US EPA

When initially installing grassed waterways, it is important to allow for grassed vegetation to establish in order for it to withstand the water velocities it is designed to accommodate. To aid in this process, side diversions can be installed along the sides of the waterway to keep flow out of the channel. Once grass has established, these diversions should be removed. Alternatively, one may utilize rock/fabric checks or mulching.

Conservation Practice Standard: Grassed Waterway, **Code 412**

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East Fork Creek Watershed: Rural Best Management Practices

Ponds & Basins

Ponds and basins are constructed bodies of water created by either excavating an area for water storage or installing a dam across an existing water course (i.e. an existing gully or low-lying area). When installing these ponds and basins, one should ensure compliance with state laws and permits during planning, design, and layout phases. When possible, a pond should be installed with 2 or more specified uses. These intended uses should impact the installation and storage requirement specifications. The stated uses below are not all compatible with each other. It is also recommended that the plan include vegetation to allow for pollution to be filtered out of the water (NRCS Engineering Field Handbook).

NRCS USDA Ohio

Benefits and Uses:

- ✓ Captures runoff water and reduces peak stormwater runoff
- ✓ Reduces stormwater velocity
- ✓ Provides water for livestock or household use
- ✓ Offers irrigation storage
- ✓ Provides water source for pesticide spraying and/or fire protection
- ✓ Allows for recreational uses (fishing, boating, swimming, etc.)
- ✓ Enhances wildlife habitat and/or aesthetic appearance

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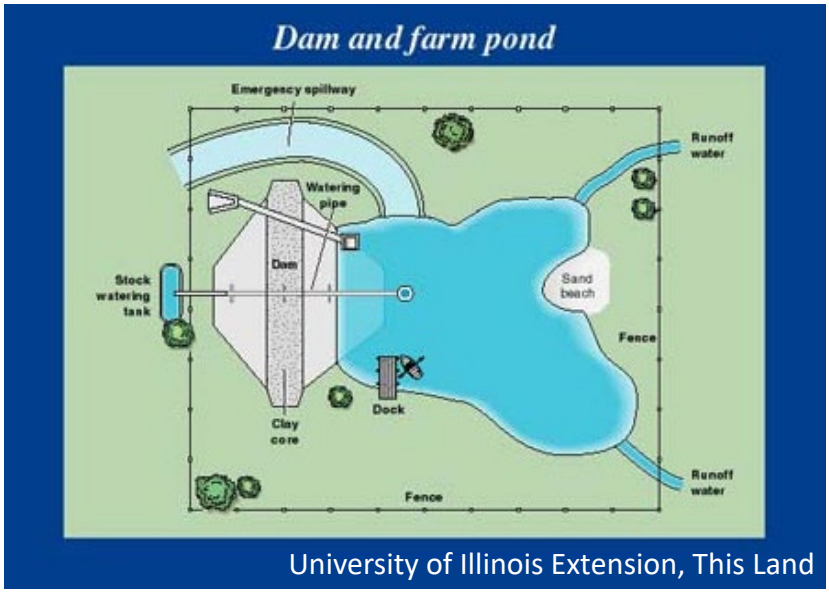
Ponds & Basins

Topography, hydrology, and water storage capacity play key roles in site selection for farm ponds and basins. One should locate a pond where the largest amount of storage capacity exists with the least amount of earthfill. Ideal topography utilizes existing low-lying areas. For instance, an area with a wide and gently sloping basin along with steep banks that come together at the dam site provides ideal water storage and a location for dam construction (thisland.Illinois.edu). Soils surrounding the pond must contain enough clay to ensure a watertight dam as well as to reduce the amount of water seepage through the bottom of the pond. Alternatively, a clay core in the dam center can assist in sealing the dam if there is not enough watertight soil. Installing a pre-fabricated pond liner could also help with minimizing seepage.



