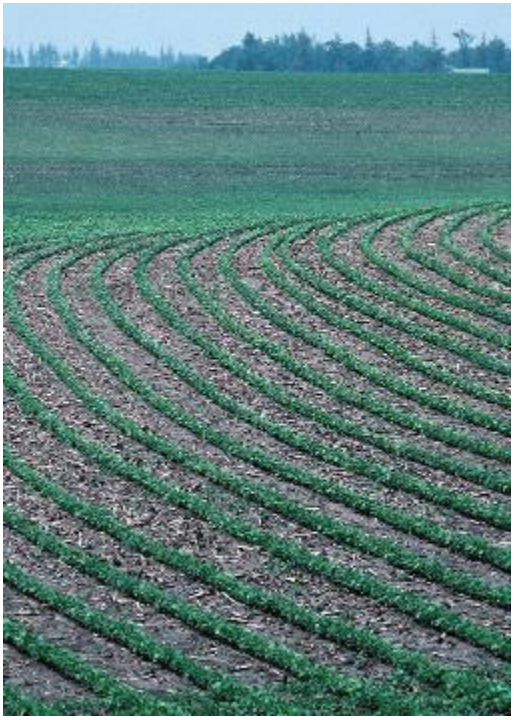
Contour farming

Definition: Tilling and planting across the slope, following the contour of the land, as opposed to farming up and down hills.

How this practice works: Farming on the contour creates small ridges that slow runoff water, and it increases the rate of water infiltration, reduces the hazard of erosion, and redirects runoff from a path directly downslope to a path around the hillslope. Farming on the contour rather than up and down the slope reduces fuel consumption and is easier on equipment.

- Contour farming is often used in combination with other practices, such as terraces, water- and sediment-control basins, and stripcropping.
- Longer, steeper slopes may require stripcropping rather than just contour farming, which is less effective in preventing excessive erosion on the steeper or longer slopes.
- Irregular slopes may require more than one key contour line. Some fields may be too steep and/or irregularly shaped for contour farming.
- Strips of row crops should be roughly the same width as strips of hay or small grain crops. The desirable acreage of row crops should be considered. Hay strips will rotate to row crops over time. The width of the strip depends on slope, equipment, and management.
- A hand level or contour gauge can be used to establish a key line around the hill.
- All tillage and planting operations should be parallel to the key contour line.
- Rotating strips from corn to legumes allows corn to use the nitrogen added to the soil by the legumes.
- Herbicide carryover may be a problem.
- Replacing end rows with grasses or legumes reduces the hazard of erosion and makes turning equipment easier.
- Grassed waterways are needed where runoff concentrates.
- The grade of the contour key line generally should not exceed 2 percent. Within 100 feet of an outlet (i.e., a waterway), however, the grade can be 3 percent.
- Where curves in contour lines are too sharp for farm equipment, grass strips may serve as sites where the equipment can turn.

How this practice helps: Contour farming can reduce soil erosion by as much as 50 percent compared to farming up and down hills. It promotes better water quality by controlling sedimentation and runoff and increasing the rate of water infiltration.



Contour farming in northeast Iowa (NRCS Photo Gallery NRCSIA99176)

References:
"Core4 Conservation Practices Training Guide," USDA, NRCS, 1999
"Contour Farming and Stripcropping," USDA, NRCS, Wisconsin
http://www.wi.nrcs.usda.gov/programs/solutions/stripcropping.html
NRCS Photo Gallery, USDA, NRCS

Contour stripcropping

How this practice works: Contour stripcropping is used with contour farming. Crops are arranged so that a strip of meadow or small grain is alternated with a strip of row crops. Not more than half of a field can be planted to row crops. Meadow slows runoff, increases the rate of water infiltration, traps sediment, and provides surface cover. Ridges formed by contoured rows slow waterflow and reduce the hazard of erosion. Rotating the strips from corn to legumes allows nutrient-needy crops to benefit from the nitrogen added to the soil by the legumes. Contour stripcropping combines the beneficial effects of contouring and crop rotation. It may be combined with terraces to provide additional erosion control and stormwater management.

