



Natural Resources Conservation Service
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January 30, 2008

NATIONAL HANDBOOK OF CONSERVATION PRACTICES – NEW YORK

NOTICE 127

This notice transmits changes in the eFOTG and instructions for filing Conservation Practice Standards contained within National Notice 142. Attached is National Release Notice 142 for your information.

<u>Standards contained in National Notice 142</u> <i>deleted from eFOTG</i>			<u>New York Practice Standards</u> <i>released to eFOTG</i>		
	No.	DATE		No.	DATE
Conservation Cover	327	2/2000	Conservation Cover	327	1/2008
Contour Farming	330	2/2000	Contour Farming	330	1/2008
Contour Buffer Strips	332	3/1999	Contour Buffer Strips	332	1/2008
Critical Area Treatment	342	2/2003	Critical Area Treatment	342	1/2008
Field Border	386	10/2003	Field Border	386	1/2008
Irrigation System, Tailwater Recovery	447	8/2000	Irrigation System, Tailwater Recovery	447	1/2008
Prescribed Grazing	528	10/2003	Prescribed Grazing	528	1/2008
			Sinkhole and Sinkhole Area Treatment	527	1/2008
			Pathogen Management	783	1/2008

State Modifications: Modified Standards 327, 330, 332, and 386 by including the following statement in the CONSIDERATIONS section: "Include native plants that provide diverse pollen and nectar sources to encourage local pollinators." The remaining modifications are grammatical in nature.

Note: Interim Standard Pathogen Management (783) is being released pending National release.

File: The policy of NRCS in New York is to use the eFOTG website as the official reference for current Conservation Practice Standards <http://www.nrcs.usda.gov/technical/efotg/>. Old Standards will be archived at the State Office. This notice will be logged into the New York Directives Tabulation Sheet in the front of the hardcopy of the NHCP kept in the State Office. If your office retains a hard copy of the NHCP, log this notice in the Directives Tabulation Sheet in the front.

PAUL W. WEBB
 State Resource Conservationist

Attachments



Natural Resources Conservation Service
P.O. Box 2890
Washington, D.C. 20013

NHCP-1AI

NATIONAL HANDBOOK OF CONSERVATION PRACTICES
450 – VI
NOTICE 142

Purpose. This notice transmits new or revised conservation practice standards for insertion into the National Handbook of Conservation Practices (NHCP). In addition, notes are included to highlight key changes made to each document.

Effective Date. This notice is effective when received.

Explanation. New or revised National Conservation Practice Standards (NCPS):

Conservation Cover (Code 327): Changes were made throughout the standard. Added three new purposes for air quality, soil quality, and manage plant pests with additional criteria for each new purpose.

Contour Farming (Code 330): Changes were made throughout the standard. One new purpose was added to address water infiltration. Criteria have been modified for maximum row grade and ridge height. The specifications and plans section and operation and maintenance section have been revised.

Contour Buffer Strips (Code 332): Changes were made throughout the standard. The criteria for buffer strip arrangement, width, and vegetation has been revised to reflect new erosion prediction technology. The plans and specification section and the operation and maintenance section have been revised to more clearly define documentation for the layout and maintenance.

Critical Area Planting (Code 342): Changes were made throughout the standard. One new purpose to address coastal areas, such as sand dunes and riparian areas and additional criteria has been added to address this purpose. Under criteria for all purposes additional criteria have been added to not seed noxious plants. Additional detail has been added to the plans and specifications section.

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DIST: S, R, L, and C



Field Border (Code 386): Changes were made throughout the standard. The conditions where the practice applies has been revised to better define the perimeter and field edges where field borders apply. Additional criteria have been added for all purposes to better meet the intended purposes of the practice.

Irrigation System, Tailwater Recovery (Code 447): Changes were made throughout the standard. The conditions where the practice applies have been changed to include pumping plants, and irrigation pits were renamed as irrigation collecting basins. Additional considerations have been added for water quantity due to rainfall runoff, and effects on visual resources.

Sinkhole and Sinkhole Area Treatment (Code 527): This is a new standard created to provide criteria for the treatment and reclamation of lands impacted by sinkholes in Karst topography.

Prescribed Grazing (Code 528): This practice was revised to add two new purposes and supporting criteria. General criteria was clarified, references were added to provide more information and there were minor editorial changes in the remainder of the standard.

Instructions. Replace the Contents pages i through vi dated May 2006 in the NHCP with the attached revised Contents pages.

Insert the new or revised standards in the NHCP in alphabetical order as designated on the revised Contents pages.

Remove and archive, as appropriate, the practice standards for: Conservation Cover (Code 327) dated , Contour Farming (Code 330) dated , Contour Buffer Strips (Code 332) dated , Critical Area Treatment (Code 342) dated , Field Border (Code 386) dated , Irrigation System, Tailwater Recovery (Code 447) dated , Sinkhole and Sinkhole Area Treatment (Code 527) dated, and Prescribed Grazing (Code 528) dated . Also, in NHCP Notice 141, Above Ground, Multi-Outlet Pipeline (431) replaced Rigid Gated Pipeline (430HH); however, the notice did not direct the removal 430HH from the NHCP. Remove and archive, as appropriate the practice standard Rigid Gated Pipeline (430HH).

Moreover, NHCP, Chapter 3, Index, has been updated to reflect a change in discipline responsibility for the conservation practice Prescribed Burning (Code 338) from the National Forester to the Grazingland Specialist. Also, previously the Index incorrectly displayed Tree/Shrub Site Preparation (Code 490), this has been corrected.

Copies of this notice and the attachments are being sent to all State offices (or equivalent) and National Centers. Additional copies may be obtained by ordering NHCP-1AI from the NRCS Publications Web page at <http://landcare.sc.egov.usda.gov/> or by calling 1-888-LANDCAR.

This notice and each of the conservation practice standards included with this notice can be accessed electronically. Access can be through either the NRCS homepage on the World Wide Web at <http://www.nrcs.usda.gov/technical/Standards/nhcp.html> or from the FTP server at <ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/>.

Federal Register Notices.

The National Conservation Practice Standards Subcommittee (NCPSS) published notice of intent to revise or adopt these standards in the *Federal Register* in May 2006. Comments from the public were accepted for 30 days.

Guidance to the States and the Pacific Islands and Caribbean Areas can be found in Title 450, Technology, General Manual, Section 401.19 for complying with the provisions of the 1996 Farm Bill that require advertising for public comment prior to revising NRCS State-level technical guides.

NOLLER P. HERBERT
Acting Director
Conservation Engineering Division

DIANE E. GELBURD
Director
Ecological Sciences Division

Attachments

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CONSERVATION COVER

(Ac.)

CODE 327

DEFINITION

Establishing and maintaining permanent vegetative cover

PURPOSE

This practice may be applied to accomplish one or more of the following:

- Reduce soil erosion and sedimentation.
- Improve water quality.
- Improve air quality
- Enhance wildlife habitat
- Improve soil quality
- Manage plant pests

CONDITION WHERE PRACTICE APPLIES

This practice applies on all lands needing permanent vegetative cover. This practice does not apply to plantings for forage production or to critical area plantings.

CRITERA

General Criteria Applicable to All Purposes

Species shall be adapted to soil, ecological sites, and climatic conditions.

Species planted shall be suitable for the planned purpose and site conditions.

Seeding rates and methods shall be adequate to accomplish the planned purpose. Certified seed shall be used.

Planting dates, planting methods and care in handling and planting of the seed or planting stock shall ensure that planted materials have an acceptable rate of survival. Vegetative planting material (e.g. sprigs, rhizomes, bulbs) shall be from a reliable supplier.

Site preparation shall be sufficiently adequate to eliminate weeds for establishment and growth of selected species.

Timing and use of equipment shall be appropriate for the site and soil conditions.

All nutrients shall be applied following the nutrient management requirements in the Field Office Technical Guide (FOTG).

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide](#).

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Additional Criteria to Reduce Soil Erosion and Sedimentation

The amount of plant biomass and cover needed to reduce wind and water erosion to the planned soil loss objective shall be determined using the current approved wind and/or water erosion prediction technology.