University of Illinois Extension, This Land

For more information on installing farms ponds and basins, please see the USDA NRCS Engineering Field Handbook.
Conservation Practice Standard: Pond, **Code 378**

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East Fork Creek Watershed: Rural Best Management Practices

Forest Stewardship

Problem: Current forested lands are choked out by invasive plant species. Invasive plants grow, reproduce, and spread very quickly and eventually choke out native vegetation as they outcompete native plants and fill in the seed bank. Invasive plants are plants from other countries that have been brought over and established in natural areas. Invasives are able to kill off native habitats by spreading aggressively because of the lack of established predators and diseases that normally regulate them in their origin countries. If these invasive species are left unmanaged they have the high potential of taking over natural areas by drowning out native plants, forming a monoculture, decreasing biodiversity, reducing habitat, and negatively affecting the natural ecosystem and its inhabitants. Invasive and weedy trees and shrubs create an overstory that blocks the sun and reduces the potential for native seed germination.

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East Fork Creek Watershed: Rural Best Management Practices

Forest Stewardship

Solution: By clearing invasive/weedy trees and shrubs, the canopy is opened for sunlight to reach the forest floor, which can then foster a healthy environment for establishment of native vegetation. More ground layer vegetation reduces and filters stormwater runoff and stabilizes the soil. Cutting woody stems (via chainsaw, brush cutters, or loppers) and herbicide treatment of stumps is an easy way to clear woody invasive plants and can be conducted at any time of the year. Larger tree clearing projects usually occur in the winter months as frozen grounds help to reduce soil disturbance.

Lake County Forest Preserves

For herbaceous plants, invasive plant management includes manual removal (i.e. hand weeding), mowing (annuals or biennials soon before going to seed), or foliar herbicide application during the growing season. Foliar application is used for aggressive, perennial invasive plants like purple loose-strife, reed canary grass, common and cut-leaved teasel. For more information visit: www.invasive.org/illinois/SpeciesofConcern.html

Conservation Practice Standard: Forest Stand Improvement, **Code 666**

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East Fork Creek Watershed:
Rural Best Management Practices
Dry Dams & Drop Boxes

As a BMP, grade stabilization structures are designed to decrease channel grade (i.e. steepness) or control gully erosion in constructed or natural waterways. Two types of grade stabilization structures in use or of interest to the watershed are:

USDA, NRCS

1. Dry dams
2. Drop boxes

Benefits of Grade Stabilization Structures:

- Stabilize grade
- Reduce erosion
- Improve water quality

Bingapis.com

Recommended Resource: NRCS electronic Field Office Technical Guide (eFOTG)>Illinois> Section IV>Conservation Practices

https://efotg.sc.egov.usda.gov/#/details

USDA, NRCS Iowa

USDA, NRCS

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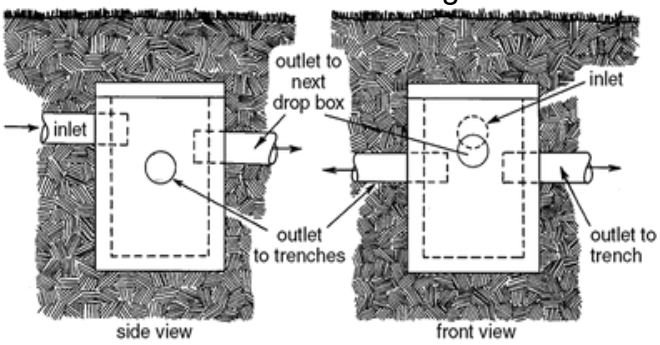
Dry Dams & Drop Boxes

Ag.ndsu.edu



A **drop box**, also known as a culvert inlet, is a rectangular box inlet drop spillway placed at the upstream end of a culvert. These box structures, usually made of reinforced concrete, can be placed where a road intersects an open field/slope and a waterway is causing erosion around the road or sloped area. The box structure collects water into a culvert that carries water under the road to the other side and releases it at grade. This structure allows the water to step down to the elevation of the culvert, which reduces erosion and decreases any potential cutting from the field. A drop box can be built as a part of a new culvert or added into existing culverts. However, if no headwall is present, one must be added. A drop box is advantageous in solving erosion issues in roadside ditches because its weir length can fit in a narrow waterway. Drop boxes do require structurally sound culverts.