How this practice helps: Contour stripcropping can reduce soil erosion by as much as 50 percent compared to farming up and down hills. The cost of fertilizer can be reduced if legumes, such as alfalfa or clover, are planted in the meadows. Contour stripcropping improves water quality by controlling sedimentation and runoff and increasing the rate of water infiltration.

Alternating strips of alfalfa and corn grown on the contour in northeast Iowa (NRCS Photo Gallery NRCSIA99355)

Aerial view of contour stripcropping in central Wisconsin (NRCS Photo Gallery NRCSUT03035)

Contour stripcropping

Reference:
Farmland Protection Program NEPA Documents, Appendix B FPP Practice Effects: Practice Photos, Descriptions and Network Diagrams, USDA, NRCS

Cover crops

Definition: Growing a crop of grass, small grain, or legumes primarily for seasonal protection and soil improvement.

How this practice works: Cover and green manure crops, including cereal rye, oats, clover, hairy vetch, and winter wheat, are grown on cropland and in orchards, vineyards, and certain recreation and wildlife areas to temporarily protect the ground from wind erosion and water erosion during times when the land is not adequately protected. These crops are usually plowed under or desiccated to accommodate the primary crop being produced on the site.

How this practice helps: Cover crops are used to control erosion, improve fertility by adding organic matter to the soil, trap nutrients, improve soil tilth, improve water infiltration and aeration in the soil, and control weed competition. These crops also are designed to increase bee populations for pollination purposes. They have beneficial effects on water quantity and quality. Cover crops also filter sediment, pathogens, and dissolved and sediment-attached pollutants.

A cover crop in an orchard (NRCS Photo Gallery NRCSCA01010)

A cover crop in a field in Black Hawk County, Iowa (NRCS Photo Gallery NRCSIA99177)

References:
"Core4 Conservation Practices Training Guide," USDA, NRCS, 1999
Farmland Protection Program NEPA Documents, Appendix B FPP Practice Effects: Practice Photos, Descriptions and Network Diagrams, USDA, NRCS
NRCS Photo Gallery, USDA, NRCS

Grassed waterways

Definition:A grassed waterway is a natural or constructed channel that is shaped or graded to carry surface water at a nonerosive velocity to a stable outlet. The required dimensions are those needed for the waterway to convey runoff from the design storm, generally the 10-year, 24-hour storm. The grassed waterway is designed to ensure that the velocity of runoff water is not excessive.

How this practice works: The primary purpose of a grassed waterway is to convey runoff from terraces, diversions, or other areas of water concentration without causing erosion or flooding. Another purpose is to improve water quality. Grassed waterways are natural drainageways that are graded and shaped to form a smooth, bowl-shaped channel. They are seeded to sod-forming grasses. Runoff water that flows down the drainageway flows across the grass rather than tearing away soil and forming a larger gully. An outlet is commonly installed at the base of the drainageway to stabilize the waterway and to keep a new gully from forming.

The most critical time for successful installation of a grassed waterway is immediately following construction, when the channel is bare and unprotected from runoff. Waterways are generally planted to perennial grass and then mulched with straw. In some areas silt fences or straw bales in the waterway reduce the velocity of the runoff, thereby reducing the risk of gully formation in the new waterway.

How this practice helps: A grassed waterway provides a vegetative strip that benefits the environment in several ways in addition to the primary benefit of providing a nonerosive waterway. These additional benefits include diversity of wildlife habitat, corridor connections, vegetative diversity, noncultivated strips of vegetation, and improved esthetics. An additional grassed width on each side of the grassed waterway allows the waterway to better serve as a conservation buffer.

