

West Virginia Best Management Practices
of
Conservation Practice Standards

**WEST VIRGINIA CONSERVATION AGENCY
NATURAL RESOURCES CONSERVATION SERVICE**



**THE BEST MANAGEMENT PRACTICE IS THE
PRACTICE OF COMMON SENSE.**

2nd Edition

The Watershed Resource Center is dedicated to protecting and improving the quality of life of residents in their watersheds through natural resource management.

Produced and distributed by the Watershed Resource Center (WRC), of the West Virginia Conservation Agency, with cooperation from the USDA NRCS. Funding is provided through Section 319 from the US EPA, WV DEP and WVCA.

"West Virginia's nonpoint source program does not discriminate on the basis of race, color, national origin, gender, or handicap."

Photographs included in this document provided by:
West Virginia Department of Environmental Protection
West Virginia Conservation Agency
Watershed Resource Center
USDA Natural Resources Conservation Service

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INTRODUCTION

This book is a guide to many of the agriculture best management practices (BMPs) available to landowners to reduce nonpoint source impacts on water quality. Nonpoint source pollution is:

- ✦ Water contamination that occurs when rainwater, snow, or ice melt washes over the land or seeps through the ground, picking up pollutants and depositing them in rivers, lakes, or streams.

Agricultural nonpoint source pollution can include excess fertilizers, pesticides, bacteria, and nutrients from livestock waste, or sediment resulting from erosion of crop or pasture lands. The primary water quality benefits that are achieved through properly installing and maintaining BMPs include:

- ✦ The reduction of soil erosion and sedimentation.
- ✦ The reduction of nutrients and bacteria from animal manures and chemical fertilizers.
- ✦ The reduction of chemical pollutants from pesticides and herbicides.

This book is not, nor intended to be, all-inclusive. Many times, farmers can use common sense approaches and remedies or newly researched practices, not listed here, to deal with nonpoint source pollution. In addition, not every practice is applicable to the nonpoint source water quality issues specific to your farm. This book provides general information on agriculture BMPs. It is not intended to explain how specific practices are to be installed.

Nearly all of the BMPs listed in this book have management and/or economic benefits to the farmer in addition to their water quality benefits. Properly installed or managed BMPs often result in improvements related to:

- ✦ Soil fertility
- ✦ Conservation of moisture
- ✦ Reduced tendency for soil compaction
- ✦ Improved crop or forage yield due to better soil productivity
- ✦ Decreased costs for chemical fertilizers, pesticides, and herbicides
- ✦ Prevention of loss of farmland due to streambank erosion
- ✦ Improved soil tilth
- ✦ Increased organic matter and soil organisms
- ✦ Improved wildlife and fish habitat

These documents provide guidance on how the application of that practice will affect the resources (soil, water, air, plants, animals, and human) and the resource concerns associated with each of these resources.



This book is not inclusive –
visit the <http://www.nrcs.usda.gov/technical/standards/nhcp.html>

The National Handbook of Conservation Practices

For a complete list and updates to these practices or
new conservation practice standards.

Additional information including design criteria
and specifications is available from your
local Natural Resources Conservation Service (NRCS) Field Office at:

<http://www.wv.nrcs.usda.gov/contact/index.html>

or Conservation District Office in your county at:

<http://www.wvca.us/districts.cfm>



West Virginia Best Management Practices of Conservation Practice Standards

Can also be found in its entirety on the web at: www.wvca.us/wvwrc/

ACCESS ROAD



WATER QUALITY BENEFITS

Properly constructed and maintained Access Roads protect water quality by reducing soil erosion. An access road is a travel way included in a conservation plan to provide a safe, fixed route of travel for moving livestock, equipment, products, and supplies. The practice applies to roads that provide access for proper management of the farm, including operation and maintenance of conservation practices. The roads also provide access to farms, specific fields, woodlands, recreation areas and various kinds of structures.

PRACTICE INFORMATION

Access Roads are designed to serve a specific purpose(s) and accommodate a specific type(s) of vehicle or equipment. Visual resources and environmental values shall be considered in planning and designing the road or system of roads. Access Roads range from seldom used trails constructed for fire protection to all-weather roads used by the public and built to very high standards. Where general public use is anticipated, roads are designed to meet applicable criteria established by appropriate national, state or local agencies. Roads are planned and designed to assure maintenance requirements are in line with operating budgets of the enterprise. In addition to planning for the intended use, the following criteria are considered:

- ✦ Control and disposal of water
- ✦ Erosion control
- ✦ Include scenic vistas when possible
- ✦ Follow natural contours when possible
- ✦ Consider pollution hazards
- ✦ Road surface treatment in line with us
- ✦ Safe entry on public roads

ANIMAL TRAILS & WALKWAYS



WATER QUALITY BENEFITS

Properly constructed and maintained animal trails and walkways protect water quality by reducing soil erosion. Animal trails and walkways provide a travel lane through difficult or ecologically sensitive terrain.

PRACTICE INFORMATION

This practice is installed on grazing lands as part of a conservation plan to accomplish one or more of the following:

- ✦ Improve access to forage, water and /or shelter. Improve grazing efficiency and distribution
- ✦ Divert travel away from ecologically sensitive and/or erosive sites.

Trails or walkways are often needed where animal movement is impeded or restricted because of steep rough terrain, rock outcrops, dense vegetation, water, etc.

Practice criteria :

- ✦ The structures will be wide enough for livestock movement and vehicles.
- ✦ Soil erosion will be minimized during construction.
- ✦ Supporting structures for water management will be provided.
- ✦ Walkways will be constructed based on normal high water levels. Walkway borrow pits will be staggered to provide access to grazing areas on either side of the structure.

CHANNEL VEGETATION



WATER QUALITY BENEFITS

Properly constructed and maintained Channel Vegetation protects water quality by reducing soil erosion, protecting nutrients, and allowing infiltration of bacteria from animal waste. Channel Vegetation is establishing and maintaining adequate plants on channel banks, berms, spoil, and associated areas.

PRACTICE INFORMATION

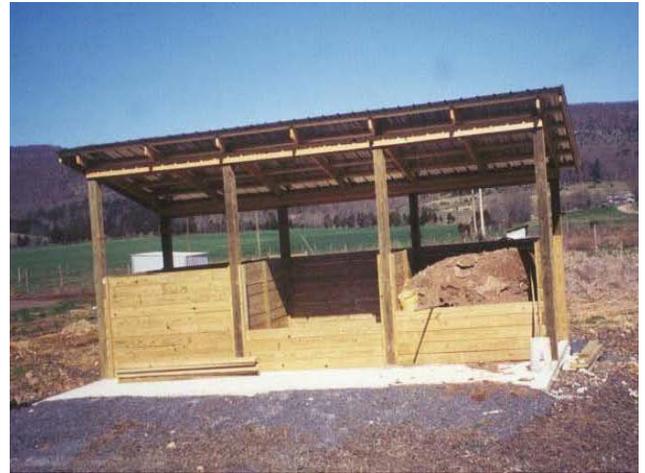
The purpose of the practice is to stabilize channel banks and adjacent areas to reduce erosion and sedimentation and to enhance the environment through aesthetics and fish and wildlife habitat improvements. Channel Vegetation applies to channels, streams, and ditches where construction activities destroyed existing vegetative cover. In addition to reestablishing a protective cover, this practice also involves identification and preservation of desirable trees and other species of plants already on the site. It may also involve special techniques for establishing and maintaining vegetation near inlets, outlets, or other appurtenances.

COMPOSTING FACILITY

WATER QUALITY BENEFITS

A properly constructed and maintained Composting Facility protects water quality by reducing soil erosion, protecting nutrients, and allowing infiltration of bacteria from animal waste. A Composting Facility is installed for biological stabilization of waste organic material.

COMPOSTING FACILITY



PRACTICE INFORMATION

The purpose of this practice is to biologically treat waste organic material and produce humus-like material that can be recycled as a soil amendment or organic fertilizer. The material may also be used by other acceptable methods of recycling that comply with laws, rules and regulations. Composting is accomplished by mixing an energy source (carbonaceous) with a nutrient source (nitrogenous) in a prescribed manner to meet aerobic bacteria requirements. Correct proportions of ingredients are essential to minimize odors and avoid pest problems. Waste material for composting may include livestock and poultry manure, dead animal carcasses, and food processing material when it is considered part of a normal farm operation. This practice applies where:

- ✦ Waste organic material is generated by agriculture production or processing
- ✦ Composting is needed to manage the waste organic material properly
- ✦ An overall waste management system has been planned that accounts for the end use of the composted material.

Aerated wind rows - Suited for large volumes of organic material managed by power equipment used to periodically turn the composting material. **Static piles** - The material is initially mixed into a homogeneous mixture that has the proper moisture content and bulk density to facilitate air movement throughout the pile without periodically turning the material. Forced air might be necessary to facilitate the composting process.

CONSERVATION COVER



WATER QUALITY BENEFITS

Properly installed and maintained Conservation Cover protects water quality by reducing soil erosion. Conservation Cover involves establishing and maintaining a protective cover of perennial vegetation on land retired from agriculture production.

PRACTICE INFORMATION

This practice reduces erosion, associated sedimentation, improves water quality, and creates or enhances wildlife habitat. Conservation Cover applies to land retired from agriculture production. Generally, this involves land under contract in a land retirement program but does not exclude land retired for other reasons. The practice does not apply to planting vegetation for forage production or on critical eroding sites being protected with vegetative cover. In selecting plant species for this practice, it is important to consider long term land use objectives. If wildlife is a consideration, adapted species are usually available that can serve more than one objective.

CONSERVATION CROP ROTATION

WATER QUALITY BENEFITS

Properly implemented and maintained Conservation Crop Rotation protects water quality by reducing soil erosion. Conservation Crop Rotation means growing various crops on the same piece of land in a planned sequence. This sequence may involve growing high residue producing crops such as corn or wheat in rotation with low residue producing crops such as vegetables or soybeans. The rotation may also involve growing forage crops in rotation with various field crops.