Dry dams are dam structures placed in areas that become inundated during rain events, particularly in ravines or other waterways that are steeply sloped. These dam structures allow water to back up behind it. A culvert pipe should be installed to slowly let water pass through the dam. This structure is permanent, but only holds water when it rains. This structure can help to reduce water velocity and water force, thus decreasing erosion.

Conservation Practice Standard: Grade Stabilization Structure, **Code 410**

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East Fork Creek Watershed: Rural Best Management Practices

Stabilize Highly Erodible Land

According to the Food Security Act of 1985, USDA program participants who farm fields that are designed as Highly Erodible Land (HEL) are required to control sheet and rill erosion and wind erosion, control all ephemeral gullies, and maintain wetlands. If farmers do not control this erosion, they can risk losing USDA farm program benefits and crop insurance eligibility. The Natural Resources Conservation Service (NRCS) randomly selects HEL fields to perform compliance reviews to verify that erosion is sufficiently controlled (USDA, Iowa NRCS. "Conservation Choices: Controlling Ephemeral Gullies." Oct 2018).Ephemeral gullies are eroded channels cutting into the soil that form in natural concentrated flow areas due to the erosive nature of flowing water. There are many different types of conservation practices (BMPs)that can aid in reducing this type of erosion on HEL: Grassed Waterways, Terraces, Water and Sediment Control Basins (WASCOBs), Critical Area Planting, Cover Crops, and No-Till.

USDA, NRCS. Ephemeral gullies and rill erosion.

NRCS Ohio

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East Fork Creek Watershed: Rural Best Management Practices

Stabilize Highly Erodible Land

When deciding on which conservation practice to enlist for stabilizing HEL and preventing ephemeral gullies, a primary factor to consider is the size and slope of the watershed. The steeper the slope and the larger the watershed results in the need for a more efficient conservation practice.

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East Fork Creek Watershed: Rural Best Management Practices

Streambank Stabilization

Streambank stabilization, or streambank and shoreline protection, is the process of employing methods that protect and stabilize banks of streams, shorelines of lakes, reservoirs, or estuaries, and constructed water channels. These methods are employed on banks that are particularly susceptible to erosion and siltation.

NRCS Iowa

NRCS Iowa

A channel is considered stable if the bottom of the channel remains at a relatively consistent elevation over long periods of time. Methods of protecting and stabilizing banks include altering channel capacity, installing riprap lining (use of stones and rocks to armor banks against water's force), vegetating the banks and channel, and creating channel crossing for livestock.

NRCS Vermont

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Streambank Stabilization

In order to implement these streambank stabilization methods, it is important to identify the causes of streambank erosion and instability through shoreline site assessments. Potential causes of shoreline instability include watershed alterations (which can modify discharge and sediment amounts), in-channel modifications such as gravel mining, livestock access, water level fluctuations, and boat-generated waves.

Benefits:

- ✓ Reduces the negative effects of sedimentation, both on-site and downstream, resulting from bank erosion
- ✓ Prevents the loss of land or destruction of land uses or facilities near the waterway
- ✓ Helps to maintain the flow capacity of the waterway
- ✓ Improves stream corridor for fish and wildlife habitat and recreational uses
- ✓ Enhances aesthetics

Conservation Practice Standard: Streambank and Shoreline Protection, **Code 580**

NRCS USDA

NRCS Georgia

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Filter Strips

A filter strip is an area or strip of permanent, herbaceous vegetation for removing organic matter, sediment, and other pollutants from runoff before it enters water sources or water bodies. Filter strips are installed in environmentally sensitive areas that need protection from contaminated runoff.