Functions: The primary function of a grassed waterway is to transport water and sediment. Nearly all grassed waterways are located topographically so that runoff enters the waterways either as sheet or concentrated flow. Because of high water velocities, little or no sediment deposition occurs within the waterway. Therefore, suspended sediment entering the grassed waterway will most likely exit the waterway at its outlet to the possible detriment of the receiving water body. The function of a grassed waterway is not to reduce sediment loading in runoff. Providing enough additional grassed width on each side of the waterway to serve as filter strips, however, reduces the sediment load entering the waterway and thus enhances the quality of water bodies.

A grassed waterway in Fayette County, Iowa (NRCS Photo Gallery NRCSIA99447)

Grassed waterways in a corn field in northeast Iowa (NRCS Photo Gallery NRCSIA99509)

Rock checks installed to reduce runoff velocity in a waterway in St. Clair County, Illinois (Office photo StC1000)

A seeded and mulched grassed waterway in St. Clair County, Illinois (Office photo StC1001)

References:
"Core4 Conservation Practices Training Guide," USDA, NRCS, 1999
Farmland Protection Program NEPA Documents, Appendix B FPP Practice Effects: Practice Photos, Descriptions and Network Diagrams, USDA, NRCS
NRCS Photo Gallery, USDA, NRCS

Terraces

How this practice works: Terraces break long slopes into shorter ones. They generally follow the contour. As water makes its way down a hill, terraces serve as small dams that intercept and guide the water to an outlet. There are two basic types of terraces: storage terraces and gradient terraces. Storage terraces collect water and store it until it can infiltrate into the ground or be released through a stable outlet. Gradient terraces are designed as a channel to slow runoff water and carry it to a stable outlet, such as a grassed waterway.

How this practice helps: Terraces improve both water quality and soil quality. Terraces with grassed frontslopes or backslopes can provide nesting habitat and other cover for wildlife.

Grassed-back terrace in Iowa (NRCS Photo Gallery NRCSIA03005)

Contour terraces in Kansas (NRCS Photo Gallery NRCSKS02026)

Reference:
NRCS Photo Gallery, USDA, NRCS

Buffer strips

How this practice works: Conservation buffers are areas or strips of land where a permanent cover of vegetation is maintained to help control pollutants and manage other environmental problems. Buffer vegetation may produce alternative commodities to diversify farm income. These include lumber, fuel wood, fiber, hay, seeds, and ornamental, medicinal, and food products.

How this practice helps: Buffers are strategically located on the landscape to accomplish many objectives. They reduce the hazard of erosion by slowing the velocity of water or wind, trap sediment or other pollutants, and may provide wildlife habitat. Following is a description of 10 different kinds of buffers.

Alley cropping

Alley cropping is the planting of trees or shrubs in two or more sets of single or multiple rows with agronomic, horticultural, or forage crops cultivated in the alleys between the rows of woody plants. Alley cropping is used to enhance or diversify farm products, control surface runoff and wind and water erosion, improve the utilization of nutrients, improve crop production by modifying the microclimate, increase the diversity of wildlife habitat, and enhance the beauty of the area.

Contour buffer strips

Contour buffer strips are strips of perennial vegetation alternated with wider cultivated strips that are farmed on the contour. Contour buffer strips slow runoff and trap sediment. The amount of sediment, nutrients, pesticides, and other contaminants in runoff is reduced as the runoff passes through the buffer strips.

Grassed contour buffer strips in Iowa (NRCS Photo Gallery NRCSIA00031)

Cross wind trap strips

Cross wind trap strips are areas of herbaceous plants that are resistant to wind erosion and as nearly as possible are grown perpendicular to the prevailing wind direction. These strips catch wind-borne sediment and other pollutants, such as nutrients and pesticides, from the eroded material before it reaches water bodies or other sensitive areas. They filter the wind-borne material.