CONSERVATION CROP ROTATION



PRACTICE INFORMATION

The effects crop rotation have on the land varies with the soil type, crops produced, farming operations, and how the crop residue is managed. The most effective crops for soil improvement are fibrous rooted, high residue producing crops such as grass and small grain. Perennial plants used for forage are very effective in crop rotations due to increases in organic matter and reduced soil erosion. In addition, crop rotations help break insect, disease, and weed cycles. Thereby reducing the need for the use of pesticides. Rotations add diversity to farm operations and often reduce economic and environmental risks. Crop rotation is a low cost practice that often forms the basis for other conservation practices. Practices such as residue management, contouring, stripcropping, diversions, terraces, and grassed waterways may not function properly without a planned crop rotation.

Major benefits include:

- ✦ Reduced runoff and erosion
- ✦ Increased organic matter
- ✦ Improved soil tilth
- ✦ Reduction of pests
- ✦ Fewer chemicals needed
- ✦ Better moisture efficiency
- ✦ Higher yields
- ✦ Improved aesthetics and wildlife habitat
- ✦ Better nutrient utilization

CONSTRUCTED WETLAND



WATER QUALITY BENEFITS

A Constructed Wetland is designed to simulate natural wetlands, and to reduce the pollution potential of runoff and wastewater from agricultural lands to water resources.

CONDITIONS WHERE PRACTICE APPLIES

- ✦ Where a Constructed Wetland is a component of a planned conservation system or agricultural waste management system.
- ✦ Where wastewater or runoff originates from agricultural lands including livestock or aquaculture facilities.
- ✦ Where a Constructed Wetland can be constructed, operated, and maintained without polluting air or water resources.

LAWS AND REGULATIONS

All federal, state, and local laws, rules, and regulations governing the use of Constructed Wetlands must be followed. Constructed Wetlands for waste treatment shall not be designed to discharge to waters of the state unless permitted by state laws and regulations, and appropriate permits have been obtained to do so. In addition, if discharge is permitted, the receiving surface water must have the capacity to assimilate the Constructed Wetland's effluent during low flow periods.



CONTOUR BUFFER STRIPS



WATER QUALITY BENEFITS

Contour Buffer Strips are strips of perennial grass alternated with wider cultivated strips that are farmed on the contour.

PRACTICE INFORMATION

The benefits of farming on the contour with the added protection from the grass strips make contour buffer strips an effective and cost efficient conservation practice. Contour Buffer Strips slow runoff water and trap sediment. Consequently, soil erosion is generally reduced significantly by this practice. Sediments, nutrients, pesticides, and other potential pollutants are filtered out as water flows through the grass strips. The grass strips also provide food and cover for wildlife. The practice is not well suited for undulating terrain with steep irregular slopes where contouring is impractical. The effectiveness of Contour Buffer Strips is dependent on several variables such as steepness, soil type, crops grown, strip widths, management and climatic factors.



CONTOUR FARMING



WATER QUALITY BENEFITS

Properly designed and maintained Contour Farming protects water quality by reducing soil erosion. Contour Farming is performed on sloping cropland by following the natural contours when tilling the soil, planting, and cultivating. It also includes following established grades of terraces or diversions.

PRACTICE INFORMATION

Contour Farming is a very cost effective practice when properly planned and applied. The purpose of this practice is to reduce erosion, control runoff water, and increase moisture infiltration. Contour Farming generally applies to sloping cropland but may be applicable on recreation and wildlife areas where cultural practices such as tillage and planting are used for production of special purpose crops. Properly designed Contour Farming will utilize tillage marks and furrows to slow runoff and allow more moisture to infiltrate. Contour Farming can increase erosion if rainfall amount exceeds the ability of the contours to remove the runoff. Therefore, this practice is usually planned in conjunction with other practices needed for support in the event runoff exceeds the carrying capacity of the contours. To be effective, the contours need to meet certain design criteria. Local standards and specifications generally cover the following items:

- ✦ Alignment requirements when planned and applied with practices such as terraces, diversion, and contour strips.
- ✦ Alignment requirements when Contour Farming is applied without protection from supporting practices.
- ✦ Established tolerances for deviation from true contour, row grade, and row length.

CONTOUR ORCHARD & OTHER FRUIT



WATER QUALITY BENEFITS

Properly constructed and maintained Contour Orchard practices protect water quality by reducing soil erosion. Contour Orchard and other fruit area is the practice of planting orchards, vineyards, or small fruit so that all cultural operations are done on the contour.

PRACTICE INFORMATION

This practice is used on sloping land to conserve and protect soil, water, and related natural resources. Contouring orchards and vineyards is especially helpful in fields where permanent cover has not been established between the rows of plants. Contouring decreases surface runoff and increases infiltration of moisture. The practice also benefits equipment operation, improves aesthetics, and reduces pollution hazards.



CONTOUR STRIPCROPPING



COVER CROP



WATER QUALITY BENEFITS

Contour Stripcropping is growing crops in a systematic arrangement of strips on the contour to reduce soil erosion and improve water quality.

PRACTICE INFORMATION

This practice is used on sloping cropland and certain recreation and wildlife lands where field crops are grown. The crops are arranged so that a strip of grass or close-growing crop is alternated with a clean tilled strip or a strip with less protective cover.

Contour Stripcropping is a multi-purpose practice that has one or more of the following effects:

- ✦ Reduced erosion and runoff
- ✦ Increased infiltration and soil water
- ✦ Improved water quality
- ✦ Improved visual quality of the landscape
- ✦ Improved wildlife habitat



WATER QUALITY BENEFITS

The coverage practice of growing a crop of grass, small grain or legumes is primarily for seasonal protection and soil improvement. This practice will protect water quality by reducing soil erosion if properly constructed and maintained.

PRACTICE INFORMATION

Cover and green manure crops are grown on cropland, orchards, vineyards, and certain recreation and wildlife areas where seasonal benefits of a Cover Crop are needed. These crops are usually plowed under or desiccated to accommodate the primary crop being produced on the site.

This practice is used to control erosion, add fertility and organic material to the soil, improve the soil tilth and increase infiltration and aeration of the soil. In orchards, this practice is also used to increase populations of bees for pollination purposes.

In addition, cover and green manure crops have beneficial effects on water quantity and quality. Cover Crops have a filtering effect on movement of sediment, pathogens, dissolved nutrients, and attached pollutants.



CRITICAL AREA PLANTING



WATER QUALITY BENEFITS

Critical Area Planting is the practice of planting vegetation on critically eroding areas that require extraordinary treatment. Critical Area Planting reduces bacteria from animal waste and reduces erosion of nutrients.

PRACTICE INFORMATION

This practice is used on highly erodible areas that cannot be stabilized by ordinary planting techniques and if left untreated may cause severe erosion or sediment damage. Examples of critical areas include the following:

- ✦ Construction sites with very steep slopes.
- ✦ Agriculture land with severe gullies requiring specialized planting techniques and management.

Erosion control is the primary consideration for plant material selection. However, a broad choice of grass, trees, shrubs, and vines are usually available and adapted for most sites. Wildlife and beautification are additional considerations that influence planning decisions on a site needing this practice. The following decisions must be made when planning this practice:

- ✦ Use of the site following establishment.
- ✦ Species of plants to establish.
- ✦ Methods and rates of planting.
- ✦ Fertilizer, lime and soil amendments.
- ✦ Necessary for establishment and growth of the plants.
- ✦ Mulching requirements.
- ✦ Planting site preparation.
- ✦ Irrigation requirement.
- ✦ Site management following establishment of the vegetation.
- ✦ Mulching requirement.
- ✦ Planting site preparation.
- ✦ Site management following establishment of the vegetation.

DEEP TILLAGE



WATER QUALITY BENEFITS

Deep Tillage is the practice of performing tillage operations below the normal tillage depth to modify the physical or chemical properties of a soil.

PRACTICE INFORMATION

This practice may be applied as part of a conservation management system to support one or more of the following:

- ✦ Fracture restrictive soil layers.
- ✦ Bury or mix soil deposits from wind, water erosion, or flood overwash.
- ✦ Reduce concentration of soil contaminants, which inhibit plant growth.

This practice applies to land having adverse soil conditions which inhibit plant growth, such as compacted layers formed by field operations, restrictive layers such as claypans, overwash, or deposits from wind and water erosion, flooding or contaminants in the root zone. This standard includes tillage operations commonly referred to as deep plowing, subsoiling, ripping or row-till, performed from time to time below the normal tillage depth.

Deep Tillage operations shall be performed when soil moisture is less than 30 percent of field capacity, according to the “feel test” or other acceptable method, at the maximum depth to which the tillage will be done.



DIVERSION



WATER QUALITY BENEFITS

A Diversion is a channel constructed across the slope with a supporting ridge on the lower side. A Diversion protects water quality by reducing soil erosion when properly constructed and maintained.

PRACTICE INFORMATION

The general purpose of a Diversion is to divert excess water from one area for use of safe disposal in other areas. This practice applies to sites where:

- ✦ Runoff damages cropland, grazing land, farmsteads, feedlots, or conservation practices such as terraces or stripcropping.
- ✦ Surface flow and/or shallow subsurface flow caused by seepage is causing damage on sloping cropland.
- ✦ Runoff is excessive and available for use on nearby sites.
- ✦ A Diversion is required to keep clean water from running through areas of animal waste or bare soil to reduce impacts from bacteria with sediment.

The channel may be parabolic, V-shaped, or trapezoidal. The channel grades may be uniform or variable as long as the velocity is nonerosive considering the soil and planned vegetation or lining. The location of the Diversion shall be determined by outlet conditions, topography, land use, farming operations, and soil type. Diversion layout in a cultivated field should be as compatible as practical with modern farm equipment. Diversions must not cause damage. If the outlet is a vegetated area, the vegetation must be established before constructing the Diversion.

FENCE



WATER QUALITY BENEFITS

Fence, when properly constructed and maintained protects water quality by limiting livestock access to streams, reduces bacteria from animal waste, and reduces erosion of nutrients.

PRACTICE INFORMATION

This practice may be applied to any area where livestock and/or wildlife control is needed. A wide variety of types of fencing are available. However, fencing material and construction quality is always designed and installed to assure the Fence will meet the intended purpose and longevity requirements of the farm and landowner. The standard fence is constructed of either barbed or smooth wire suspended by posts with support structures. Other types include woven wire for small animals, electric fence as a cost efficient alternative and suspension fences which are designed with heavy but widely spaced posts and support structures. Things to consider when planning a fence include the following:

- ✦ For ease of maintenance purposes avoid as much irregular terrain as possible.
- ✦ Wildlife movement needs should be considered.
- ✦ State and local laws may apply to boundary fences.
- ✦ Consider livestock handling, watering, and feeding requirements when locating fences.
- ✦ Consider soil erosion potential and feasibility of fence construction when planning fences on steep or irregular terrain.