Additional Criteria for Improving Air Quality

In perennial crop systems such as orchards, vineyards, berries and nursery stock, vegetation established shall provide full ground coverage in the alleyway during mowing and harvest operations.

To sequester carbon, plant cover established will result in a positive CO₂ equivalent value when determined by the current approved carbon prediction technology.

Additional Criteria for Enhancing Wildlife Habitat

Grasses, forbs, shrubs and/or legumes shall be planted in a diverse mix to promote bio-diversity and meet the needs of the targeted species of wildlife.

Additional Criteria to Improve Soil Quality

Plants will be selected on the basis of producing high volumes of organic material to maintain or improve soil organic matter. The amount of biomass needed will be determined using the current soil condition index procedure.

Additional Criteria to Manage Plant Pests

In perennial crop systems such as orchards, vineyards, berries and nursery stock, permanent vegetative cover shall be established and managed according to Cornell University Integrated Pest Management (IPM) recommendations for the target pest species.

CONSIDERATIONS

This practice may be used to promote the conservation of wildlife species in general, including threatened and endangered species.

Certified seed and planting stock that is adapted to the site should be used when it is available.

Inoculating legume seed with the proper Rhizobium bacteria should be considered on sites where the legumes to be planted have not been previously grown.

Mowing may be needed during the establishment period to reduce competition from broadleaf annual weeds.

On sites where annual grasses are an expected weed problem it may be necessary to postpone nitrogen fertilizer application until the planted species are well established.

Where applicable this practice may be used to conserve and stabilize archeological and historic sites.

Consider rotating management and maintenance activities (e.g. mow only one-fourth or one-third of the area each year) throughout the managed area to maximize spatial and temporal diversity.

Where wildlife management is an objective, the food and cover value of the planting can be enhanced by using a habitat evaluation procedure to aid in selecting plant species and providing or managing for other habitat requirements necessary to achieve the objective.

Use native species that are appropriate for the identified resource concern and management objective. Consider trying to re-establish the native plant community for the site

Include native plants that provide diverse pollen and nectar sources to encourage local pollinators.

If a native cover (other than what was planted) establishes, and this cover meets the intended purpose and the landowner's objectives, the cover should be considered adequate.

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PLANS AND SPECIFICATIONS

Specifications for this practice shall be prepared for each site. They shall include, but are not limited to:

- recommended species,
- seeding rates and dates,
- establishment procedures,
- other management actions needed to insure an adequate stand

Specifications shall be recorded using approved specifications sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Mowing and harvest operations in perennial crop systems such as orchards, vineyards, berries and nursery stock shall be done in a manner which minimizes the generation of particulate matter.

Maintenance practices and activities shall not disturb cover during the reproductive period for the desired species. Exceptions should be considered for periodic burning or mowing when necessary to maintain the health of the plant community.

Maintenance measures must be adequate to control noxious weeds and other invasive species.

To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife.

REFERENCES

K. G. Renard, G. R. Foster, G. A. Weesies, K. D. K. McCool and D. C. Yoder. 1997. Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE), Agricultural Handbook Number 703.

Revised Universal Soil Loss Equation Version 2 (RUSLE2) website (checked May 2007):
http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CONTOUR FARMING

(Ac.)

CODE 330

DEFINITION

Using ridges and furrows formed by tillage, planting and other farming operations to change the direction of runoff from directly downslope to around the hillslope.

PURPOSE

This practice is applied to achieve one or more of the following:

- ◆ Reduce sheet and rill erosion.
- ◆ Reduce transport of sediment, other solids and the contaminants attached to them.
- ◆ Increase water infiltration

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on sloping land where annual crops are grown. For orchards, vineyards and nut crops use the practice Contour Orchard and Other Fruit Areas, code 331.

CRITERIA

General Criteria Applicable to All Purposes

Minimum Row Grade - The crop rows shall have sufficient grade to ensure that runoff water does not pond and cause unacceptable crop damage.

Maximum Row Grade - The maximum row grade shall not exceed:

- one-half of the up-and-down hill slope percent used for conservation planning, or
- 10 percent or whichever is less.

Up to a 25% deviation from the design row grade is permitted within 150 feet of a stable outlet.

When the row grade reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line and used for layout of the next contour pattern.

Minimum Ridge Height

- **Row spacing greater than 10 inches.** The minimum ridge height shall be 2 inches during the period of the rotation that is most vulnerable to sheet and rill erosion. Ridge height will be determined using the current approved erosion prediction technology.
- **Row spacing 10 inches or less.** The minimum ridge height shall be one inch for close-grown crops, such as small grains. Plant height shall be at least 6 inches high and the spacing between plants

within the row shall not be greater than 2 inches during the time most vulnerable to sheet and rill erosion.

The minimum ridge height criteria are not required when the practice Residue and Tillage Management, No Till/Strip Till/Direct Seed (code 329) is used on the contour and at least 50 percent surface residue cover is present between the rows after planting.

Stable Outlets - Surface flow from contoured fields shall be delivered to stable outlets.

Additional Criteria to Increase Water Infiltration

Row Grade - The maximum row grade shall not exceed 0.2%.

CONSIDERATIONS

General - Several factors influence the effectiveness of contour farming to reduce soil erosion. These factors include: 10-year, 24-hour rainfall in inches; ridge height; row grade; slope steepness; soil hydrologic group; cover and roughness; and slope length. Cover and roughness, row grade, and ridge height can be influenced by management and provide more or less benefit depending on design.

Contour farming is most effective on slopes between 2 and 10 percent. This practice will be less effective in achieving the stated purpose(s) on slopes exceeding 10 percent and in areas with 10-year, 24-hour rainfall of about 6.5 inches. The practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria.

This practice is most effective on slopes between 100 and 400 feet long. On slopes longer than 400 feet, the volume and velocity of overland flow exceeds the capacity of the contour ridges to contain them. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities, thus increasing the slope length at which this practice is effective. Increasing roughness alone is not sufficient to produce this effect.

The closer the row grade is to the true contour, the greater will be the erosion reduction.

Prior to design and layout, obstruction removal and changes in field boundaries or shape should be considered, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

When the intersection of crop rows with the field edge is not perpendicular, a Field Border (code 386) may be needed to allow farm implements room to turn.

If using Residue and Tillage Management, Ridge Till on the contour, avoid crossing over ridged rows at correction areas because, this will destroy the effectiveness of the ridges. Sod turn strips may be established if correction areas are unavoidable.

The width of correction areas, and the distance between baselines, should be adjusted for equipment operation widths.

Ridge Height - Ridge height is created by the operation of tillage and planting equipment. The greater the ridge height, the more effective the operation is in slowing overland flow. The RUSLE 2 Operations database contains the ridge height value for each field operation.

Stable Outlets - Grassed waterways, water and sediment control basins, underground outlets, or other suitable practices should be used to protect areas of existing or potential concentrated flow erosion.

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice shall be prepared for each field according to the Criteria, Considerations, and Operation and Maintenance described in this standard. The plans shall include, as a minimum:

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- Percent land slope used for conservation planning;
- The minimum and maximum allowable row grades for the contour system;
- A sketch map or photograph of the field showing:
 - ◊ the approximate location of the baselines used to establish the system;
 - ◊ the location of stable outlets for the system

Specifications shall be recorded using approved specification sheets, job sheets, narrative statements in the conservation plan, or other acceptable documentation.

OPERATION AND MAINTENANCE

Perform all tillage and planting operations parallel to contour baselines or terraces, diversions, or contour buffer strip boundaries where these practices are used, provided the applicable row grade criteria are met.

Where terraces, diversions, or contour buffer strips are not present, maintain contour markers on grades that, when followed during establishment of each crop, will maintain crop rows at designed grades. Contour markers may be field boundaries, a crop row left untilled near or on an original contour baseline or other readily identifiable, continuous, lasting marker. All tillage and planting operations shall be parallel to the established marker. If a marker is lost, re-establish a contour baseline within the applicable criteria set forth by this standard prior to seedbed preparation for the next crop.

Farming operations should begin on the contour baselines and proceed both up and down the slope in a parallel pattern until patterns meet. Where field operations begin to converge between two non-parallel contour baselines, establish a correction area that either is permanently in sod, established to an annual close-grown crop.