Field borders

Field borders are bands or strips of perennial vegetation established on the edge of a cropland field. They help to control sheet, rill, and gully erosion at the edge of fields; trap sediment, chemicals, and other pollutants; are turning areas for farm equipment; and provide habitat for wildlife.

A field border in Iowa (NRCS Photo Gallery NRCSIA99192)

Filter strips

Filter strips are areas of grass or other permanently established vegetation used to reduce the amount of sediment, organic material, nutrients, pesticides, and other contaminants from runoff and to maintain or improve water quality. They slow the velocity of water, filter suspended soil particles, and increase infiltration of runoff and soluble pollutants and adsorption of pollutants on soil and plant surfaces.

Conservation filter strips in Illinois (NRCS Photo Gallery NRCSIL00018)

Grassed waterway/vegetated filter

A grassed waterway/vegetated filter system is a natural or constructed vegetated channel that is shaped and graded to carry surface water at a nonerosive velocity to a stable outlet. It spreads the flow of water before the water enters a vegetated filter.

Herbaceous wind barriers

Herbaceous wind barriers consist of tall grasses and other nonwoody plants established in one- to two-row, narrow strips spaced across the field, perpendicular to the normal wind direction. These barriers reduce wind velocity across the field and intercept wind-borne soil particles.

Riparian forest buffers

Riparian forest buffers are areas of trees and shrubs adjacent to streams, lakes, ponds, and wetlands. They intercept contaminants from surface runoff and shallow subsurface waterflow.

Buffers along a stream in an area of rangeland in California (NRCS Photo Gallery NRCSCA00026)

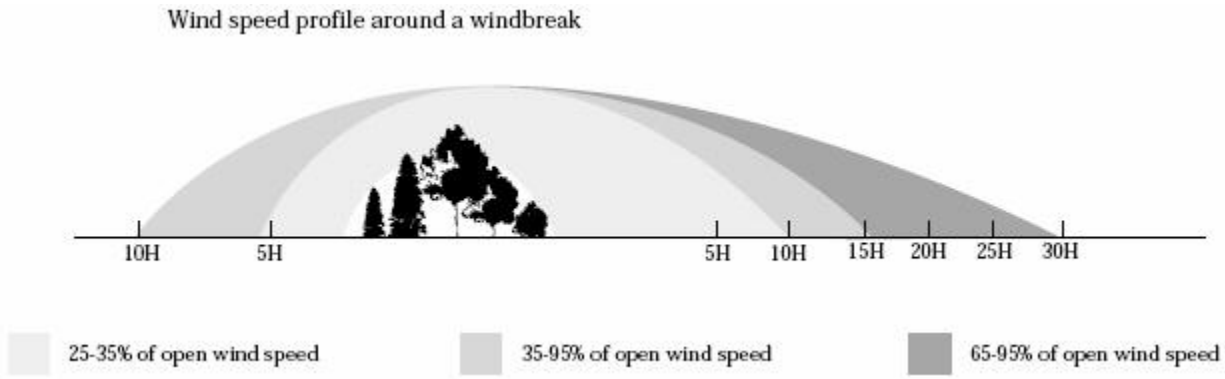
Vegetated barriers

Vegetated barriers are areas of narrow, permanent strips of stiff-stemmed, erect, tall, dense perennial plants established in parallel rows and perpendicular to the dominant slope of the field. These barriers provide help to control water erosion on cropland and offer an alternative to terraces where the soil might be degraded by terrace construction.

Windbreaks or shelterbelts

Windbreak or shelterbelts consist of a single row or multiple rows of trees or shrubs that protect the soil from wind erosion, protect sensitive plants, manage snow, improve irrigation efficiency, protect livestock and structures, and create or enhance wildlife habitat.

Field windbreaks in North Dakota (NRCS Photo Gallery NRCSND99001)



Wind speed profile around a windbreak

References:
"Core4 Conservation Practices Training Guide," USDA, NRCS, 1999
NRCS Photo Gallery, USDA, NRCS