FIELD BORDER



WATER QUALITY BENEFITS

Field Borders are a strip of perennial grass or shrubs established at or around the edge of a field. Field Borders provide erosion protection by stabilizing the field edge, providing a buffer effect around the perimeter, or at least one side of the field, for improved water quality and other environmental benefits.

PRACTICE INFORMATION

The field containing the border is usually but not necessarily cropland. The border is generally converted from cropland, but may have been covered by trees or other vegetation. Field borders are functional and aesthetically pleasing. Field borders provide both on-site and off-site benefits to soil, water, air, plants, and animals. Multiple objectives including erosion protection, wildlife cover, forage, or pollution control, should be considered when selecting the plant species for the border area of a field.

The major purposes of a field border include the following:

- ✦ Provide erosion protection by stabilizing the field edge(s).
- ✦ Provide a buffering effect around the perimeter or at least one side of the field for improved water quality and other environmental benefits.
- ✦ Reduce competition from trees that may be bordering the field.
- ✦ Provide wildlife food and cover.
- ✦ Provide a protected turn row or travel lane.
- ✦ Improve landscape aesthetics.

FILTER STRIP



WATER QUALITY BENEFITS

A Filter Strip is an area of vegetation established for the purpose of removing sediment, organic material, and other pollutants from runoff and waste water.

PRACTICE INFORMATION

Filter Strips are generally located at the lower edge(s) of a field. This will vary somewhat with land use, topography, and objectives. A Filter Strip removes pollutants from runoff before the material enters a body of water. It also serves as a buffer between water and the fields above the water so that pesticides and other chemicals are not applied directly adjacent or into the water body. Filter Strips also reduce sedimentation of streams, lakes, and other bodies of water. Plant species selected for planting in a Filter Strip requires careful planning. There may be multiple objectives that can be accomplished by proper plant selection. In addition to the above functions, Filter Strips can be designed to provide one or more of the following secondary benefits:

- ✦ Improved fish and wildlife habitat.
- ✦ Improved aesthetics.
- ✦ Improved equipment operations such as field access and turn rows or head lands.
- ✦ Improved recreation opportunities.



FOREST HARVEST MANAGEMENT



WATER QUALITY BENEFITS

Forest Harvest Management reduces erosion from pasture and reduces nutrient runoff by cutting and removing forages from the field as hay, greenchop, or ensilage.

PRACTICE INFORMATION

This practice applies to all land uses where machine harvested forage crops are grown. It is designed to help the farmer optimize the economic yield of forage at the desired quality and quantity. In addition, the practice provides the following functions:

- ✦ Promote vigorous plant growth for improved ground cover and protection from erosion.
- ✦ Soil improvement provided by healthy vigorous plants that increase soil organic matter, root channels, water holding capacity, earth worms, etc.
- ✦ Maintain stand life for the desired time period.
- ✦ Maintain desired species composition.
- ✦ Use forage plants as a nutrient uptake tool to utilize or reduce excess plant nutrients available in the soil.
- ✦ Provide food and cover for wildlife.

The following management concepts are considered in the specifications of this practice:

- ✦ Stage of maturity and harvest interval.
- ✦ Moisture content for cutting silage/haylage as well as baling as hay.
- ✦ Length of cut for silage/haylage.
- ✦ Stubble height maintained for plant health and vigor.
- ✦ Management considerations that help improve wildlife food and cover.

GRADE STABILIZATION STRUCTURE



WATER QUALITY BENEFITS

Grade stabilization structures reduce pollution from sedimentation and controls erosion to prevent the formation or advance of gullies and headcuts. A grade stabilization structure is used to control the grade and head cutting in natural or artificial channels.

PRACTICE INFORMATION

Grade stabilization structures are installed to stabilize the channel grade and control erosion to prevent the formation or advance of gullies and headcuts. The practice is used in areas where structures are necessary to stabilize the site. Grade stabilization structures are not designed to regulate flow or water levels in a channel area. Special attention is given to enhancing fish and wildlife habitat where enhancement is practical. The practice is also helpful in reducing pollution from sedimentation. Grade stabilization structures are located so that the elevation of the inlet of the spillway is set at an elevation that will control upstream headcutting. A wide range of alternative types of structures are available for this practice. An intensive site investigation is required to plan and design an appropriate grade stabilization structure for a specific site.



GRASSED WATERWAY



WATER QUALITY BENEFITS

A Grassed Waterway is a natural or constructed channel established in suitable vegetation for safe water disposal that reduces erosion from adjacent fields and allows for infiltration of bacteria and nutrients.

PRACTICE INFORMATION

Waterways are constructed to convey runoff from terraces, diversions or other concentrated flow areas **where erosion control is needed**.

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 with perennial grass. It is critical during the vegetative establishment period to restrict outside water from flowing through the channel.

Therefore, it may be necessary to delay construction of terraces and/or diversions until the waterway is well established. Another critical consideration is the outlet at the lower end. If water quality or protection of riparian vegetation (streambank) is an issue, the outlet end may need to be widened significantly or another buffer or filtering type practice may be necessary.

In addition, the waterway installation must assure that the runoff from the waterway does not cause gullies and/or overfalls to develop.

Grassed Waterways are multipurpose and provide one or more of the following benefits:

- ✦ Safe disposal of runoff water.
- ✦ Erosion control in concentrated flow areas of a field.
- ✦ Improved water quality.
- ✦ Improved wildlife habitat.
- ✦ Reduced sediment damage.
- ✦ Improved landscape aesthetics.

HEAVY USE AREA PROTECTION



WATER QUALITY BENEFITS

Heavy Use Area Protection is the protection of heavily used areas by establishing vegetative cover, surfacing with suitable materials or installing needed structures.

PRACTICE INFORMATION

Heavy Use Area Protection is a practice used on any land area frequently and intensely used by people, animals, or vehicles. Treatment provided by this practice not only reduces erosion and runoff of animal waste, bacteria, and nutrients, but also addresses other types of natural resource degradation including aesthetics. The prescribed surface treatment is designed to accommodate the specific type of traffic expected to occur. Surface treatment may involve pavement for vehicle traffic or vegetation may provide sufficient protection for people and animal traffic. Impermeable surfaces such as pavement increase runoff. Therefore, provisions for drainage is always considered when planning this practice.



LINED WATERWAY OR OUTLET



WATER QUALITY BENEFITS

A Lined Waterway or Outlet is a structure that reduces erosion by having a resistant lining such as concrete, stone or other permanent material.

PRACTICE INFORMATION

The purpose of the practice is to provide protection to the structure when grass cover would not be sufficient or sustainable. Properly designed linings also control seepage, piping and sloughing or slides.

This practice applies to waterways or outlets that need a lining of nonreinforced, cast in place concrete, rock riprap or similar permanent linings. This practice often becomes necessary when the location is such that people or animals make vegetative protection impractical or when high value property or adjacent facilities warrant the extra cost of this relatively expensive method of protecting a waterway that is ordinarily protected with grass.

The lining material will cover the entire wetted perimeter of the structure. Extra freeboard will be designed into the lining if a protective grass cover cannot be established and maintained immediately above the design high water line.



MANURE TRANSFER



WATER QUALITY BENEFITS

Manure Transfer is a manure conveyance system using structures, conduits, equipment, or appropriate storage that prevents over application of nutrients and bacteria from animal waste.

PRACTICE INFORMATION

The purpose of the practice is to transfer animal manure, bedding material, spilled feed, process waste water and other residues associated with animal production to a treatment facility or to agricultural land for final utilization as a source of organic material.

This practice is only one component to a Manure Management System. Manure Transfer may involve one to several conservation practices such as various types of structures, pipelines, pumps, and even delivery trucks.



MULCHING



WATER QUALITY BENEFITS

Mulching is applying a protective cover of plant residue or other suitable material not produced on the site to the soil surface.

PRACTICE INFORMATION

This practice is used to help control erosion, reduce the need for the use of herbicides, protect crops, conserve moisture, prevent compaction/crusting, reduce the potential for runoff and helps control weeds. The practice is utilized on sites subject to erosion and high runoff that need the additional protection from material brought in from off the site. The material may be manufactured and commercially available or it may be hay or crop residue hauled to the site and applied.

This is a high input practice used primarily on construction sites. However, Mulching is often used in production of specialty crops including grapes, fruit, and vegetables.



NUTRIENT MANAGEMENT



WATER QUALITY BENEFITS

Nutrient Management involves managing the amount, placement, and timing of plant nutrients to obtain optimum yields and minimize the risk of surface and groundwater pollution.

PRACTICE INFORMATION

Nutrient Management may be used on any area of land where plant nutrients are applied to enhance yields and maintain or improve chemical and biological conditions of the soil. The source of plant nutrients may be from organic wastes, commercial fertilizer, legumes, or crop residue. ***The objective is to apply the proper amount of nutrients at the proper time to achieve the desired yield and minimize entry of nutrients into surface and groundwater supplies.***

Planning Nutrient Management involves the following considerations:

- ✦ National, state, and local water quality standards.
- ✦ Sources and forms of plant nutrients available to the farmer.
- ✦ Amounts and timing of nutrients based on soil testing, planned yield and growing season of target plants.
- ✦ Evaluate use of crop rotations that enhance efficiency of nutrient utilization and improve soil tilth.
- ✦ Consider waste storage requirements and land area requirements for proper management of plant nutrients.

PASTURE AND HAY PLANTING



WATER QUALITY BENEFITS

The purpose of Pasture and Hay Planting is to reduce soil erosion by wind and/or water.

PRACTICE INFORMATION

This practice may be applied on cropland, hayland, pastureland, or other agriculture lands where forage production is planned.