Where contour row curvature becomes too sharp to keep machinery aligned with rows during field operations, establish sod turn strips on sharp ridge points or other odd areas as needed.

REFERENCES

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (In Draft) USDA-ARS, Washington, DC 2005

Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook 703.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

CONTOUR BUFFER STRIPS

(Ac.)

CODE 332

DEFINITION

Narrow strips of permanent, herbaceous vegetative cover established around the hill slope, and alternated down the slope with wider cropped strips that are farmed on the contour.

PURPOSE

This practice is applied to achieve one or more of the following:

- Reduce sheet and rill erosion.
- Reduce transport of sediment and other water-borne contaminants downslope
- Increase water infiltration

CONDITIONS WHERE PRACTICE APPLIES

This practice applies on all sloping cropland, including orchards, vineyards and nut crops.

Where the width of the buffer strips will be equal to or exceed the width of the adjoining crop strips, the practice Stripcropping (code 585) applies.

CRITERIA

General Criteria Applicable to All Purposes

Surface flow from contoured crop rows must be delivered to a stable outlet.

The width of the cropped strip shall be designed to accommodate some multiple of full equipment width.

No plants listed on the noxious weed list of the state will be established in a buffer strip cropping system.

Buffer strips shall not be used as travel lanes for livestock or equipment.

Buffer strips are not a part of the normal crop rotation, and shall remain in the location they were originally established until they need to be renovated or re-established.

Row Grade. When the row grade of any crop strip reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last buffer strip and used for the layout of the next crop strip.

Arrangement of Strips. A crop strip shall occupy the area at the top of the hill, unless unusually complex topography requires vegetating this area in order to establish a farmable system.

When used in combination with terraces, diversions or water and sediment control basins, the layout of the buffer strips shall be coordinated with the grade and spacing of the terraces so that the buffer strip

boundaries will parallel the terraces as closely as possible. The buffer strip shall be located immediately upslope from the terrace channel or the storage area of the water and sediment control basin.

Additional Criteria to Reduce Sheet and Rill Erosion

Minimum Row Grade. The cropped strips shall have sufficient row grade to ensure that runoff water does not pond and cause unacceptable crop damage.

Maximum Row Grade. The maximum row grade shall not exceed:

- one-half of the up-and-down hill slope percent used for conservation planning,
or
- 2%, whichever is less.

Up to 3% row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

When the row grade reaches the maximum allowable design grade, a new baseline shall be established up or down slope from the last contour line and used for layout of the next contour pattern.

Width of Strips. The minimum width shall be

- at least than 15 feet wide for strips planted to grasses or grass-legume mixtures with at least 50% grass and
- At least 30 feet wide when legumes are used alone or legumes make up more than 50% of the stand.

Buffer strip widths shall be increased as needed to keep the width of the cropped strips uniform.

Cropped strips shall be of uniform width between buffer strips and shall not exceed 50% of the slope length (L), used for the erosion calculation.

Vegetation. Buffer strips designed to reduce sheet and rill erosion shall be established to permanent vegetation consisting of grasses, legumes or grass-legume mixtures.

Species established shall be adapted to the site, and tolerant of the anticipated depth of sediment deposition.

The buffer strips shall have at least 95% ground cover during periods when erosion is expected to occur on the cropped strips.

The stem density for grasses and grass-legume mixtures shall be at least 50 stems per square foot, and for pure legume stands at least 30 stems per square foot.

Additional Criteria to Reduce the Transport of Sediment and Other Water-Borne Contaminants Downslope

Minimum Row Grade. The cropped strips shall have sufficient row grade to ensure that runoff water does not pond and cause unacceptable crop damage.

Maximum Row Grade. The maximum row grade within the crop strips shall not exceed

- one-half of the up-and-down-hill field slope used for conservation planning,
or
- 2%, whichever is less.

Up to 3% row grade is allowed for a maximum of 150 feet as crop rows approach a stable outlet.

Vegetation. Buffer strips designed for this purpose shall be established to permanent sod-forming vegetation with stiff, upright stems.

Width of Strips. Buffer strips for this purpose shall be at least 15 feet wide. The buffer strip widths shall be increased as needed to keep the width of the cropped strips uniform.

The maximum width of cropped strips shall be one-half of the field slope length or 150 feet, whichever is less.

Arrangement of Strips. In addition to the buffer strips established on the hillside, a buffer strip will be established at the bottom of the slope. This strip shall be two times the width of the narrowest buffer strip in the system.

Additional Criteria to Increase Water Infiltration

Row Grade. The grade along the upper edge of the buffer strip shall not exceed 0.2%

CONSIDERATIONS

General. Several factors influence the effectiveness of contour farming to reduce soil erosion. These factors include: 10-year, 24-hour rainfall in inches; ridge height; row grade; slope steepness; soil hydrologic group; cover and roughness; and slope length. Cover and roughness, row grade, and ridge height can be influenced by management and provide more or less benefit depending on design.

Contour farming is most effective on slopes between 2 and 10 percent. This practice will be less effective in achieving the stated purpose(s) on slopes exceeding 10 percent and in areas with 10-year, 24-hour rainfall of about 6.5 inches. The practice is not well suited to rolling topography having a high degree of slope irregularity because of the difficulty meeting row grade criteria.

This practice is most effective when the slope length on the cropped strips is between 100 and 400 feet long. On slopes longer than 400 feet, the volume and velocity of overland flow exceeds the capacity of the contour ridges to contain them. Increasing residue cover and roughness will change the vegetative cover-management conditions and decrease overland flow velocities, thus increasing the slope length at which this practice is effective. Increasing roughness alone is not sufficient to produce this effect.

Contour buffer strips are more difficult to establish on undulating to rolling topography because of the difficulty of maintaining parallel strip boundaries across the hill slope or staying within row grade limits.

Areas of existing or potential concentrated flow erosion should be protected by conservation practices such as grassed waterways, water and sediment control basins, or diversion terraces.

Where contour row curvature becomes too sharp to keep equipment aligned with rows during field operations, increasing the buffer strip width can help avoid sharp ridge points. In drainage ways, establishing grassed waterways at least up to the point of sharp curvature can allow the equipment to be lifted and/or turned to meet the same rows across the turn strip.

Prior to design and layout, remove any obstructions and/or make changes in field boundaries or shape, where feasible, to improve the effectiveness of the practice and the ease of performing farming operations.

Prior to layout, inspect the field's position on the landscape to find key points for starting layout or getting the width of one set of strips (one cultivated and one buffer) to pass by an obstruction or ridge saddle.

Whenever possible, run strip boundaries parallel with fence lines or other barriers.

Wildlife Food and Cover. The following management activities may be carried out to enhance wildlife benefits as long as they do not compromise the effectiveness of the buffer strips:

- Plant herbaceous species that provide habitat enhancement for the wildlife species of concern.
- Add native forbs to the seeding mixture to increase habitat diversity.
- Mow the buffer strips every other year or every third year depending upon geographical location. The standing cover provides early and late season nesting and escape cover for many species of wildlife displaced from adjacent disturbed areas.

- Delay mowing until after the nesting period of ground-nesting species, but mow early enough to allow for regrowth before the growing season ends.

PLANS AND SPECIFICATIONS

Specifications for installation, operation and maintenance of Contour Buffer Strips shall be prepared for each field according to the Criteria, Considerations and Operations and Maintenance described in this standard. The plans shall include, as a minimum,

- Percent land slope used for conservation planning;
- The minimum and maximum allowable row grades for the contour system;
- The designed width of the buffer strips
- The species to be established in the buffers strips
- A sketch map or photograph of the field showing:
 - ◇ the approximate location of the baselines used to establish the system;
 - ◇ the location of stable outlets for the system

This and other pertinent information shall be recorded on specification sheets, job sheets, in practice narratives in conservation plans, or other acceptable documentation.

OPERATION AND MAINTENANCE

Conduct all farming operations parallel to the strip boundaries except on headlands or end rows with gradients less than the criteria set forth in this standard.

Time mowing of buffer strips to maintain appropriate vegetative density and height for optimum trapping of sediment from the upslope cropped strip during the critical erosion period(s).

Fertilize buffer strips as needed to maintain stand density.