Conservation Practice Standard: Filter Strips, **Code 393**

Benefits:

- ✓ Reduces suspended solids and other pollutants in runoff
- ✓ Reduces excessive sediment in waterways
- ✓ Decreases dissolved contaminant loadings in runoff

NRCS Georgia

NRCS USDA

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East Fork Creek Watershed: Rural Best Management Practices

Filter Strips

Design Considerations: Filter strips should be planted cross-slope or on the contour downhill from the source of contamination. They should be wide enough to accomplish intended purposes. According to the NRCS Conservation Practice Standard, filter strip width should be based on a 15 minute flow through time determined not to exceed a 30 minute flow through time.

Species Considerations: Plant species should be adapted to climate and soil of the planting site and have a moderate to aggressive establishment rate in order to inhabit the site quickly. Chosen plants should also be able to tolerate polluted runoff, sediment deposition, and herbicide runoff. Ideally, selected plant species could have stiff stems and a high stem density close to ground surface.

Operation/Maintenance Considerations: In order to maintain the filter strip's filtering capacity, filter strip vegetation should be harvested and removed at appropriate times. Harvesting and removing dead vegetation will improve vigor and density of vegetation, remove pollutants absorbed in plant tissue, and aid in maintaining upright growth habit. Periodically it may be necessary to regrade or reestablish filter strip vegetation when sedimentation jeopardize the filter strip's function.

NRCS Iowa

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East Fork Creek Watershed:
Rural Best Management Practices
Reduced Tillage

Tilling the soil with conventional plow-based systems leaves the soil vulnerable to erosion and intensifies agricultural runoff. Many farmers have been turning to more conservative tillage practices to reduce negative impacts. Reduced tillage as a BMP is the process of utilizing any tillage practices that are less intensive or aggressive than conventional tillage. For example, if a tillage process that requires less energy per unit area replaces a conventional tillage process, then the farmer has achieved reduced tillage. The term reduced tillage sometimes implies conservation tillage, but conservation tillage systems require farmers to cover 30 percent of the soil surface with residue after planting (EPA BMP Descriptions for STEPL and Region 5 Model 2018).

Photo credit: Jason Johnson, NRCS-Iowa. A no-till planter plants soybeans into a terminated cover crop

No till is already occurring throughout the entire East Fork Creek watershed on all farms when crops are rotated from beans to corn, corn to beans, or beans to beans. When rotating corn to corn, no till processes are difficult due to yield loss, rut formation, and periodic implementation of conventional tilling. Some producers have learned to overcome these difficulties. It is recommended to learn how to perform continuous no till from other producers who have had success, since periodic conventional till negates some of the benefits.

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Reduced Tillage

Currently plans are being made to bring in some farmers who have seen success with no till practices. For instance, Cade Bushnell, a farmer in Ogle County, has preserved soil integrity and developed successful methods for consistent no till that have improved his overall farming operations and yields.

Conservation Practice Standard: Residue and Tillage Management, **Code 345**

Positives:

- ✓ Reduces soil erosion (in some cases by 70-100%)
- ✓ Reduces polluted runoff flow into water bodies
- ✓ Improves soil health and structure & reduces soil compaction
- ✓ Conserves water
- ✓ Decreases fuel by 50-80% and labor costs by 30-50%
- ✓ Sequesters carbon

Negatives:

- ✓ Transition from conventional to no till is difficult
- ✓ Requires pricey equipment (i.e. specialized no-till seeding equipment)
- ✓ Increases reliance on herbicide (alternatively farmers can use cover crop and crop rotation to aid in weed management)
- ✓ Causes unexpected shifts in weeds, disease, or pest prevalence
- ✓ Potentially slows germination and reduces yields

(Huggins, David & Reganold, John. "No-Till: The Quiet Revolution." *Scientific American Inc*. 2008, pp. 70-77.)

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