This practice is used for one or more of the following purposes:

- ✦ Provide forage for livestock and/or wildlife.
- ✦ Improve or maintain livestock nutrition and/or health.
- ✦ Provide additional forage to fill gaps in a year long forage management program.
- ✦ Provide emergency forage.
- ✦ **Reduce soil erosion**, improve aesthetics, provide wildlife food and cover, **improve water quality** and other environmental benefits.

Plant species recommendations for this practice are based on the following considerations:

- ✦ Climatic conditions such as annual rainfall, growing season days, humidity, and temperature extremes.
- ✦ Site conditions including soil series, soil condition, flooding hazards, drainage, salinity, inherent fertility, slope, toxic elements, and other attributes associated with the specific site.
- ✦ Plant resistance to pests common to the site. Period of growth (cool vs. warm season).

PEST MANAGEMENT



WATER QUALITY BENEFITS

Pest Management is managing weeds, insects, and diseases to reduce adverse effects on plant growth, crop production, and natural resources.

PRACTICE INFORMATION

This practice establishes the minimum acceptable elements of a Pest Management program. It includes appropriate cultural, biological, and chemical controls and combinations thereof. The purpose of the practice is to establish a Pest Management program that is consistent with crop production goals and environmental concerns.

The following are major considerations:

- ✦ Use crop rotations to break up pest cycles.
- ✦ Use hand weeding or spot treatment when appropriate.
- ✦ Use biological control and beneficial insects.
- ✦ Scout fields and apply chemicals at the correct time and dose rate.
- ✦ Consider the effects of repetitive use of the same chemicals on pesticide resistance.
- ✦ Control erosion to reduce runoff and associated pollution.
- ✦ Use field borders and buffer strips to reduce potential for pollution from runoff.
- ✦ Become familiar with common pests including life cycles and learn alternative control techniques.
- ✦ Use chemicals safely, always follow label.
- ✦ Use extreme care in preparing tank mixes and rinsing chemicals from tanks.
- ✦ Assure farm workers are properly trained in safety precautions.

PRESCRIBED GRAZING



WATER QUALITY BENEFITS

Prescribed Grazing minimizes concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff, and erosion.

PRACTICE INFORMATION

This practice may be applied on all lands where grazing and/or browsing animals are managed. Removal of the grazing animals is in accordance with production limitations, plant sensitivities, and management goals. Frequency of defoliations and season of grazing is based on the rate of growth and physiological condition of the plants. Duration and intensity of grazing is based on desired plant health and expected productivity of the forage species to meet management objectives. In all cases, enough vegetation is left to prevent accelerated soil erosion. This practice will manipulate the intensity, frequency, duration, and season of grazing to:

- ✦ Maintain riparian and upland area vegetation.
- ✦ Protect stream banks from erosion.
- ✦ Manage for deposition of fecal material away from water bodies.
- ✦ Promote ecological and economically stable plant communities which meet landowner objectives.

Grazing schedule considerations:

- ✦ Expected forage quality and quantity.
- ✦ Numbers and kinds of animals utilizing available forage.
- ✦ Inventory of all sources of forage and supplemental feed.
- ✦ A grazing schedule for livestock showing periods of grazing, rest, and other activities for all fields and pastures included in the grazing plan.
- ✦ A contingency plan that details potential climatic problems and a guide for adjusting.

RESIDUE MANAGEMENT MULCH TILL



WATER QUALITY BENEFITS

Residue Management Mulch Till reduces erosion by managing crop residue on a year round basis to conserve moisture and maintain or improve soil tilth. Soil slowly but steadily improves when erosion is reduced and organic matter increases. Soil tilth improves and productivity increases as the constant supply of organic material left on the soil surface is decomposed by a healthy population of earth worms and other organisms.

PRACTICE INFORMATION

This practice generally applies to cropland but may also be used on other areas where field crops are grown such as wildlife or recreation lands. Mulch tillage is a term used when referring to non-inversion tillage such as chiseling and disk harrowing to partially incorporate organic material left on the soil surface. Mulch tillage includes at least the following:

- ✦ Uniformly spreading the residue on the soil surface to accommodate planting the following crop.
- ✦ Use non-inversion tillage tools that only partially incorporate surface organic material.
- ✦ Plan the number, sequence, and timing of tillage operations to achieve the prescribed amount of surface residue needed to accomplish the objectives of the practice.
- ✦ Use planting equipment designed to operate in high residue situations.
- ✦ Minimize removal of organic residue by burning, baling, or grazing.

RESIDUE MANAGEMENT NO TILL



WATER QUALITY BENEFITS

The benefits of Residue Management No-Till are significant. Erosion is usually reduced to an acceptable level due to the protective residue left on the surface. Soil organic matter increases and soil organisms such as earth worms increase progressively. The soil tilth improves, and productivity increases as the constant supply of organic material left on the surface is decomposed by a healthy population of soil organisms.

PRACTICE INFORMATION

The objective of this practice is to maintain most of the crop residue on the soil surface throughout the year. The practice may be referred to as no-till, zero-till, slot plant, row-till, strip-till or just the generic term conservation tillage. The common characteristic of this practice is that the only tillage performed is a very narrow strip prepared by coulters, sweeps, or similar devices attached to the front of the planter. Weeds and other pests are generally managed by using approximately the same as those used with a tillage based system, but a “no-till” residue management system requires a higher level of technology and management than a more conventional tillage system. The fields must be scouted on a regular basis and the farm operator must be very familiar with the pests and understand the concept of threshold populations and other Integrated Pest Management technologies.

RESIDUE MANAGEMENT, SEASONAL



WATER QUALITY BENEFITS

Residue Management seasonal reduces erosion by managing to leave protective amounts of crop residue on the soils surface during a prescribed time of the year, by delaying primary tillage or seedbed preparation until immediately prior to planting time.

PRACTICE INFORMATION

This practice generally applies to cropland but may also be used on other areas where field crops are grown such as wildlife or recreation lands. The practice only applies to crops that produce sufficient amounts of residue to protect the soil from erosion. Erosion can be significantly reduced by this practice in locations where delaying seedbed preparation allows residue to be left on the soil surface during critical periods for protection from wind and water erosion.

Crops grown using this tillage system are generally planted in a relatively clean seedbed. Excessive removal of plant residue by burning, baling, or grazing often produces negative impacts on the natural resources. These activities should not be performed without evaluating the impacts.

RIPARIAN FOREST BUFFER



WATER QUALITY BENEFITS

A Riparian Forest Buffer is an area of trees and/or shrubs located adjacent to a body of water. The vegetation extends outward from the water body for a specified distance necessary to provide a minimum level of protection and/or enhancement.

PRACTICE INFORMATION

This practice applies to areas adjacent to permanent or intermittent streams, lakes, ponds, wetlands, and areas associated with groundwater recharge. The Riparian Forest Buffer is a multi-purpose practice design to accomplish one or more of the following:

- ✦ Reduce erosion on streambanks.
- ✦ Create shade to lower water temperatures and improve habitat for aquatic animals.
- ✦ Provide a source of debris necessary for healthy robust populations of aquatic organisms and wildlife.
- ✦ Act as a buffer to filter out sediment, organic material, fertilizer, pesticides, and other pollutants that may adversely impact the water body, including shallow groundwater.

Dominant Vegetation consists of existing or planted trees and shrubs suited to the site and purpose(s) of the practice. Grasses and forbes that come in naturally further enhance the wildlife habitat and have a filtering effect on the practice. Headcuts and streambank erosion should be assessed and treated appropriately before establishing the riparian forest buffer. Specifications for each installation are based on a thorough field investigation of each site.

RIPARIAN HERBACEOUS COVER



WATER QUALITY BENEFITS

Riparian Areas are ecosystems that occur along water courses or at the fringe of water bodies. Riparian Herbaceous Cover consist of perennial grasses and other nonwoody plants.

PRACTICE INFORMATION

Riparian Areas provide habitat (food, shelter, and water) for aquatic and terrestrial organisms, intercept direct solar radiation, create shade and increases the depth to width ratio to help maintain or restore suitable water temperatures for fish and other aquatic organisms while providing a milder microclimate for wildlife.

Also, Riparian Areas improve and protect water quality by reducing the amount of sediment and other pollutants, such as pesticides, organic and nutrients in surface runoff as well as nutrients and chemicals in shallow ground water flow. They provide food, in the form of plant detritus, for aquatic insects which are important food items for fish, help stabilize the channel bed and stream-bank. They also serve as corridors to provide landscape linkages between existing habitats and provide room for water courses to establish geomorphic stability.

Riparian Areas manage existing Riparian Herbaceous Habitats to improve or maintain desired plant communities. This practice applies along water courses or on the fringe of water bodies where the natural plant community is dominated by herbaceous vegetation, where the ecosystem has been altered, the potential natural plant community has changed or has been converted to cropland, pastureland, grazing land, etc.

ROOF RUNOFF STRUCTURE



WATER QUALITY BENEFITS

Roof Runoff Structures are facilities for collecting, controlling, and disposing of runoff water from roofs.

PRACTICE INFORMATION

The purpose of this practice is to prevent roof runoff water from flowing across concentrated waste areas, barnyards, roads and alleys. The practice reduces pollution, flooding, and erosion. It also improves water quality, drainage, and the overall efficiency of a waste management system. The water from roof runoff can be stored and reused for cleaning and other purposes. The practice also reduces the volume requirements of lagoons and waste storage facilities and reduces the volume of effluent water requiring treatment or land application.



SPRING DEVELOPMENT



Spring development is improving springs and / or seeps by excavating, cleaning, capping, or providing collection and storage facilities.

PRACTICE INFORMATION

The purpose of spring development is to improve distribution of water for livestock, recreation, and wildlife. The practice also applies to irrigation when the quantity and quality of water are suitable when the quantity and quality of water are suitable for irrigating crops. Spring development involves cleaning and / or enlarging the discharge opening of the spring. Other appurtenances might be needed such as a collection device to channel the water and a spring box to provide a small amount of storage, as well as a sediment trap and connection point for an outlet pipe(s). The outlet pipe(s) may then lead to a storage facility such as a trough or tank.

Prior to spring development, an investigation of site conditions must be completed including ecological functions and potential losses to these functions that may occur. Consideration should be given to how diversion of water from the spring may affect streamflow in the watershed and either the spring can be developed to preserve conditions that support unique habitats in the landscape.



