Georgia State Technical Committee Meeting (GA STCM)
23 May 2023
09:00 AM – 11:30 AM
MS Teams Meeting

Presenters: Terrance O. Rudolph, David Walden, and Tracy Cole

Attendees: Reginald Cason, Ryan Phillips, Abit Massey, JT Pynne, Jessica McGuire, Tyler MacMillian, Krisztian Varsa, Brad Alexander, Joy Hinkle, Ken Bradley, Ben Hyer, Penny Barnhart, Amanda Smith, Kenny Johnson, Jeremy Taylor, Dale Sandlin, Antron Williams, Joe Perry, Alexander Nalewaik, Nikki Crews, Krisha Whiting, Sharon Swagger, Karla Hollis, Noah McCoard, Dale Bogardus, Charlie Grace, Gary Hankins, Marcus Griffin, Davina Lee, Samuel Lewis, Janice Lester, Reggie Taylor, and others.

Terrance O. Rudolph, NRCS, Georgia State Conservationist: Welcome and opening comments. Discussed the Inflation Reduction Act, Climate-Smart, and other updates.

David Walden, NRCS, Acting Assistant State Conservationist for Programs: Discussed updates and news regarding the Inflation Reduction Act (IRA), IRA funding, and Climate-Smart.

Tracy Cole, NRCS, State Resource Conservationist: Discussed updates and news regarding Climate-Smart, Source Water Protection (SWP), SWP high priority areas, provisions to the 2018 Farm Bill, and new Interim Conservation Practice Standards and Implementation Requirements

Questions and Comments from the Committee / Open Discussion

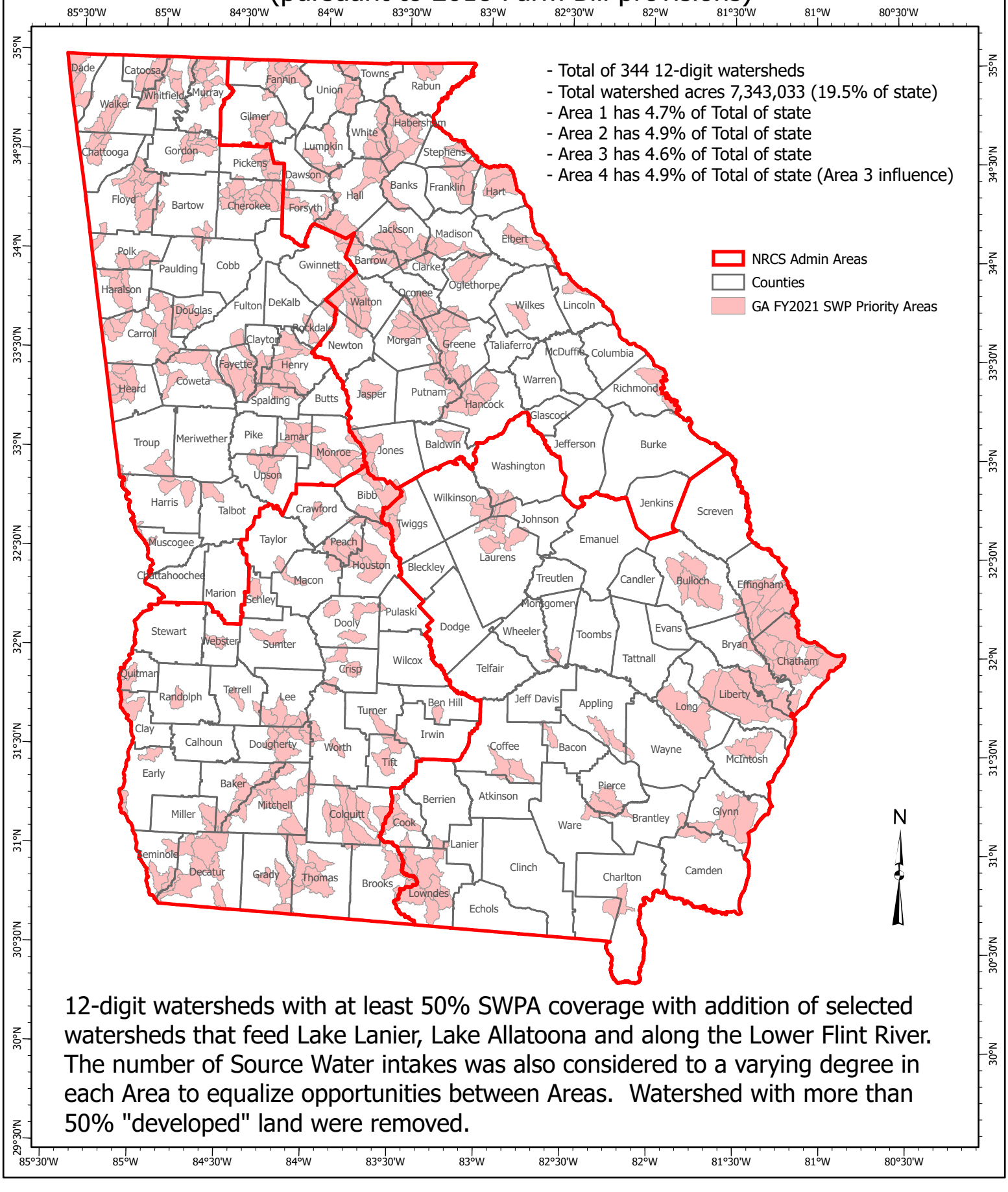
Terrance O. Rudolph, NRCS, Georgia State Conservationist: Closing statements. Next GA STCM will take place in Fall of 2023.