Mow sod turn strips and waterways at least once a year.

Spot seed or totally renovate buffer strip systems damaged by herbicide application after residual action of the herbicide is complete.

Redistribute sediment that accumulates along the upslope edge of the buffer strip/crop strip interface as needed. This sediment shall be spread evenly upslope over the cultivated strip when needed to maintain uniform sheet flow along the buffer/cropped strip boundary.

If sediment accumulates just below the upslope edge of the buffer strip to a depth of 6 inches or more, or stem density falls below specified amounts in the buffer strip, relocate the buffer/cropped strip interface location.

Cultivated strips and buffer strips shall be rotated so that a mature stand of protective cover is achieved in a newly established buffer strip immediately below or above the old buffer strip before removing the old buffer to plant an erosion-prone crop. Alternate repositioning of buffer strips to maintain their relative position on the hill slope.

Renovate vegetated headlands or end row area as needed to keep ground cover above 65 percent.

REFERENCES

Foster, G.R. Revised Universal Soil Loss Equation, Version 2 (RUSLE2) Science Documentation (In Draft). USDA-ARS, Washington, DC. 2005.

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Renard, K.G., G.R. Foster, G.A. Weesies, D.K. McCool, and D.C. Yoder, coordinators. 1997. Predicting soil erosion by water: A guide to conservation planning with the Revised Universal Soil Loss Equation (RUSLE). U.S. Department of Agriculture, Agriculture Handbook 703.

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

CRITICAL AREA PLANTING

(Ac.)

CODE 342

DEFINITION

Establishing permanent vegetation on sites that have or are expected to have high erosion rates, and on sites that have physical, chemical or biological conditions that prevent the establishment of vegetation with normal practices.

PURPOSE

- Stabilize areas with existing or expected high rates of soil erosion by water.
- Stabilize areas with existing or expected high rates of soil erosion by wind.
- Rehabilitate and revegetate degraded sites that cannot be stabilized through normal farming practices.
- Stabilize coastal areas, such as sand dunes and riparian areas.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to highly disturbed areas such as active or abandoned mined lands, urban conservation sites, road construction areas, conservation practice construction sites, areas needing stabilization before or after natural disasters such as floods, hurricanes, tornados and wildfires and other areas degraded by human activities or natural events.

CRITERIA

General Criteria Applicable To All Purposes

A site investigation shall be conducted to identify any physical, chemical or biological conditions that could affect the successful establishment of vegetation.

Species selected for seeding or planting shall be suited to current site conditions and intended uses.

No plants on the state noxious weeds list shall be planted.

Selected species will have the capacity to achieve adequate density and vigor within an appropriate period to stabilize the site sufficiently to permit suited uses with ordinary management activities.

Species, rates of seeding or planting, minimum quality of planting stock, such as pure live seed (PLS) or stem caliper, method of seedbed preparation, and method of establishment shall be specified before application. Only viable, high quality seed or planting stock will be used.

Seeding or planting shall be done at a time and in a manner that best ensures establishment and growth of the selected species a temporary cover and/or mulch may be necessary. What constitutes successful establishment, e.g. minimum percent ground/canopy cover, percent survival, stand density, etc. shall be specified before application.

Conservation practice standards are reviewed periodically and updated if needed. To obtain the current version of this standard, contact your Natural Resources Conservation Service [State Office](#) or visit the [electronic Field Office Technical Guide](#).

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Planting dates shall be scheduled during approved dates for the species and to optimize soil moisture for germination and/or establishment.

Apply soil amendments (e.g. lime, fertilizer, compost) at rates necessary to insure stand establishment.

Plantings shall be protected from pests (e.g. weeds, insects, diseases, livestock, wildlife) as necessary to ensure stand establishment.

All soil amendment application and pest control shall follow the requirements in the Field Office Technical Guide (FOTG).

The amount of plant biomass and cover needed to reduce wind and water erosion to the planned soil loss objective shall be determined using the current approved wind and/or water erosion prediction technology.

Additional Criteria to Restore Degraded Sites

If gullies or deep rills are present, they will be treated, if feasible, to allow equipment operation and ensure proper site and seedbed preparation.

Based on a soil test, soil amendments will be added as necessary to ameliorate or eliminate physical or chemical conditions that inhibit plant establishment and growth. Required amendments, such as compost or manure to add organic matter and improve soil structure and water holding capacity; agricultural limestone to increase the pH of acid soils; or elemental sulfur to lower the pH of calcareous soils shall be included in the site specification with amounts, timing, and method of application.

Additional Criteria to Restore Sand Dunes and Coastal Sites

Plants for sand dunes and coastal sites must be able to survive being buried by blowing sand, sand blasting, salt spray, salt water flooding, drought, heat, and low nutrient supply.

Local plant lists including appropriate species shall be developed and utilized.

Sand trapping devices such as sand fences or brush matting shall be included in the revegetation/stabilization plans where applicable.

CONSIDERATIONS

Species or mixes that are adapted to the site and have multiple values should be considered. Native species should be considered when appropriate to site treatment.

Avoid species that may harbor pests. Species diversity should be considered to avoid loss of function due to species-specific pests.

Plans should be in compliance with the Migratory Bird Treaty Act.

Planning and installation of other conservation practices such as Diversions, Land Smoothing, Obstruction Removal, Surface and Subsurface Drains or Underground Outlets may be necessary to prepare a critical area for planting.

If mulching is needed, follow the Mulching (484) standard.

When planning nutrient applications and tillage applications, encourage soil carbon buildup while discouraging greenhouse gas emissions.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or management unit according to the criteria and operation and maintenance sections of this standard. Specifications shall describe the requirements for applying this practice to meet the intended purpose.

Record practice specifications using approved specification sheets, job sheets or other acceptable documentation.

The following elements shall be addressed in the plan, as applicable, to meet the intended purpose.

- Site Preparation
- Topsoil
- Fertilizer Application
- Seedbed/Planting Bed Preparation
- Methods of Seeding/Planting
- Time of Seeding/Planting
- Selection of Species
- Seed/Plant Source
- Seed Analysis
- Rates of Seeding
- Mulching
- Planting Trees, Shrubs and Vines
- Supplemental Water for Plant Establishment
- Protection of Plantings

OPERATION AND MAINTENANCE

Use of the area shall be managed as long as necessary to stabilize the site and achieve the intended purpose.

Control or exclude pests that will interfere with the timely establishment of vegetation.

Inspections, reseeding or replanting, fertilization, and pest control may be needed to insure that this practice functions as intended throughout its expected life. Observation of establishment progress and success should be performed at regular intervals until the practice has met the criteria for successful establishment and implementation.

Where establishment of vegetation creates potential habitat for grass-nesting birds, the impacts of vegetative disturbance upon these birds and their nests should be considered and included in operation and maintenance plans. Maintenance activities that result in disturbance of vegetation will not be conducted during the primary nesting season for grass-nesting birds where occupied habitat for these species exists.

REFERENCES

USDA, NRCS. 2006. The PLANTS Database (<http://plants.usda.gov>, 19 October 2006). National Plant Data Center, Baton Rouge, LA 70874-4490 USA.

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

FIELD BORDER

(Ac.)

CODE 386

DEFINITION

A strip of permanent vegetation established at the edge or around the perimeter of a field.

PURPOSE

This practice may be applied to accomplish one or more of the following:

- Reduce erosion from wind and water
- Protect soil and water quality
- Manage pest populations
- Provide wildlife food and cover
- Increase carbon storage
- Improve air quality

CONDITIONS WHERE PRACTICE APPLIES

This practice is applied around the perimeter of fields. Its use can support or connect other buffer practices within and between fields. This practice may also apply to recreation land or other land uses where agronomic crops including forages are grown.

CRITERIA

General Criteria Applicable to All Purposes

Field borders shall be established around the field edges to the extent needed to meet the resource needs and producer objectives. Minimum field border widths shall be based on local design criteria specific to the purpose or purposes for installing the practice.

The field borders shall be established to adapted species of permanent grass, legumes and/or shrubs that accomplish the design objective and do not function as host for diseases of the field crop.

Plants selected for field borders will have the physical characteristics necessary to control wind and water erosion to tolerable levels on the field border area.