STREAM CHANNEL STABILIZATION



WATER QUALITY BENEFITS

Stream channel stabilization is the use of conservation structures to stabilize the channel of a stream.

PRACTICE INFORMATION

This practice applies to structural work done to control aggradation or degradation in a stream channel that cannot feasibly be controlled by clearing obstructions, establishing vegetation, or installing upstream water control structures. Stream channels may aggrade or degrade during a given storm. This is natural and does not necessarily indicate the stream should be considered unstable. A channel is considered unstable when changes in the channel bottom are on a long term trend toward aggradation or degradation. In the design of channel stabilization, the following should be considered as a minimum:

- ✦ The objective of the planned modification to the channel.
- ✦ Temporary and long-term effects on erosion and sedimentation.
- ✦ Effects on wildlife associated with changes that may occur in water temperature, turbidity, bottom geologic material, etc.
- ✦ Effects on the visual quality of the stream.
- ✦ The overall effects that may occur if the stream volume and/or velocity is changed by the planned structures.

STREAM CROSSING



WATER QUALITY BENEFITS

A Stream Crossing is a stabilized area or structure constructed across a stream to provide a travel way for people, livestock, equipment, or vehicles.

PRACTICE INFORMATION

This practice applies to all land uses where an intermittent or perennial watercourse exists and a ford, bridge, or culvert type crossing is desired for livestock, people, and / or equipment.

Stream crossings are located in areas where the streambed is stable or where grade control can be provided to create a stable condition. Avoid sites where channel grade or alignment changes abruptly, excessive seepage or instability is evident, or where large tributaries enter the stream.

A properly designed and installed stream crossing provides a way for normal passage of water, fish, and other aquatic animals within the channel during all seasons of the year.



STREAMBANK & SHORELINE PROTECTION



WATER QUALITY BENEFITS

Streambank & Shoreline Protection is using vegetation or structural techniques to stabilize and protect banks of streams, lakes, estuaries, or excavated channels against scour and erosion.

PRACTICE INFORMATION

This practice applies to natural or excavated channels where the streambanks are susceptible to erosion from the action of water, ice, debris, or to damage from livestock or vehicular traffic. It also applies to controlling erosion on shorelines where the problem can be solved with relatively simple structural measures or vegetation.

The purpose(s) of this practice include the following:

- ✦ Prevent loss of land mass.
- ✦ Prevent damage to utilities, roads, buildings, and other facilities including conservation practices adjacent to the banks.
- ✦ Maintain the capacity of the channel.
- ✦ Control channel meandering.
- ✦ Reduce sediment loads causing downstream damage and pollution.
- ✦ Improve the stream for recreation.
- ✦ Improve the stream for fish and wildlife.

STRUCTURE FOR WATER CONTROL



WATER QUALITY BENEFITS

A Structure for Water Control is a structure in a water management system that conveys water, controls the direction or rate of flow or maintains a desired water surface elevation.

PRACTICE INFORMATION

These structures are normally installed in a well planned irrigation or drainage system. However, the structures may be part of a wildlife project or some type of recreation plan that involves water conveyance, flow control or water level regulation. This practice covers the planning and functional design of the needed water control structures, but not the detailed design or construction specifications for specific structures.

These structures are used in water management to control the stage, discharge, distribution, delivery, or direction of flow in open channels or water use areas. The structures installed under this practice may also be used to improve water quality by reducing sedimentation or to regulate water temperatures for fish production.



USE EXCLUSION



WATER QUALITY BENEFITS

Use Exclusion is excluding animals, people, or vehicles from an area.

PRACTICE INFORMATION

The purpose of Use Exclusion is to protect, maintain, or improve the quantity and quality of the natural resources in an area. The purpose also includes aesthetic resources as well as human health and safety.

The practice is used in a conservation plan in areas where vegetation establishment or maintenance is a concern. Protecting the vegetation is often essential to conserving the other natural resources.

The barriers constructed for Use Exclusion must be adequate to prevent intrusion of the target animals, vehicles, or people. The barriers are usually fences, but may also be natural and artificial structures such as logs, boulders, earth fill, gates, signs, etc.



WASTE STORAGE FACILITY



WATER QUALITY BENEFITS

To temporarily store wastes such as manure, wastewater, and contaminated runoff as a storage function component of an Agricultural Waste Management System.

PRACTICE INFORMATION

Waste Storage Facilities must be planned, designed, and constructed to meet all federal, state, and local laws and regulations.

They should minimize the potential for contamination of streams. Waste storage facilities should be located outside of floodplains.

The minimum storage period shall be based on the timing required for environmentally safe waste utilization considering the climate, crops, soil, equipment and local, state, and federal regulations.

Waste Storage Facilities should be located as close to the source of waste and pollution runoff as practical.

Solid/liquid separation of runoff or wastewater entering pond facilities should be considered to minimize the frequency of accumulated solids removal and to facilitate pumping and application of the stored waste.

Due consideration should be given to environmental concerns, economics, the overall waste management system plan, and safety and health factors.

WASTE TREATMENT LAGOON



WATER QUALITY BENEFITS

A Waste Treatment Lagoon is a practice used to store and biologically treat organic waste, reduce pollution, and protect water quality by excavation or earth fill to provide storage for biological treatment of animal or other agriculture waste.

PRACTICE INFORMATION

This practice applies under the following conditions:

- ✦ Where a complete waste management system has been planned.
- ✦ Waste generated by agriculture production and/or processing needs treatment.
- ✦ A suitable location is available.
- ✦ The soils are suitable for retaining the waste or can be sealed to prevent seepage.
- ✦ A water supply is adequate to maintain the design depth of water in the lagoon.

The three general types of waste treatment lagoons are the following:

1. Anaerobic - require less surface area than naturally aerobic lagoons but may give off offensive odors.
2. Naturally aerobic - require more surface area but are relatively odor free.
3. Mechanically aerated - comparable in size to anaerobic lagoons but require energy for aeration.

Waste Treatment Lagoons are located as near the source of waste as possible but as far from human dwellings as possible. The location should also be where prevailing winds will carry odors away from residences and public areas. To improve efficiency and reduce sludge buildup, solids should be removed from the waste before it enters the lagoon.

WASTE UTILIZATION



WATER QUALITY BENEFITS

Waste Utilization is the application of agricultural waste or other waste on the land in an environmentally acceptable manner while maintaining or improving the natural resources.

PRACTICE INFORMATION

This practice may be used on any land suitable for application of waste as a fertilizer. This includes waste from barnyards, feedlots, dairy operations, and other agriculture sources. The waste material may also come from municipal treatment plants and food processing plants.

The purpose of applying this practice include the following:

- ✦ Provide safe disposal of waste material.
- ✦ Provide fertility for food and fiber production.
- ✦ Improve soil tilth and fertility.
- ✦ Reduce erosion.
- ✦ Protect water and other natural resources.



WATERING FACILITY



WATER QUALITY BENEFITS

A Water Facility is a device (tank, trough, or other watertight container) to provide watering for livestock and/or wildlife at selected locations in order to:

- ✦ Protect and enhance vegetative cover through proper distribution of grazing.
- ✦ Provide erosion control through better grassland management. OR
- ✦ Protect streams, ponds, and water supplies from contamination by providing alternative access to water.

PRACTICE INFORMATION

Providing water for agriculture use may incorporate several practices. These include the development of a water source or a combination of sources such as springs, wells, streams, ponds, public water, and/or catchments to accommodate needs and match available resources. The conveyance of the water through pipelines to storage tanks, cisterns, or watering troughs is another factor considered when developing a watering facility. Gravity fed systems are installed where possible but pumping stations may be necessary and are part of some projects to convey water to the location or locations that best serve the farming operation's management scheme. Pump systems may be powered by water, wind, photo voltaic cells (solar) or traditional electrical sources.



WELL DECOMMISSIONING



WATER QUALITY BENEFITS

Well Decommissioning is sealing and permanently closing a water well that is no longer in use. The practice serves to:

- ✦ Prevent entry of vermin, debris, or other foreign substances into the well or well bore hole.
- ✦ Eliminate the physical hazard of an open hole to people, animals, and machinery.
- ✦ Prevent entry of contaminated surface water into a well and migration of contaminants into unsaturated (vadose) zone or saturated zone.
- ✦ Prevent the commingling of chemically or physically different ground waters between separate water bearing zones.

PRACTICE INFORMATION

This practice applies to any drilled, dug, driven, bored, or otherwise constructed vertical water well determined to have no further beneficial use.

This practice is not used when evidence of contamination exists, or when the well contains contaminate levels that exceed state or federal quality standards. Prior to decommissioning a contaminated well, treatment of the contamination source(s) is required, as well as monitoring the groundwater to assure quality standards are met.



WETLAND CREATION



WETLAND DEVELOPMENT OR RESTORATION



WATER QUALITY BENEFITS

Wetlands are some of the most productive and dynamic habitats in the world. The physical, chemical and biological interactions within wetlands are often referred to as wetland functions. These functions include surface and subsurface water storage, nutrient cycling, particulate removal, maintenance of plant and animal communities, water filtration or purification and groundwater recharge. Similarly, the characteristics of wetlands that are beneficial to society are called wetland values. Perhaps these can best be thought of as the importance of a wetland function to an individual or group. Some examples of wetland values include reduced damage from flooding, water quality improvement

PRACTICE INFORMATION

This practice applies to sites where no natural wetland occurred or where a wetland exists, or existed and the wetland characteristics (hydrology, vegetation, and functions) will be different from what historically occurred. Upon completion of the practice, the site will meet the current NRCS definition of wetland if hydric soils exist at the site. This practice is applicable only if hydrologic conditions can be approximated by modifying drainage and/or artificial flooding of a duration and frequency to create and maintain wetland conditions during an average annual precipitation event. The wetland class/subclass will be specified. This practice does not apply to: 1) a constructed wetland intended to treat point and non-point sources of water pollution; 2) wetland enhancement intended to rehabilitate a degraded wetland where specific functions and/or values are enhanced beyond original conditions; or 3) wetland restoration intended to rehabilitate a degraded wetland where the soils, hydrology, vegetative community and biological habitat are returned to original conditions.