Meeting was adjourned.

Natural Resources Conservation Service
Georgia State Office
355 East Hancock Avenue - Athens, GA - 30601-2775
Voice: 706-546-2272 Fax: 855-417-8490

Georgia NRCS FY-2021 Source Water Protection (SWP) High Priority Areas

(pursuant to 2018 Farm Bill provisions)



12-digit watersheds with at least 50% SWPA coverage with addition of selected watersheds that feed Lake Lanier, Lake Allatoona and along the Lower Flint River. The number of Source Water intakes was also considered to a varying degree in each Area to equalize opportunities between Areas. Watershed with more than 50% "developed" land were removed.

NRCS Natural Resources Conservation Service

Cover Crop for Improved Soil Health

Implementation Requirement

Prepared for: _____

Prepared by: _____

Farm:_____ Tract Number:_____Date: _____

DEFINITION

Cover crops are vegetative covers that include grasses, legumes, and forbs for seasonal cover and other conservation purposes.

Cover crops are planted after the harvest of the cash crop and are killed just prior to planting the next crop to provide cover and to build soil health. This system is designed to: obtain maximum soil cover, improve the soil's physical, biological, and chemical properties, naturally cycle nutrients, reduce weed pressure, limit soil erosion, limit runoff, conserve moisture, etc. This system maintains soil cover and living roots when the field would otherwise be bare and fallow, helping to improve soil health.

PURPOSE

- Reduce erosion from wind and water
- Maintain or increase soil health and organic matter content
- Reduce water quality degradation by utilizing excessive soil nutrients
- Suppress excessive weed pressures and break pest cycles
- Improve soil moisture use efficiency
- Minimize soil compaction

SPECIFICATIONS

Plant species, seeding rates, seeding dates, and planting methods will be consistent with approved local criteria and site conditions as listed for this plan in Table 1. Table 2 lists management information for annual cover crop species commonly used in Georgia.

To maximize biomass production and soil health benefits, plant cover crops as early as possible within the range listed in Table 1 and terminate as late as feasible. Ensure that planting and strip tillage equipment can handle the residue from the cover crop in the spring. Soil moisture should be considered when determining cover crop termination. In years where soil moisture is low, and the extended forecast is for little rainfall, consider termination 4 weeks prior to the planned planting date. In years where soil moisture is abundant, and the extended forecast is for additional rainfall, consider delaying termination until 2 to 3 weeks prior to the planned planting date to maximize biomass and soil health benefit. To maximize biomass production, in years of adequate moisture, termination can be delayed until at or immediately after planting.

Organic Considerations:

- Cover crops are a key component of organic production systems. They are an essential practice to meet National Organic Program (NOP) requirements to minimize erosion; maintain or improve soil organic matter and the biological condition of the soil; and manage crop nutrients and soil fertility through cover crops and other techniques.
- Cover crops in the grass family are a good choice for vegetable rotations to prevent disease and suppress nematode build up. Brassica cover crops should typically not be used in brassica cash crop rotations. Generally, a 3-year rotation away from brassicas is needed to reduce disease problems. Due to the very hot and difficult late summer growing season, organic vegetable farmers may want to plant cover crops during this window and shift to more fall/winter cash crop production. See *Organic Cool-Season Vegetable Crop Rotation for the Southeast* (Organic Cool-Season Vegetable Crop Rotations for the Southeast | UGA Cooperative Extension) for more information. Vegetable growers should also consider growing cover crops in small sections throughout the year to attract beneficial insects.
    - Cover crop planting date, planting methods and termination timing and methods are especially important in organic systems. Typically, the best cover crop stands are produced by drilling the seed. Row crop farmers often own or have access to drills that can be used to plant the cover crop. However, in the case of fall/winter planted cover crops that need to be planted during harvest season, particularly with large operations, drilling is a relatively slow process for establishment. Broadcasting or aerially seeding can be quicker options, but only certain cover crop species can be established this way and higher seeding rates need to be used. In general, grass cover crops and smaller seeds can be broadcast successfully if there is sufficient moisture. It is difficult to get good consistent stands of large-seeded cover crops like winter peas, sunn hemp, or sunflowers. Additionally, many small-scale organic vegetable producers do not have access to drills. Cover crops can be established by broadcasting and raking or lightly tilling in cover crop seeds. Some farmers have used push-seeders to plant rows of cover crops in beds. Tillage should be minimized to reduce erosion and promote soil health.
- Cover crop benefit is generally maximized by maximizing biomass; however, planting into high biomass covers can be very difficult without proper equipment and planting methods. There are basically three approaches:
    - roll and crimp to leave the cover crop biomass on the surface in a no-till system
    - mow and leave on the surface as a mulch in a no-till system, or
    - mowing and incorporating for a clean till system.
- In all cases, the most effective termination is when the cover crop has reached a reproductive stage (milk or soft dough for grains, half to two thirds of plants flowering for legumes). More information for both row crop and vegetable production can be found at *southerncovercrops.org*. Cover crop species should be chosen based on the equipment available to terminate the cover crop. Termination methods influence planting methods. Residual on the surface of the soil has many benefits for reducing erosion and holding soil moisture. Cover crop that is killed by using a roller crimper is easier to plant into. Laying the stalks in one direction facilitates planting, especially with cover crops such as sorghum and Sunn hemp that have thick stalks. Tools can be purchased or made that cut a furrow through cover crop to make planting easier. Also, cover crop left on the surface can make it harder to apply fertilizer. Again, tools that cut a narrow furrow through the cover crop can be used to apply fertilizer in row or as side dressing.

Table 1. Site specific planned cover crop management information.

Tract/Field	Cash Crop Before and After Cover	Species 1/	Seeding Rate (lbs./ac) & depth (in)	Seeding Date Range 2/	Method D=Drill B=Broadcast A=Aerial	Planned Cover Crop Termination Date/Stage 3/

1/ Cover crop species selection should be based on producer's needs, appropriate for the intended purpose and meet all applicable program limitations. For specific management information on cover crop species, see Table 2, or contact the Conservation Agronomist for cover crops not listed.

2/ The cover crop shall be planted within the given range, however planting as early as practical within the range will increase biomass production and improve soil health benefits.

3/ Planned cover crop termination date/stage should allow the accumulation of sufficient biomass to meet the intended purpose(s). For example, a producer may plan to kill the cover crop 2 weeks prior to planting the cash crop or if large amounts of biomass are needed, a producer may plan to kill the cover crop after the cover crop flowers. Either way a decision should be made and documented in this column. However, flexibility in the implementation of killing the cover crop is needed to ensure the success of the practice. Consideration must be given to ensure equipment is capable of handling the residue in the spring and soil moisture is not depleted to a level that will affect cash crop emergence.

Table 2. Management information for common annual cover crop species used in Georgia, for information on additional species, contact the State Conservation Agronomist.

Cool Season Species[1/]	Type[2/]	Monoculture Seeding Rate (lbs./ac)[3/]	Seeding Depth (in)	Seeding Date Range		
				Mountains	Piedmont	Coastal Plains
Small grains (Oats, Rye, Wheat, barley, Triticale)	NL	60	1-2	Sep 1 – Nov 1	Sep 15 – Nov 1	Sep 15 – Dec 15*
Brassicas (radish, turnip, canola)	NL	8-12	0- ½	Aug 25 – Oct 1	Sep 1 – Oct 15	Sep 15 – Nov 1
Crimson Clover	L	15-18	0- ½	Aug 25 – Oct 1	Sep 1 – Oct 15	Sep 15 –Dec 1
Hairy Vetch	L	10-15	1-2	Sep 1 – Oct 15	Sep 1- Oct 15	Sep 15 – Nov 1
Lupine	L	60-90	¾-1	Sept 1-Oct 1	Sept 15-Oct 1	Oct 15-Nov 15
Warm Season Species						
Browntop Millet	NL	20-30	½ - ¾	May 1–Aug 1	Apr 1-Aug 15	Apr 1-Aug15
Sorghum-Sudan Hybrids	NL	15	½ - 1	May 1–Aug 1	Apr 15-Aug 1	Apr 1–Aug 15
Forage Sorghum	NL	10	1	Apr 20-May 15	Apr 20-May 15	Apr 20-July 1
Buckwheat	NL	55-65	½ - 1 ½	Apr 20-May 15	Apr 20-May 15	Apr 20-July 1
Soybean	L	50-80	1-2	May 1–Aug 1	Apr 15-Aug 1	Apr 1–Aug 15
Sun Hemp	L	25-30	¼ - 1	May 1–Aug 15	Apr 15-Aug 15	Apr 1–Aug 15
Cowpeas	L	50-80	1-3	May 1-June 15	May 1-June 15	May 1-July 15