Seedbed preparation, seeding rates, dates, depths, fertility requirements, and planting methods will be consistent with approved local criteria and site conditions.

Ephemeral gullies and rills present in the planned border area will be eliminated as part of seedbed preparation. If present, ephemeral gullies and rills located immediately upslope from the planned border area need to be treated to ensure more of a sheet flow into the planned border area.

Additional Criteria to Reduce Erosion from Wind and Water

Field border establishment, in conjunction with other practices, will be timed so that the soil will be adequately protected during the critical erosion period(s).

Establish stiff-stemmed, upright grasses, grass/legumes or forbs to trap wind- or water-borne soil particles.

The amount of surface and/or canopy cover needed from the field border shall be determined using current approved water and wind erosion prediction technology. Calculations shall account for the effects of other practices in the management system.

Wind Erosion Reduction. Locate borders to provide a stable area on the windward edge of the field as determined by prevailing wind direction data.

Minimum height of grass or forbs shall be one foot during the critical erosion period.

Water Erosion Reduction. Locate borders to eliminate sloping end rows, headlands, and other areas where concentrated water flows will enter or exit the field.

Orient plant rows as closely as possible to perpendicular to sheet flow direction.

Additional Criteria to Protect Soil and Water Quality

Do not burn the field border if the main goal of the field border is to protect soil or water quality.

Reducing Runoff and Increasing Infiltration. Locate borders around the perimeter of the field, or as a minimum, install borders to eliminate sloping end rows, headlands and other areas where concentrated water flows will enter or exit the field.

Water Quality – Adsorbed, Dissolved and Suspended Contaminants. As a minimum, locate field borders along the edge(s) of the field where runoff enters or leaves the field. The minimum width for this purpose shall be 30 feet and have a vegetation stem density/retardance of moderate to high (e.g. equivalent to a good stand of wheat).

Design border widths to comply with all applicable State and local regulations regarding manure and chemical application setbacks.

Reducing Soil Compaction from Equipment Parking and Traffic. Border widths will be designed to accommodate equipment turning, parking, loading/unloading equipment, grain harvest operations, etc.

Additional Criteria to Manage Pest Populations

Provide a Harbor for Beneficial organisms (e.g. insects, mites, etc.). Include appropriate plants that attract beneficial organisms that prey on target pests.

Mowing, harvesting, pesticide applications and other disturbance activities will be scheduled to accommodate life cycle requirements of the beneficial organisms.

Provide a Habitat to Cause Pests to Congregate. Select plants for the field border that attract pests (e.g. alfalfa strips planted to lure lygus bugs away from a cotton crop).

Additional Criteria to Provide Wildlife Food and Cover

Establish plant species that provide wildlife food and cover for the target wildlife species. Use the “New York General Wildlife Habitat Inventory” form to aid in selecting plant species and providing or managing for other habitat requirements necessary to achieve the objective.

Design border width and length to meet the habitat needs of the targeted wildlife species.

Schedule mowing, harvest, weed control, and other management activities within the field border to accommodate reproduction and other life cycle requirements of target wildlife species.

Vegetative successional state shall be maintained to accommodate target wildlife species requirements.

When wildlife is a concern, a lower percent groundcover than would be needed if protecting soil and water quality was the only goal is acceptable as long as the soil resource concern is also adequately addressed (i.e. no excessive soil loss). This may be achieved by simply increasing the field border width.

Additional Criteria to Increase Carbon Storage

Establish plant species that will produce adequate above- and below-ground biomass for the site (i.e. a positive soil conditioning index).

Maximize the width and length of the herbaceous border to fit the site and increase total biomass production.

Do not burn if the main goal of the field border is carbon storage.

Do not disturb the roots of the established vegetation with tillage.

Additional Criteria to Improve Air Quality

Establish plant species with morphological characteristics that optimize interception and adhesion of airborne particulates. Select plants with persistent roots and residue that stabilize soil aggregates and capture airborne soil particles.

Establish species resistant to damage from equipment traffic.

CONSIDERATIONS

Consider planting field borders around the entire field, not just on the field edges where water enters or leaves the field, for maximizing multiple resource protection.

Establishing a narrow strip of stiff-stemmed upright grass at the crop/field border interface can increase soil particle trapping efficiency of the field border.

Native plants are best suited for wildlife habitat enhancement and provide other ecological benefits where adapted to site conditions and when consistent with producer objectives.

Include native plants that provide diverse pollen and nectar sources to encourage local pollinator populations.

Use field borders as corridors to connect existing or planned habitat blocks.

Prescribed burning, strip disking, or selective herbicide applications are management tools that can be used to maintain suitable habitat for specifically desired wildlife species.

Overseed the field border with legumes for increased plant diversity, soil quality, and wildlife benefits.

Waterbars or berms may be needed to breakup or redirect concentrated water flow within the borders.

In selecting plant species to establish in the field border, among other items, consider the plant's tolerance to:

- Sediment deposition and chemicals planned for application
- Drought in arid areas or where evapotranspiration can potentially exceed precipitation during the field border's active growing period(s).
- Equipment traffic.

Design border widths to match the required field application setback widths for easier management (i.e. land-use and management changes occur in the same location).

Establish plant species that will have the desired visual effects and that will not interfere with field operations or field border maintenance.

Consider the amount of shading that the field border or portions of the field border may experience and select species for those locations accordingly.

The use of native perennial plant species as opposed to annual species provides a longer period of resource protection.

Consider installing a contour buffer system, No Till practice or other conservation practices on adjacent upland areas to reduce surface runoff and excessive sedimentation of field borders.

PLANS AND SPECIFICATIONS

Prepare plans and specifications for each field or treatment unit according to the Criteria included in this Standard. Specifications shall describe the requirements for applying this practice to meet the intended purpose. Record practice specifications on the Field Border 386, Conservation Practice Job Sheet. The following components shall be included for recording this specification:

- Field Border widths and lengths based on local design criteria.
- Field Border location(s) within the field(s) or farm boundary.
- Species to be used and the location and planting density of the species used.
- Site preparation requirements.
- Timing of planting and planting method.
- Liming or fertilizer requirements.
- Operation and maintenance requirements.

OPERATION AND MAINTENANCE

Field borders require careful management and maintenance for performance and longevity. The following O&M activities will be planned and applied as needed:

- Repair storm damage.
- Remove sediment from above or within the field border when accumulated sediment either alters the function of the field border or threatens the degradation of the planted species' survival.
- Shut off sprayers and raise tillage equipment to avoid damage to field borders.
- Shape and reseed border areas damaged by animals, chemicals, tillage, or equipment traffic.
- Maintain desired vegetative communities and plant vigor by liming, fertilizing, mowing, disking, or burning and controlling noxious weeds to sustain effectiveness of the border.
- Repair and reseed ephemeral gullies and rills that develop in the border.
- Minimally invasive tillage (e.g. paraplowing) may be performed in rare cases where compaction and vehicle traffic have degraded the field border function. The purpose of the tillage is strictly to decrease bulk density and increase infiltration rates so as to provide a better media for reestablishment of vegetation and field border function.
- Maintenance activities that result in disturbance of vegetation should not be conducted during the nesting season of grass nesting birds.
- To benefit insect food sources for grassland nesting birds, spraying or other control of noxious weeds shall be done on a "spot" basis to protect forbs and legumes that benefit native pollinators and other wildlife.
- Avoid vehicle traffic when soil moisture conditions are saturated.

NRCS, NY

January 2008

REFERENCES

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http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm.

**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

IRRIGATION SYSTEM, TAILWATER RECOVERY

(No.)

CODE 447

DEFINITION

A planned irrigation system in which all facilities utilized for the collection, storage, and transportation of irrigation tailwater and/or rainfall runoff for reuse have been installed.

PURPOSE

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

- Conserve irrigation water supplies
- Improve offsite water quality

CONDITIONS WHERE PRACTICE APPLIES

Tailwater recovery systems are suitable for use on lands that are served by a properly designed and installed irrigation system where recoverable irrigation runoff and/or rainfall runoff flows can be anticipated under current or expected management practices.