PRACTICE INFORMATION

Wetland Development or Restoration applies primarily to areas that were once wetland but were drained to accommodate another land use. It also applies to sites that were never wetland but are capable of storing water for wetland purposes. In most cases, dikes or other water control structures are used to create or improve water storage on the site. The purpose of this practice is to establish or reestablish wetlands for the benefit of wildlife, to reduce flooding, provide off-site water quality benefits and increase groundwater recharge.



RESOURCE CONSERVATION & DEVELOPMENT PROGRAM

RC&D OFFICE LOCATIONS

RC&D Office	RC&D Coordinator	Telephone Number	e-mail Address
Great Kanawha RC&D	Jackie Byars	304-776-5256	Jackie.Byars@wv.usda.gov
Little Kanawha RC&D	Norm Bailey	304-679-3639	Norm.Bailey@wv.usda.gov
Mountain RC&D	Mike Gasper	304-469-9738	Mike.Gasper@wv.usda.gov
Northern Panhandle RC&D	Nicole Viars	304-242-0576	Nicole.Viars@wv.usda.gov
Potomac Headwaters RC&D	Rebecca MacLeod	304-263-7547	Rebecca.MacLeod@wv.usda.gov
Wes-Mon-Ty RC&D	Jason Teets	304-457-4596	Jason.Teets@wv.usda.gov

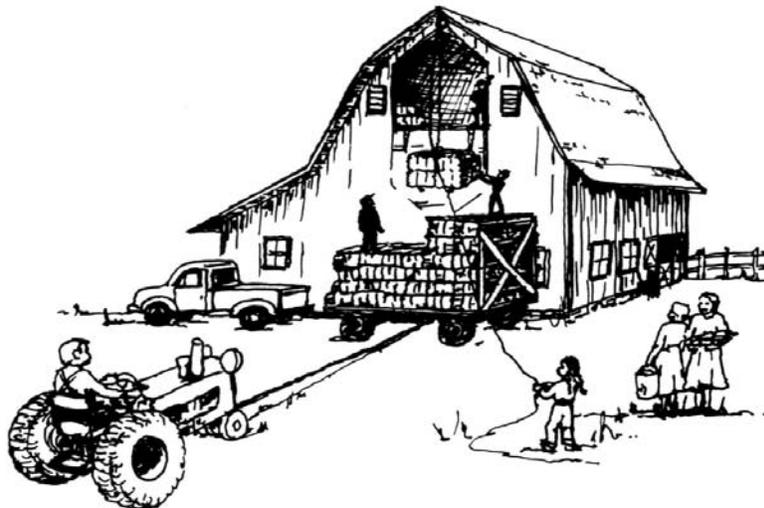
WEST VIRGINIA STATE FSA OFFICE

1550 Earl Core Road, Suite 102

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Phone: (304) 284-4800

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Lime Program

The West Virginia Association of Conservation Districts and the West Virginia Conservation Agency, in cooperation with USDA NRCS, USDA Farm Service Agency, and WVU Extension, announces a new program designed to help WV farmers improve their grasslands.

The WV Lime Incentive Program will provide 50% cost-share reimbursement to farmers who need to purchase agricultural lime to improve their grasslands and who also meet program eligibility requirements.

For more information contact your local Conservation District or visit: http://www.wvca.us/dl/lime/wv_lime_program.pdf



Invasive Species Management Program

The purpose of the Multiflora Rose Control Program is to provide technical and financial assistance to WV farmers to control a noxious weed, Multiflora Rose, in pastures. The infestation of Multiflora Rose decreases access to pasture which causes severe economic loss to farmers, increased soil erosion, and poor quality forage for livestock production.

Some of the general guidelines are:

- ⇒ Participants in the program must be district cooperators and actively involved in agriculture on grazing lands.
- ⇒ Participants will be required to sign an agreement requiring them to obtain a minimum of 90% kill on the first application.
- ⇒ Participants must be willing to cost share 50% for the expenses of the initial application to achieve the minimum kill.
- ⇒ Participants will be responsible for controlling and managing any Multiflora Rose re-growth by use of herbicides or other pest management methods.
- ⇒ Participants must sign a binding contract to maintain the treated area for five years by removing dead debris and revegetating to a grass sod as determined by a Conservation planner.
- ⇒ Dead Multiflora Rose debris must be removed not earlier than six months but no later than 2 years after final application of herbicide. (Land Class 7 {35% or greater slope}) is exempt from this requirement. Removal can include use of a brush hog, feed over techniques, or other methods as recommended.
- ⇒ Farms to be treated will be required to have a conservation plan. These plans may include, but are not limited to: prescribed grazing, nutrient management, pasture and hay land planting, spring development and livestock watering facilities.

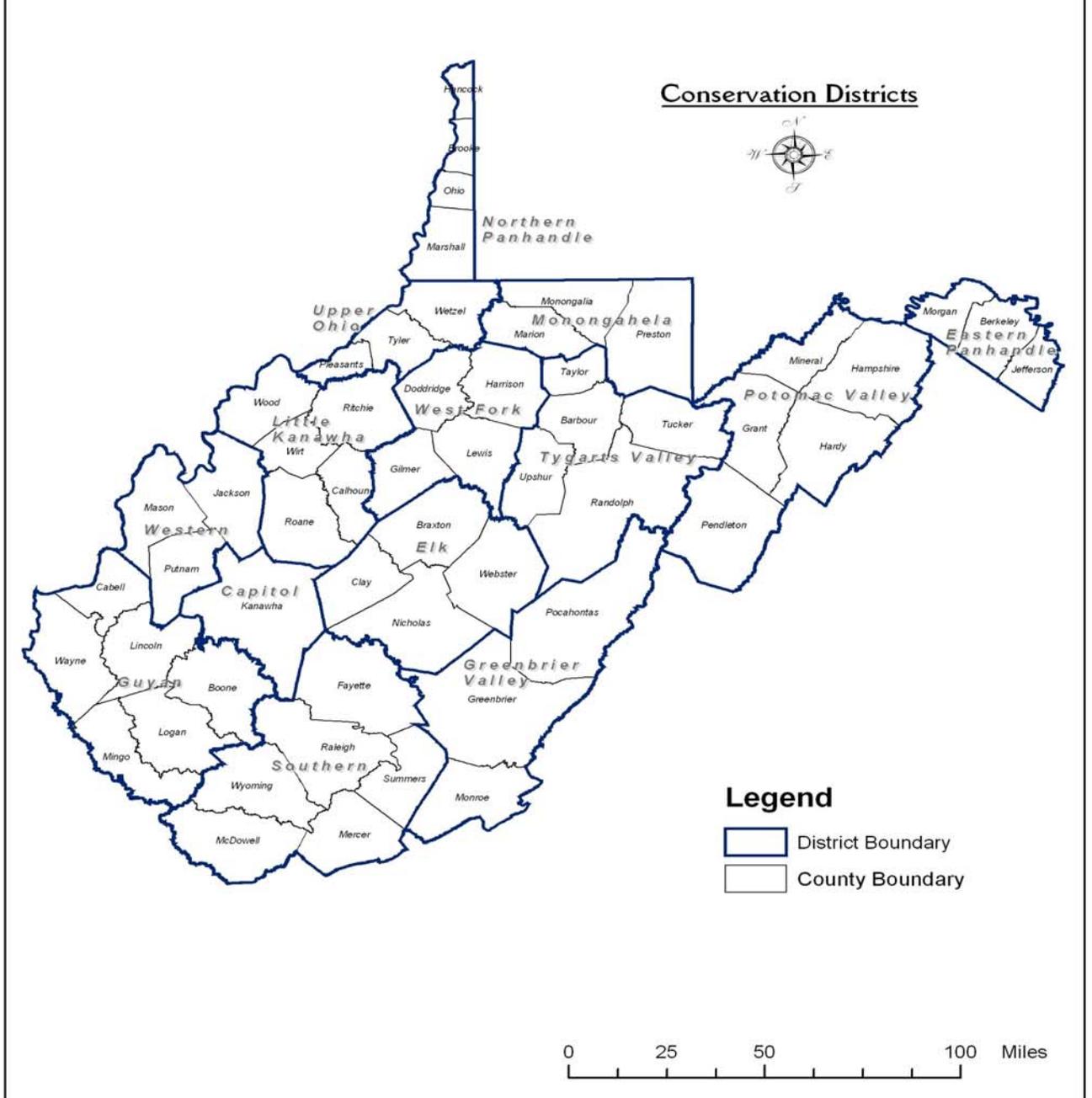
The WVCA Multiflora Rose Committee recently amended the WV Multiflora Rose Control Program, allowing landowners who hold a Private Pesticide Applicators License to participate in the program. Producers may sign an exemption agreement allowing them to conduct applications under the strength of a Private Applicators License. In this event, all responsibilities of the commercial applicator become that of the land owner. Please be aware, mishaps with pesticides are not covered under typical insurance policies. These policies, known as pollution coverage, are not required but are often a good idea and may be offered as a rider to your current policy. It is the responsibility of the farmer to determine whether pollution coverage is part of his or her insurance coverage. If you are interested in receiving an exemption, please contact you local Conservation District for more information and the appropriate form.