1/ Some typical seeding rates and mixes are as follows:
(1 species) Small grain-60 lbs.
(2 species) Small grain (35-40 lbs.) and crimson clover (10 lbs.)
(2 species) Small grain (35-40 lbs.) and radish (5 lbs.)
(3 species) 2 Small grains (15-18 lbs. each) and crimson clover (10 lbs.)
(3 species) Small grain (30 lbs.), crimson clover (8 lbs.), and radish (3 lbs.)
(4 species) 2 Small grains (15-18 lbs. each), crimson clover (8 lbs.), and radish (3 lbs.) --- [if oats and rye can do 20 oats and 10 rye, etc., depending on objectives]

(Contact the state agronomist for other mixes and rates.) As a general rule, from the monoculture seeding rate, decrease seeding rate by half for a two-species mix and by one-third for a three-species mix, etc. Additional adjustments may be needed depending on the species. Seeding rates are based on average purity and germination, not pure live seed (PLS). Adjustment may be needed for coated seed.

2/ Type: NL=non-legume L=legume

3/ All rates listed are for drilling seed. If broadcasting seed, plant maximum seeding rate and consider increasing this rate by 15 to 20 percent to insure good stand establishment. For aerial applications (airplane), increase seeding rates by 30 percent. For grazing, increase rates by 50-100% or utilize the Annual Forages for Grazing Systems conservation practice. Utilize the appropriate inoculant for legumes unless using pre-inoculated seed.

Cover crop termination may not be earlier than 30 days before cash crop planned planting date or cover crop flowering whatever is first.

*- Planting date for small grains may be extended to Dec. 15 in the coastal plain. Termination for late planted cover crops should be extended when possible and should occur no earlier than a month prior to cash crop planting to promote biomass and/or nitrogen production.

Georgia Practice Certification:
340: Cover Crop for Improved Soil Health

Landowner/Cooperator	
Field Office	
Farm/Tract No.	

Applied seed calculations attached (seed tags and receipts) and the producer certifies that the right seeding rate was used. [Pure Live Seed (PLS) calculations should not be used unless specified in the seeding rate chart, Table 2. Seeding rates for cover crops were not developed on a PLS basis.]

Yes ☐ No ☐

Termination of the cover crop was within the timeframe planned, and meets all applicable program limitations (no earlier than 30 days before cash crop planned planting date)

Yes ☐ No ☐

If certified organic or transitioning to organic does the seed meet the requirements of the Organic System Plan or document that the organic seed was unavailable.

Yes ☐ No ☐ N/A ☐

Notes:

This practice has been installed according to the site-specific installation requirements and meets standards and specifications:

_____ **Date:** _____

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

AMENDING SOIL PROPERTIES WITH LIME

CODE 805

(ac)

DEFINITION

Adjust the soil pH with lime to change physical and chemical properties of the soil to achieve a conservation objective.

PURPOSE

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

- Improve plant productivity and health
- Improve plant structure and composition
- Improve habitat for soil organisms
- Improve water quality by increasing plant availability of applied nutrients
- Improve aggregate stability

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to cropland, pasture, and associated agricultural lands where the soil pH is below the desired range and lime can be applied to increase the soil pH to achieve a conservation benefit.

CRITERIA

General Criteria Applicable to All Purposes

The soil pH is a measure of the negative logarithm of the H+ ion activity (pH = -log[H+]). Therefore, a pH of 6 is 10 times the acidity of the pH of 7, and a pH of 5 would be 100 times more acidic than a pH of 7. The following formula describes the reaction that takes place when lime is added to an acidic soil:

$CaCO3 + H2O <——> Ca2+ + HCO3 - + OH$

Safety precautions should be taken to prevent eye and lung exposure to lime dust.

Right Material:

The liming product must have an analysis to provide its Effective Calcium Carbonate Equivalent (ECCE). The ECCE is determined by the Calcium Carbonate Equivalent (CCE) and its fineness of grind. The CCE of several common liming materials are found in Table 1. As liming materials are ground finer, surface area of the liming material increases which will result in quicker reactions in the soil. Table 2 illustrates the common Fineness Factor Effectiveness (FFE) for different screen sized materials. Additionally, the liming product must be supported by the local Land Grant University.