This standard applies to the planning and functional design of irrigation tailwater recovery systems including, but not limited to, pickup ditches, sumps, collecting basins, pumping plants and pipelines. It does not apply to detailed design criteria or construction specifications for individual structures or components of the recovery system.

CRITERIA

General Criteria Applicable To All Purposes

The installation and operation of a tailwater recovery system shall comply with all federal, state and local laws, rules and regulations.

Appropriate NRCS standards and specifications shall be used in the design and construction of facilities needed for a tailwater recovery system. The criteria for the design of components not addressed in a NRCS practice standard shall be consistent with sound engineering principles.

Collection Facilities. Facilities for the collection of irrigation tailwater can be an integral part of irrigation systems covered by NRCS Conservation Practice Standards (443), Surface and Subsurface Irrigation Systems and (442), Sprinkler Irrigation Systems. These facilities may include, but are not limited to, ditches, culverts, pipelines, water control and/or grade stabilization structures or other erosion control measures, as needed.

Storage Facilities. Facilities are needed to store the collected water until it is redistributed in the irrigation system. Runoff volume and rate, as well as the required level of water control at the point

where the tailwater is returned to the irrigation system, should be considered in determining the size of the storage facility.

For systems where tailwater is discharged into a collecting basin or regulating reservoir or into a pipeline having facilities for regulating fluctuating flows (i.e. a float valve), small sumps with frequently cycling pumping plants may be used. For systems unable to regulate flows, tailwater sumps or collection basins shall be made large enough to provide the regulation needed to permit efficient use of the water.

When energy sources for tailwater pump back systems are subject to interruption, safe emergency bypass areas cannot be provided, or tailwater discharges violate local or state regulations, tailwater storage requirements shall, as a minimum, include a volume adequate to store the complete runoff from a single irrigation set.

Sumps and collecting basins shall be equipped with inlets designed to protect the side slopes and the collection facilities from erosion. A dike, ditch, or water control structure shall be provided, if required by state law, to limit the entrance of rainfall runoff into the designed inlet. Sediment traps shall be installed as needed.

Conveyance Facilities. All tailwater recovery systems require facilities to convey water from the storage facility to a point of entry back into the irrigation system. These facilities may consist of a pumping plant and pipeline to return the water to the upper end of the field, or a gravity outlet having a ditch or pipeline to convey the water to a lower elevation in the irrigation system. Other components or combinations of components may be necessary as determined on a site-specific basis.

The capacity of conveyance facilities shall be determined by an analysis of the expected runoff rate, the planned irrigation collecting basin or regulating reservoir storage capacity, and the anticipated irrigation application. If the return flow is used as an independent irrigation supply rather than as a supplement to the primary irrigation water supply, the rate and volume of flow must be adequate for the method(s) of water application employed.

Additional Criteria Applicable To Improving Water Quality

Storage Facilities. Where additional storage is required to provide adequate retention time for the breakdown of chemicals in the runoff waters, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular chemical used.

Seepage from a storage facility shall be controlled to the extent possible when the storage facility is expected to receive chemical-laden waters. Control may be in the form of natural soil liners, soil additives, commercial liners, or other approved methods.

Where additional storage is required to provide for sediment deposition, storage facilities shall be sized accordingly. Allowable retention times shall be site specific to the particular soil type(s).

CONSIDERATIONS

Water Quantity

- Irrigation systems should be designed to limit tailwater volumes to that needed for effective operation. This reduces the need or minimizes the size and capacity of collection, storage, and transportation facilities.

Where tailwater recovery systems are used to collect rainfall runoff for storage and use as an irrigation water source, the size and capacity of collection and storage facilities will be sized according to expected runoff volumes and rates as well as the expected crop water needs.

- Changes in irrigation water management activities may be necessary to optimize the use of return flows.

- Downstream flows or aquifer recharge volumes dependent on runoff will be reduced and could cause undesirable environmental, social, or economic effects.

Water Quality

- Effects on surface and groundwater quality by the movement of sediment and soluble and sediment-attached substances should be considered. Chemical-laden water can create a potential hazard to wildlife, especially waterfowl that are drawn to ponded water.
- Nutrient and pest management measures should be planned to limit chemical-laden tailwater as much as practical.
- Protection of system components from storm events and excessive sedimentation should be considered.

Other Considerations

- This practice may adversely affect cultural resources and must comply with GM 420, Part 401 during planning, installation, and maintenance.
- Effects on the visual quality of water resources should be also considered.

PLANS AND SPECIFICATIONS

Plans and specifications for irrigation tailwater recovery systems shall be prepared for specific field sites in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An Operation and Maintenance plan specific to the facilities installed shall be prepared for use by the landowner or operator responsible for operation and maintenance. The plan should provide specific instructions for operating and maintaining facilities to ensure they function properly. The plan shall include provisions to address the following, as a minimum:

- Periodic cleaning and re-grading of collection facilities to maintain proper flow lines and functionality.
- Periodic checks and removal of debris as necessary from trash racks and structures to assure proper operation.
- Periodic removal of sediment from traps and/or storage facilities to maintain design capacity and efficiency.
- Inspection or testing of all pipeline and pumping plant components and appurtenances, as applicable.
- Routine maintenance of all mechanical components in accordance with the manufacturer's recommendations.

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD
SINKHOLE AND SINKHOLE AREA TREATMENT
(No.)
CODE 527

DEFINITION

The treatment of sinkholes and/or sinkhole areas to reduce contamination of groundwater resources, and/or improve farm safety.

PURPOSE

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

- To improve Water Quality.
- To improve farm safety.

CONDITIONS WHERE PRACTICE APPLIES

On any land surface or existing practice where the soils and geologic conditions have led to the development of sinkholes.

CRITERIA**General Criteria Applicable to all Purposes**

The installation and operation of sinkhole treatment(s) will comply with all federal, state, and local laws, rules, and regulations.

A geologic investigation of the potential impact of the treatment on ground water, surface water, and the karst features will be conducted by a qualified geologist.

Trash and other material will be removed from the sinkhole and disposed of in an environmentally sound manner.

Excess surface water caused by construction activities will be diverted from the sinkhole area in accordance with the Conservation Practice Standard Diversion (Code 362).

Nutrient management (Code 590) and pest management (Code 595) plans will be developed for the drainage area of the sinkhole controlled by the landowner.

Vegetative Treatment

All sinkholes treated will have a vegetated buffer a minimum of 25 feet wide measured from the rim of the sinkhole. The buffer area may be extended to control concentrated flow channels entering the sinkhole. Vegetative buffers for the treatment of sinkhole areas will follow Riparian Forest Buffer (Code 391), Riparian Herbaceous Cover (Code 390), and/or Filter Strip (Code 393). The width of the vegetated buffer will be established and maintained in accordance with the type of buffer chosen. The sinkhole and surrounding buffer will be fenced in accordance with Conservation Practice Standard Fence (Code 382).

Livestock will be excluded from the vegetative buffer except where applicable for maintenance purposes.

Nutrients, herbicides, pesticides, and animal waste will not be applied within an established buffer. Only mechanical treatments shall be used for weed control.

Appropriate erosion and sediment control measures will be used to reduce the amount of sediment entering sinkhole openings during the establishment of the vegetative buffer.

Surface Water Control

Changes to the volume of surface water that enters a sinkhole may disturb the underground hydrology. To the extent possible, the surface water flow should be maintained at historic (or predevelopment) volumes.

Pre-existing concentrated flow channels will be stabilized but should not otherwise be altered. If a plug or inverted filter is used, the area to be protected will be characterized by a qualified geologist. Concentrated flow caused by the construction activities will be dispersed with a suitable spreading structure.

Sinkhole Treatment/Closing

Adequate protection of most sinkhole and sinkhole areas can be achieved by the use of vegetative buffers and livestock exclusion. However, if an open sinkhole is a safety hazard, it may be treated with a rock filter, gabions, or other methods approved by the State Conservation Engineer.

Sinkholes that open into caves shall not be filled under any circumstances. Gated openings may be used for safety reasons.

CONSIDERATIONS

The practice should work in conjunction with conservation cropping systems, pest and nutrient management, and practices that control sheet, rill and gully erosion.

Current and planned land use should be considered. In particular, structures, septic fields, wells, feedlots, ponds, and animal waste storage systems should not be located over a sinkhole site or within the impact area.