For further guidelines and information contact your local Conservation District:

<http://www.wvca.us/districts.cfm>



West Virginia Conservation Agency



Capitol (CCD)

Kanawha
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Cross Lanes, WV 25313
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Eastern Panhandle (EPCD)

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WVCA Contact: Carla Hardy, WPC
304.538.7581

Elk (ECD)

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WVCA Contact: Bruce Skidmore, CS
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Greenbrier Valley (GVCD)

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179 Northridge Drive
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Phone: (304) 645-6173
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Adam Merritt, CS
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WVCA Contact: Mark Buchanan, CS
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Little Kanawha (LKCD)

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Parkersburg, WV 26104
Phone: (304) 422-9088
Fax: (304) 422-9086
Email: lkcd@wvca.us
WVCA Contact: Harry Huff, CS
Robert Skidmore, CS
304.758.2512

Monongahela (MCD)

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WVCA Contact: Bradley Durst, CS
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Northern Panhandle (NPCD)

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WVCA Contact: Matthew Gadd, CS
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Potomac Valley (PVCD)

Grant, Hampshire, Hardy, Mineral, Pendleton
500 East Main Street
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Southern (SCD)

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463 Ragland Road
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Tygarts Valley (TVCD)

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Upper Ohio (UOCD)

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Phone: (304) 758-2512
Fax: (304) 758-4303
Email: uocd@wvca.us
WVCA Contact: Harry Huff, CS
304.758.2512

West Fork (WFCD)

Doddridge, Gilmer, Harrison, Lewis
Route 2, Box 204-E
Mt. Clare, WV 26408
Phone: (304) 627-2160
Fax: (304) 624-5976
Email: wfcd@wvca.us
WVCA Contact: Bradley Durst, CS
304.329.3218

Western (WCD)

Jackson, Mason, Putnam
224-C First Street
Pt. Pleasant, WV 25550
Phone: (304) 675-3054
Fax: (304) 675-3054
Email: wcd@wvca.us
WVCA Contact: Mark Buchanan, CS
304.528.5718

**THE FOLLOWING EQUIPMENT IS AVAILABLE FOR RENT THROUGH THE
CONSERVATION DISTRICT IN YOUR COUNTY: CALL FOR CURRENT RENTAL PRICES**

CAPITOL CONSERVATION DISTRICT

Kanawha
418 Goff Mountain Rd. Suite 102
Cross Lanes, WV 25313
Phone: (304) 759-0736
Fax: (304) 776-5326
Email: ccd@wvca.us

Services Offered:

- ✦ Forage / Hay Testing

Supplies for sell:

- ✦ Float Valves

**EASTERN PANHANDLE
CONSERVATION DISTRICT**

Berkeley, Jefferson, Morgan
151 Aikens Center, Suite 1
Martinsburg, WV 25404
Phone: 304.263.4376
FAX: 304.263.4986
Email: epcd@wvca.us

- ✦ No Till Drill
- ✦ Great Plains No Till Drill
- ✦ Poultry Litter Spreader
- ✦ Stoltfus 5 Ton Lime Spreader

Services Offered:

- ✦ Forage Testing
- ✦ Soil Testing

ELK CONSERVATION DISTRICT

Braxton, Clay, Nicholas, Webster
USDA Service Center
1336 State Street, Room 200
Gassaway, WV 26624
Phone: 304.364.5105
FAX: 304.364.5434
Email: ecd@wvca.us

- ✦ (2) 4 ton Lime/Litter Spreaders
- ✦ (2) 2 ton Lime/Litter Spreaders
- ✦ Tye No Till Seeders
- ✦ (2) 50 gal. Sprayers

**GREENBRIER VALLEY
CONSERVATION DISTRICT**

Greenbrier, Monroe, Pocahontas
179 Northridge Drive
Lewisburg, WV 24901
Phone: 304.645.6173
FAX: 304.645.4755
Email: gvcd@wvca.us

- ✦ (3) No Till Seeders
- ✦ (2) Lime Spreaders / (2) Litter Spreaders
- ✦ (3) Post Drivers
- ✦ A Pasture Aerator
- ✦ A Pasture Drag
- ✦ An Engine-Driven Portable 300 gal. Sprayer
- ✦ A Portable Mist Sprayer
- ✦ Portable Animal Scales
- ✦ Tree Planting Bars
- ✦ Weed Wiper

Also sell supplies:

- ✦ Spring Tiles
- ✦ Lids & Strainers
- ✦ Filter Fabric
- ✦ Watson, Roberts & Jobe Float Valves / Parts

Services Offered:

- ✦ Forage Sampling
- ✦ Soil Sampling

GUYAN CONSERVATION DISTRICT

Boone, Cabell, Lincoln, Logan, Mingo, Wayne
2631 5th Street Road
Huntington, WV 25701
Phone: (304) 528-5718
Fax: (304) 697-4164
Email: gcd@wvca.us

- ✦ Lime Spreader

Services Offered:

- ✦ Forage / Hay Testing

**THE FOLLOWING EQUIPMENT IS AVAILABLE FOR RENT THROUGH THE
CONSERVATION DISTRICT IN YOUR COUNTY: CALL FOR CURRENT RENTAL PRICES**

**LITTLE KANAWHA
CONSERVATION DISTRICT**

Calhoun, Ritchie, Roane, Wirt, Wood
91 Boyles Lane
Parkersburg, WV 26104
Phone: 304.422.9088
FAX: 304.422.9086
Email: lkcd@wvca.us

- ✦ No Till Drill
 - ✦ 2 Ton Lime Spreader
 - ✦ 4 Ton Lime Spreader
 - ✦ Fertilizer Spreader
 - ✦ Seeders
 - ✦ Sprayers
- Also sell supplies:**
- ✦ Spring Boxes
 - ✦ Copper Pipe with Clamp
 - ✦ Concrete Lids for Spring Boxes
 - ✦ Float Valve Assembly
 - ✦ Float Valve Assembly Copper

**MONONGAHELA
CONSERVATION DISTRICT**

Marion, Monongalia, Preston
201 Scott Avenue
Morgantown, WV 26508
Phone: 304.296.0081
FAX: 304.285.3151
Email: mcd@wvca.us

- ✦ 4 Ton Stoltzfus Lime Spreader
 - ✦ 2 Ton Stoltzfus Lime Spreader
 - ✦ Wheatheart Post Driver
 - ✦ 6" Great Plains No Till Seeder
- Also sell supplies:**
- ✦ 18 by 30" Spring Boxes
 - ✦ 18" Diameter Concrete Lids
 - ✦ Float Valves
 - ✦ Geotextile Fabric

**NORTHERN PANHANDLE
CONSERVATION DISTRICT**

Brooke, Hancock, Marshall, Ohio
1 Ballpark Drive
McMechen, WV 26040
Phone: 304.238.1231
FAX: 304.242.7039
Email: npcd@wvca.us

- ✦ No Till Drill
 - ✦ Fimco Sprayer
 - ✦ Aerator
 - ✦ Lime/Fertilizer Spreader
- Also offer supply items for sell.**

**POTOMAC VALLEY
CONSERVATION DISTRICT**

Grant, Hampshire, Hardy, Mineral, Pendleton
500 East Main Street
Romney, WV 26757
Phone: 304.822.5174
FAX: 304.822.3728
Email: pvcd@wvca.us

- ✦ No-Till Drill (Tye Seeder)
- ✦ Brillion Cultipacker Seeders
- ✦ Litter Spreader Truck w/PVCD Driver
- ✦ Pull-Behind Litter Spreader
- ✦ Hydroseeder with PVCD Driver Price Based on Job

INFORMATION AND TECHNICAL ASSISTANCE

More detailed information and / or technical assistance is available through your local Conservation District, Natural Resources Conservation Service, or WVU Extension Service.

FINANCIAL ASSISTANCE

Financial assistance is also available in some areas.

**THE FOLLOWING EQUIPMENT IS AVAILABLE FOR RENT THROUGH THE
CONSERVATION DISTRICT IN YOUR COUNTY: CALL FOR CURRENT RENTAL PRICES**

SOUTHERN

CONSERVATION DISTRICT

Fayette, McDowell, Mercer, Raleigh, Summers, Wyoming
463 Ragland Road
Beckley, WV 25801
Phone: 304.253.0261
FAX: 304.253.0238
Email: scd@wvca.us

- ✦ Lime Spreader
- ✦ Post Driver
- ✦ No-Till Grass Drill

Services:

- ✦ Heavy / Small Equipment (operated by SCD employees)
- ✦ Large / Pick Up Trucks (operated by SCD employees)
- ✦ Lime Spreader Trucks

Available for sell:

- ✦ Tire Troughs (uncut / already cut)

Services Offered:

- ✦ Soil / Forage Sampling

TYGARTS VALLEY

CONSERVATION DISTRICT

Barbour, Randolph, Taylor, Tucker, Upshur
Route 4, Box 501
Philippi, WV 26416
Phone: 304.457.3026
FAX: 304.457.6927
Email: tvcd@wvca.us

- ✦ Wet Lime
- ✦ Poultry Litter Spreaders
- ✦ Fertilizer Spreaders

Construction Services:

- ✦ Pond Construction & Cleanout
- ✦ Open Ditching
- ✦ Spring Developments
- ✦ Watering Troughs & Pipeline Installation
- ✦ Hydroseeding
- ✦ Dozer Service & Brush-hogging

Parts available for sell:

- ✦ Spring Tiles
- ✦ Spring Pipes & Lids
- ✦ Float Valve Assemblies
- ✦ Concrete Troughs
- ✦ Filter Fabrics & Related Items

UPPER OHIO CONSERVATION DISTRICT

Pleasants, Tyler, Wetzel
201 Underwood Street
Middlebourne, WV 26149
Phone: 304.758.2512
FAX: 304.758.4303
Email: uocd@wvca.us

- ✦ Culti-Packer
- ✦ No Till Drill
- ✦ Fertilizer/Lime Spreader
- ✦ Aerator

WEST FORK CONSERVATION DISTRICT

Doddridge, Gilmer, Harrison, Lewis
Route 2, Box 203-E
Mt. Clare, WV 26408
Phone: 304.627.2160
FAX: 304.624.5976
Email: wfcd@wvca.us

- ✦ 2 Ton Lime Spreader
- ✦ 4 Ton Lime Spreader
- ✦ Seeder
- ✦ SubSoiler
- ✦ Sprayer

WESTERN CONSERVATION DISTRICT

Jackson, Mason, Putnam
224-C First Street
Pt. Pleasant, WV 25550
Phone: (304) 675-3054
Fax: (304) 675-3054
Email: wcd@wvca.us

Services Offered:

- ✦ Forage / Hay Testing

Supplies for sell:

- ✦ Float Valves
- ✦ Filter Fabric

Guidelines to Determine an Appropriate Buffer Width

In many situations, buffers are a vital component of a conservation system for water quality protection. Without the appropriate width and other parameters, the buffer may not function as it is intended. The following chart is a guide for determining the width and parameters of buffers based on the intended service of the buffer.