For a sinkhole receiving contaminated overland flow, every effort should be made to first treat the source of the contamination. Although it is important to maintain the hydrology of the karst system, it may be more beneficial to the ground water quality to divert the contaminated water away from the sinkhole. In some cases, it may be necessary to completely plug a sinkhole with sealing materials rather than treat it with a filter. Acceptable sealing materials are provided in ASTM D 5299, part 6.4. An example of this would be a sinkhole in a feedlot or a site that is difficult to protect by any other method.

The sinkhole treatment should not result in excessive surface water ponding or high soil moisture conditions over an extended period of time.

Treatment of one sinkhole may have an effect on other sinkholes or solution features in the vicinity. The use of a Conservation Easement for the buffer and sinkhole should be considered.

PLANS AND SPECIFICATIONS

Plans and specifications for Sinkhole and Sinkhole Area Treatment will be in keeping with this standard and will describe the requirements for applying the practice to achieve its intended purpose.

1. Plan view showing sinkhole and sinkhole area. Include topographic information and photographs.
2. The geologic investigation will include a study of potential impacts on the Karst resource.
3. Planned treatment measures.
4. Delineate the drainage area of sinkhole on a topographic map.
5. Availability of safe outlet for surface water, if applicable
6. Operation and Maintenance requirements.
7. Special safety requirements.
8. Environmental Assessment.

OPERATION AND MAINTENANCE

An operation and maintenance (O&M) plan will provide specific instructions for maintaining the sinkhole and sinkhole area treatment, including reference to periodic inspections and the prompt repair and/or replacement of damaged components.

REFERENCES

1. *Estimating Runoff and Peak Discharges*, USDA-NRCS, Engineering Field Handbook, Chapter 2, August 1987.
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**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PRESCRIBED GRAZING

(Ac.)

CODE 528

DEFINITION

Managing the harvest of vegetation with grazing and/or browsing animals.

PURPOSE

- Improve or maintain desired species composition and vigor of plant communities.
- Improve or maintain quantity and quality of forage for grazing and browsing animals' health and productivity.
- Improve or maintain surface and/or subsurface water quality and quantity.
- Improve or maintain riparian and watershed function.
- Reduce accelerated soil erosion, and maintain or improve soil condition.
- Improve or maintain the quantity and quality of food and/or cover available for wildlife.
- Manage fine fuel loads to achieve desired conditions.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all lands where grazing and/or browsing animals are managed.

CRITERIA

General Criteria Applicable to All Purposes

Removal of herbage will be in accordance with site production limitations, rate of plant growth the physiological needs of forage plants and the nutritional needs of the animals.

Adequate quantity and quality drinking water will be supplied at all times during period of occupancy.

Adjust intensity, frequency, timing and duration of grazing and/or browsing to meet the desired objectives for the plant communities and the associated resources, including the grazing and/or browsing animal.

Manage kind of animal, animal number, grazing distribution, length of grazing and/or browsing periods and timing of use to provide grazed plants sufficient recovery time to meet planned objectives. The recovery period of non-grazing can be provided for the entire year or during the growing season of key plants. Deferment (non-grazing period less than one year) and/or rest (non-grazing period equal or greater than one year) will be planned for critical periods of plant needs.

Provide deferment or rest from grazing or browsing to ensure the success of prescribed fire, brush management, seeding or other conservation practices that cause stress or damage to key plants.

Manage grazing and/or browsing animals to maintain adequate vegetative cover on sensitive areas (i.e.

riparian, wetland, habitats of concern, karst areas).

Manage livestock movements based on rate of plant growth, available forage, and allowable utilization target.

Develop contingency plans to deal with expected episodic disturbance events e.g. insect infestation, drought, wildfire, etc .

Additional Criteria to Improve or Maintain the Health and Vigor of Plant Communities.

Duration and intensity of grazing and/or browsing will be based on desired plant health and expected productivity of key forage species to meet management objectives.

Plan periodic deferment from grazing and/or browsing to maintain or restore the desired plant community following episodic events, such as wildfire or severe drought.

Where appropriate, soil test periodically for nutrient status and soil reaction and apply fertilizer and/or soil amendments according to soil test to improve or maintain plant vigor.

Additional Criteria to Improve or Maintain Quantity and Quality of Forage for Animal Health and Productivity

Plan grazing and/or browsing to match forage quantity and quality goals of the producer within the capability of the resource to respond to management.

Enhance diversity of rangeland and pasture plants to optimize delivery of nutrients to the animals by planning intensity, frequency, timing and duration of grazing and/or browsing.

Plan intensity, frequency, timing and duration of grazing and/or browsing reduce animal stress and mortality from toxic and poisonous plants.

Supplemental feed and/or minerals will be balanced with the forage consumption to meet the desired nutritional level for the kind and class of grazing and/or browsing livestock.

Dietary needs of livestock will be based on the National Research Council's Nutrient Requirements of Domestic Animals or similar scientific sources with appropriate adjustments made for increased energy demand required by browsing or grazing animals foraging for food including travel to and from pasture site.

Biosecurity safeguards will be in place to prevent the spread of disease between on-farm or ranch classes of livestock and between livestock farm or ranch units.

Shelter in the form of windbreaks, sheds, shade structures, and other protective features will be used where conditions warrant to protect livestock from severe weather, intense heat/humidity, and predators.

Additional Criteria to Improve or Maintain Surface and/or Subsurface Water Quality and Quantity.

Minimize concentrated livestock areas to enhance nutrient distribution and improve or maintain ground cover.

Plan intensity, frequency, timing and duration of grazing and/or browsing to:

- Minimize deposition or flow of animal wastes into water bodies,
- Minimize animal impacts on stream bank or shoreline stability.
- Provide adequate ground cover and plant density to maintain or improve infiltration capacity and reduce runoff.
- Provide adequate ground cover and plant density to maintain or improve filtering capacity of the vegetation.

Additional Criteria to Improve or Maintain Riparian and Watershed Function.

Minimize concentrated livestock areas to enhance nutrient distribution and improve or maintain ground cover and riparian/floodplain plant community structure and functions.

Plan intensity, frequency, timing and duration of grazing and/or browsing to:

- Provide adequate ground cover and plant density to maintain or improve infiltration capacity and reduce runoff.
- Provide adequate ground cover and plant density to maintain or improve filtering capacity of the vegetation.
- Maintain adequate riparian community structure and function to sustain associated riparian, wetland, floodplain and stream species.

Additional Criteria to Reduce Soil Erosion and Maintain Soil Condition

Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion.

Plan intensity, frequency, timing and duration of grazing and/or browsing to provide adequate ground cover, litter and canopy to maintain or improve infiltration and soil condition.

Additional Criteria to Improve or Maintain Food and/or Cover for Fish and Wildlife Species of Concern

Identify species of concern in the objectives of the prescribed grazing plan.

Plan intensity, frequency, timing and duration of grazing and/or browsing to provide for the development and maintenance of the plant structure, density and diversity needed for the desired fish and wildlife species of concern.

Additional Criteria for Management of Fine Fuel Load

Plan intensity, frequency, timing and duration of grazing and/or browsing to reduce hazardous fuel loads.

Plan intensity, frequency, timing and duration of grazing and/or browsing to manage fuel continuity, load and other conditions to facilitate prescribed burns.

CONSIDERATIONS

Protect through controlled access or time limits; oil, water, air, plant and animal resources when locating livestock feeding, supplementing, handling and watering facilities.

Livestock feeding, handling, and watering facilities will be designed and installed in a manner to improve and/or maintain animal distribution. These facilities will also be designed and installed to minimize stress, the spread of disease, parasites, contact with harmful organisms and toxic plants.

Utilization or stubble height target levels are tools that can be used in conjunction with monitoring to help ensure that resource conservation and producer objectives are met.

Where practical and beneficial, start the grazing sequence in a different management unit each growing season.

When weeds are a significant problem, prescribed grazing and/or browsing should be implemented in conjunction with other pest management practices to promote plant community resistance to invasive species and protect desired plant communities.

Prescribed grazing should consider the needs of other enterprises utilizing the same land, such as wildlife and recreational uses.