Recommendations for Buffer Widths Based on the Intended Purpose of the Buffer						
Physical Ecosystem Services						
Services	Range Under Normal Conditions	Range Under Extreme Conditions	Buffer Parameters	Minimum Width Using BMP's	BMP Type	Expected Load Reductions
Temperature Control	10-30 Feet	25-100 Feet	Trees of sufficient height to shade full width of stream	10 feet	Existing natural canopy of forested buffer strip	
Streambank Stability and Erosion Control	25-66 Feet	Benefits To 100 Feet	Native vegetation cover and root mass for erosion prevention	25 feet	Forested buffer strip, filter strip, land preservation	85% of erosion
Minimization of Direct Human and Livestock Impacts	50 Feet	50 Feet	sufficient density of vegetation to limit access	50 feet (human) 25 feet (livestock)	Fencing, dense vegetation	
Contaminant Removal (Suspended Solids)	30-60 Feet	50-150 Feet	Two zone or three-zone buffer; forested, managed forest, grasses, Width dependent on slope flow length, permeability vegetative cover and type and concentration	30 Feet	Wet ponds, wetlands bioretention infiltration filtration	84%
Chemical Ecosystem Services						
Nutrient Removal (Nitrogen)	15-50 Feet	50-100 Feet	Two-zone or three-zone buffer; forested, managed forest, grasses. Width dependent on slope, flow length, permeability, vegetative cover and type, and concentration.	15 Feet	Wet ponds, wetlands bioretention infiltration filtration	54%
Nutrient Removal (Phosphorus)	30-100 Feet	100 + Feet		30 Feet		79%
Contaminant Removal (Pesticides)	40-66 Feet	Benefits To 100 Feet		40 Feet		40 % @ 40 Feet 100% @ 66 Feet
Contaminant Removal (Bacteria)	15-30 Feet	30+ Feet		15 Feet		88%
Contaminant Removal (metals)	50 Feet	200 Feet		50 Feet		40% @ 50 Feet 100% Pb @ 200 Ft.
<p>This chart is based on information gathered from Rupprecht, Kilgore, and Gunther "Riparian and Wetland Buffers for Water-Quality Protection" November/December 2009 Stormwater Magazine</p> <p>This article is based on 137 published scientific papers and reports relating to riparian and wetland buffer widths and vegetative composition. These studies include primary literature as well as technical reports and review papers on the subject</p> <p>*Normal conditions refer to typical riparian areas around residential and office/commercial campuses, and include low to moderate slopes warmwater riverine habitat, and open lands.</p> <p>**Extreme conditions refers to unusual and nontypical riparian areas, including extreme slopes, point-source nutrient loading, areas hing contamination, and nontypical concentration of contaminants.</p>						

COMMON SEEDING RATES

Tips for Establishing Grass Seed:

- ✦ Plant permanent cool season grass between March 15 and April 15 or August 15 and September 15.
- ✦ Plant permanent warm season grass between April 1 and May 15.
- ✦ Be sure seed comes in contact with soil.
- ✦ If preparing a traditional seed bed by disking the soil, no more than 1/3 of the seed should be visible on soil surface after cultipacking.
- ✦ Seeding depth should never exceed ¼ inch.
- ✦ Apply seed based on pure live seed rates.

Temporary Seeding: (WV Erosion & Sediment Control Manual)

<u>Species</u>	<u>Planting dates</u>	<u>Application Rate</u>
Annual Ryegrass	Mid Feb-Mid May or Aug-October	40 lbs/Acre
Field Bromegrass	March-Mid June or Aug-Sept	40 lbs/Acre
Spring Oats	March –Mid June	100 lbs/Acre
Winter Rye	Mid Aug-February	170 lbs/Acre
Winter Wheat	Mid Aug-February	180 lbs/Acre
Japanese Millet	Mid March-Mid Aug	30 lbs/Acre
Redtop	March-Mid June	10 lbs/Acre
Annual Ryegrass & Spring Oats	March-Mid June	30 lbs/Acre 70 lbs/Acre
German/Foxtail Millet	May-August	40 lbs/Acre
Harry Vetch	Mid Aug-March	60 lbs/Acre

Permanent Seeding: (USDA NRCS)

1. Red Clover	8 lbs.	2. Alsike Clover	4 lbs.
Timothy	4 lbs.	Timothy	4 lbs.
3. Red Clover	4 lbs.	4. Alfalfa	10 lbs
Alsike Clover 2 lbs.		Orchardgrass	4 lbs.
Orchard Grass 4 lbs.			
5. Alfalfa	10 lbs.	6. Orchardgrass	10 lbs.
Timothy	4 lbs.		
7. Alfalfa	10 lbs.	8. Birdsfoot Trefoil	8 lbs.
		Timothy	4 lbs.
9. Reed Canarygrass	12 lbs.	10. Birdsfoot Trefoil	8 lbs.
		Orchardgrass	6 lbs.
11. Birdsfoot Trefoil	8 lbs.	12. Ladino Clover	2 lbs.
Tall Fescue	8 lbs.	Tall Fescue	10 lbs.
13. Tall Fescue	15 lbs.	14. Ladino Clover	2 lbs.
		Orchardgrass	8 lbs.

COMMON SEEDING RATES

Permanent Seeding (USDA NRCS) - continued

15. Ladino Clover	2 lbs.	16. White Clover	2 lbs.
		Orchardgrass	5 lbs.
		Kentucky Bluegrass	5 lbs.
17. Switchgrass	8 lbs.	18. Big Bluestem	8 lbs.
19. Caucasian Bluestem	6 lbs.	20. Bermudagrass	20 bu./ac.
21. Red Clover	4 lbs.	22. Birdsfoot Trefoil	6 lbs.
Ladino Clover	1 lb.		
23. Orchardgrass	4 lbs.	24. Orchardgrass	6 lbs.
Bluegrass	9 lbs.	Bluegrass	10 lbs.
Timothy	2 lbs.	Ladino Clover	1 lb.
Ladino Clover	1 lb.		
25. Bluegrass	8 lbs.	26. Bluegrass	6 lbs.
Timothy	5 lbs.	Smooth Bromegrass	4 lbs.
Ladino Clover	1 lb.	Ladino Clover	1 lb.
		Red Clover	2 lbs.
27. Bluegrass	6 lbs.	28. Bluegrass	8 lbs.
Smooth Bromegrass	4 lbs.	Smooth Bromegrass	4 lbs.
Timothy	2 lbs.	Timothy	4 lbs.
Birdsfoot Trefoil	6 lbs.		

How to Determine the Appropriate Tank Mix Concentration for Mixing Pesticides

A common mistake when using pesticides that leads to both surface and ground water contamination is mixing too heavy of a concentrated solution for spot spray applications. The chart below is intended to help an applicator understand what it means when a pesticide label calls for a particular percent solution. For example, if the label calls for a 2% solution and the sprayer being used has a 10 gallon tank, then 25.6 ounces of chemical will be mixed into the tank with 10 gallons of water and appropriate adjuvants.

WHAT DOES "% SOLUTION" MEAN?

SPRAYER SIZE (gallons)	SOLUTIONS CONCENTRATION (ounces-pints-quarts-gallons)					
	1/2%	1%	1.50%	2%	2.50%	3%
1	0.64	1.28	1.92	2.56	3.2	3.84
3	1.92	3.84	5.76	7.68	9.6	11.52
5	3.2	6.4	9.6	12.8	1 pt	19.2
10	6.4	12.8	19.2	25.6	1 qt	38.4
15	9.6	19.2	28.8	38.4	3 pt	57.6
20	12.8	25.6	38.4	51.2	2 qt	76.8
25	1 pt	1 qt	3 pt	2 qt	5 pt	3 qt
30	19.2	38.4	57.6	76.8	3 qt	115.2
35	22.4	44.8	67.2	89.6	7 pt	134.4
40	25.6	51.2	76.8	102.4	1 gl	153.6
45	28.8	57.6	86.4	115.2	9 pt	172.8
50	1 qt	2 qt	3 qt	1 gl	5 qt	6 qt
55	35.2	70.4	105.6	140.8	11 pt	211.2
60	38.4	76.8	115.2	153.6	6 qt	230.4
65	41.6	83.2	124.8	166.4	13 pt	249.6
70	44.8	89.6	134.4	179.2	7 qt	268.8
75	3 pt	3 qt	9 pt	6 qt	15 pt	9 qt
80	51.2	102.4	153.6	204.8	2 gl	307.2
85	54.4	108.8	163.2	217.6	17 pt	326.4
90	57.6	115.2	172.8	230.4	9 qt	345.6
95	60.8	121.6	182.4	243.2	19 pt	364.8
100	2 qt	1 gl	6 qt	2 gl	10 qt	3 gl

16 ounces = 1 pint = 0.5 quart = 0.125 gallon

23 ounces = 2 pint = 1 quart = 0.25 gallon

128 ounce = 8 pint = 4 quart = 1 gallon



The West Virginia Conservation Agency is proud of its "Conservation Partnership" with the following entities: WV Association of Conservation Districts, WV Association of Conservation Districts Auxiliary, WV Soil & Water Conservation Society, WV Association of Professional Soil Scientists, WV Resource Conservation & Development Association, WV Conservation Districts, WV Conservation Agency, USDA Natural Resources Conservation Service, USDA Farm Service Agency.

Through the guidance of this agency and its partnership, also including six RC&D councils, resources are brought to local communities and land users to address a broad range of priority conservation issues. This cooperative, grass roots approach is proving to be an effective method for solving the natural resource management issues we face in West Virginia. The West Virginia Conservation Partnership is working with community leaders, local landowners and government agencies to build a productive State that exists in harmony with its environment.

The West Virginia Conservation Agency (WVCA) coordinates statewide conservation efforts. The West Virginia State Code charges the WVCA (in Chapter 19-21A-2) to conserve natural resources, control floods, prevent impairment of dams and reservoirs, assist in maintaining the navigability of rivers and harbors, conserve wildlife, protect the tax base, protect public lands and protect and promote the health, safety and general welfare of the people.

The West Virginia State Conservation Committee is the board of directors for the WVCA. It consists of nine members (four serving Ex Officio) and includes the Director of the West Virginia University State Cooperative Extension Service, the Dean of the WVU College of Agriculture and Forestry, the Director of the West Virginia Division of Environmental Protection, the Forestry Administrator and the Commissioner of the West Virginia Department of Agriculture, who serves as chair. In addition, the Governor appoints four representative citizens as members to the Committee. The State Conservationist of the U.S.D.A. Natural Resources Conservation Service serves as an advisory member.