Consider improving carbon sequestration in biomass and soils through, management of grazing and/or browsing to produce the desired results.

If nutrients are being applied, Nutrient Management (590) will be applied.

PLANS AND SPECIFICATIONS

The prescribed grazing plan shall conform to all applicable federal, state and local laws. Seek measures to avoid adverse affects to endangered, threatened, and candidate species and their habitats.

Prepare a prescribed grazing plan for all planned management units where grazing and/or browsing will occur according to state standards and specifications.

Prescribed Grazing Plan will include:

- Goals and Objectives clearly stated.
- Resource Inventory that identifies:
 - existing resource conditions and concerns
 - ecological site or forage suitability group
 - identifies opportunities to enhance resource conditions
 - location and condition of structural improvements such as fences, water developments, etc, including seasonal availability and quality of watering sites.
- Forage Inventory of the expected forage quality, quantity and species in each management unit(s).
- Forage-Animal Balance developed for the grazing plan, which ensures forage produced or available meets forage demand of livestock and/or wildlife.
- Grazing Plan developed for livestock that identifies periods of grazing and/or browsing, deferment, rest, and other treatment activities for each management unit.
- Contingency plan developed that details potential problems (i.e., severe drought, flooding, insects) and serves as a guide for adjusting the grazing prescription to ensure resource management and economic feasibility without resource degradation.
- Monitoring plan developed with appropriate records to assess in determining whether the grazing strategy is resulting in a positive or upward trend and is meeting objectives. Identify the key areas and key plants that the manager should evaluate in making grazing management decisions.

OPERATION AND MAINTENANCE

Operation. Prescribed Grazing will be applied on a continuing basis throughout the occupation period of all planned grazing units.

Adjustments will be made as needed to ensure that the goals and objectives of the prescribed grazing strategy are met.

Maintenance. Monitoring data and grazing records will be used on a regular basis within the prescribed grazing plan to insure that objectives are being met, or to make necessary changes in the prescribed grazing plan to meet objectives.

All facilitating and accelerating practices (e.g. Fence (382), Pest Management (595), Brush Management (314), Pasture Planting (512) (etc.) that are needed to effect adequate grazing and/or browsing distribution as planned by this practice standard will be maintained in good working order and are being operated as intended.

REFERENCES

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**NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD**

PATHOGEN MANAGEMENT

(No.)

CODE 783

DEFINITION

Use of preventative measures, livestock management and conservation practices to provide multiple barriers to the introduction, replication and survival of pathogens in domestic livestock and reducing the risk of pathogen contamination of surface and groundwater resources by treatment and/or controlling the movement of pathogens to water

PURPOSE

To reduce the threat to surface and ground water from contamination by pathogenic organisms found in farm animals.

CONDITION WHERE PRACTICE APPLIES

On agricultural land (livestock and poultry operations) where there is a need to reduce the potential to contaminate surface and ground water by pathogens.

This standard does not apply to contamination of crops intended for human consumption. This standard also does not apply to pathogen issues related to occupational safety nor catastrophic mortalities, which are under the authority of other federal agencies.

CRITERA

A pathogen management component of a conservation plan, which incorporates a 4-barrier approach, as described below, shall be developed. The pathogen management plan will address each of the four barriers. A veterinarian, or other qualified professional, utilizing the protocol from the New York State Cattle Health Assurance Program (NYSCHAP), or other similar protocols for appropriate species, shall develop the first two barriers.

The first barrier is reducing the potential for pathogens to enter the farm. This shall be accomplished by carrying out actions such as the following:

- The testing of non-chlorinated water supplies that serve the herd or flock for fecal coliform bacteria
- Establishing appropriate biosecurity measures, including those controlling people, pets, pests and other animals, equipment or materials that may transport pathogens from other sources.
- Maintaining good hygiene and minimizing herd or flock contact with manure from other animal groups.
- Maintaining an accurate animal identification system and record of all health events

The second barrier minimizes cross-contamination among animals and amplification of infection within a herd or flock. This shall be accomplished by actions such as:

- Keeping animal raising areas clean and dry,
- Proper worker hygiene when moving between facilities or animal groups,
- Ensuring that all feeds are stored and handled properly, and feeding utensils are clean, specifically avoiding manure contamination of feed.
- Implementing rodent and pest control programs,
- Separating pre-weaned animals to prevent direct contact with another young animal and with adult manure,
- Isolating infected animals until they are no longer infectious,
- Identifying the order in which animals should be fed, i.e. youngest to oldest, etc. depending upon the pathogen of concern.

The third barrier provides for collection, handling, and treatment of manure and wastes appropriately to minimize the spread of the pathogens. This shall be accomplished by practices such as:

- The treatment of confinement area runoff according to the Waste Management System (NY312) conservation practice standard
- Waste Treatment Strips (635) conservation practice standard to reducing runoff
- Composting (317) conservation practice standard for the composting of manures
- Animal Mortality (316) conservation practice standard for proper disposal of animal mortalities
- Waste Storage Structure (313) conservation practice standard to extension of waste storage time and/or isolation of waste storages to take advantage of pathogen die-off using
 - Anaerobic Digester, Controlled Temperature (366) conservation practice standard
 - Waste Storage Lagoon (359) conservation practice standard
 - Constructed Wetland (656) conservation practice standard
 - Water Well Testing (355) conservation practice standard

The fourth barrier restricts movement of contaminated feces into watercourses and/or groundwater. This shall be accomplished by practices such as:

- Diversion (362) conservation practice standard to divert clean water away from livestock facilities
- Nutrient Management (590) conservation practice standard to spreading manure.
- Use Exclusion (472) conservation practice standard for the exclusion of animals from water bodies, such as streams, creeks, rivers and lakes
- Fence (382) conservation practice standard for isolating septic systems, leach fields and filter areas, and other seepage disposal areas from grazing animals
- Protecting aquifer recharge areas and wellheads from manure runoff from fields
 - Filter Strips (393) and Riparian Herbaceous Cover (390) conservation practice standards providing buffers around water bodies

CONSIDERATIONS

Consider establishing an isolation period for animals coming onto a property.

Consider testing non-chlorinated water supplies that serve the herd for fecal coliform bacteria during droughts, local disease outbreaks, and after extreme rainfall events.

Consider participating in the New York State Cattle Health Assurance Program.

Consider developing an appropriate vaccination program.

Consider cleaning rearing housing flooring and air-drying for 2 weeks between animal occupation cycles.

Consider steam cleaning and disinfecting of livestock facilities between animal occupation cycles.

Consider separate feed utensils and buckets for each animal.

Consider washing and drying water buckets between feedings.

Consider (if continuous rearing activities occur on farm) rotating animals across locations in order to allow previously used areas to be thoroughly cleaned and sun dried prior to receiving new animals.

Consider delaying the use of pasture or hay land for one year after fertilization with manure.

Consider participation in the Agricultural Environmental Management Program.

PLANS AND SPECIFICATIONS

Plans and specifications shall be in accord with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

The producer should receive a pathogen management plan with sections that addresses all four barriers to pathogens. This plan should include the recommendations provided by a veterinarian, or other qualified professional for addressing the first two barriers.

OPERATION AND MAINTENANCE

The operation and maintenance of pathogen management is critical to the success of reducing the threat to surface and ground water. The owner/client shall be responsible for implementing the pathogen management plan. Operation and maintenance shall address the following:

- Periodic plan review to determine if adjustments or modifications to the plan are needed
- Implementation and annual adjustment of the Waste Management System (NY312)
- Inspection and maintenance of animal exclusion

REFERENCES

NYS Agricultural Environmental Management (AEM) Tier 2 worksheet titled "Waterborne Pathogens"

<http://www.nys-soilandwater.org/aem/techtools.html>

Waterborne Pathogen Information Sheet:

Principles of Pathogens of Concern:

Cryptosporidium and Giardia

Escherichia coli 0157:H7

Watershed Science Institute, USDA, NRCS

Waterborne Pathogens in Agricultural Watersheds, Watershed Science Institute, USDA, NRCS, June 2000 (NRAES 147)

<http://www.nraes.org/>

NYSCHAP Core and Environmental Pathogen Modules

<http://nyschap.vet.cornell.edu/>