Table 1: Typical Calcium Carbonate Equivalent (CCE) ranges of common liming materials

Common Liming Materials	CCE Range*
Calcitic Lime - CaCO3	75-100
Dolomitic Lime - CaMg(CO3)2	75-109
Hydrated Lime - Ca(OH)2	120-136
Burned Lime - CaO	179
Pel-Lime	90-95
Other Local Products	

*Range is due to variations in the purity of the base material.

Table 2: Common Fineness Factor Effectiveness for different sized liming material

Screen Mesh Size	Fineness Factor Effectiveness
8 (Coarse material)	0%
<60	50%
>60 (Very fine material)	100%

Calculating Calcium Carbonate Equivalent and Effective Calcium Carbonate Equivalent:

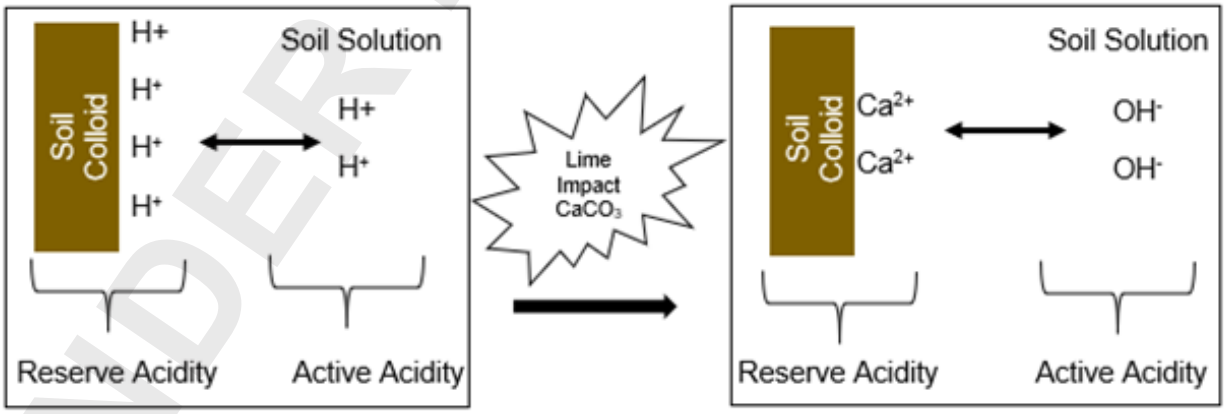
ECC = CCE x % Fineness Factor

ECCE (CCE/ton) = (CCE/100) x 2000 lbs

Right Rate:

Lime application rates must be sufficient to address the active acidity in the soil solution and the soil's pH buffer capacity or reserve acidity. Buffer capacity refers to the soil's ability to resist change in pH. Finer textured soils have significantly higher buffer capacity than coarser soils. The below schematic illustrates active and reserve acidity:

Figure 1. Impact of lime on active and reserve acidity



Lime application rates must be based soil test analysis for the planned cropping/tillage system and follow local Land Grant University (LGU) recommendations. Use soil tests no older than 2 years. Collect, prepare, store, and ship all soil samples following LGU guidance.

Soil test results must provide a recommendation for how much lime in CCE material is needed/ac to adjust the soil pH to the optimum range for the planned cropping system.

Application rates of lime will be based on the most pH sensitive crop in the planned crop rotation.

Right Placement

When soil incorporation or injection is feasible, and will not result in excessive soil erosion, lime should be incorporated or injected into the soil to increase its interaction with soil particles.

When lime is not incorporated into the soil it will react quickly with the soil at the surface but will move very slowly through the soil profile and will have little effect past the first one to two inches of soil.

For sites where the land is in no-till management or pasture, surface applications of lime will still provide significant benefit, as the Nitrification of NH4 + near the soil surface is a major cause of soil acidification.

To improve the efficacy of unincorporated lime applications, use lime materials with a highest fineness of grind and ECCE available.

Right Timing

Applications of lime should be made as early as possible in the cropping system to allow for soil reactions to occur and increase the pH to the desired range.

Soil conditions should be sufficiently dry to prevent rutting and soil compaction during lime applications.

Risk Assessment

If soil disturbance will occur due to incorporation of lime, analyze soil erosion with current erosion tools.

To optimize the placement of lime, applications of liming material should not take place on windy days.

Consult with LGU about potential nutrient releases from soils with high levels of soil test phosphorous following pH adjustments.

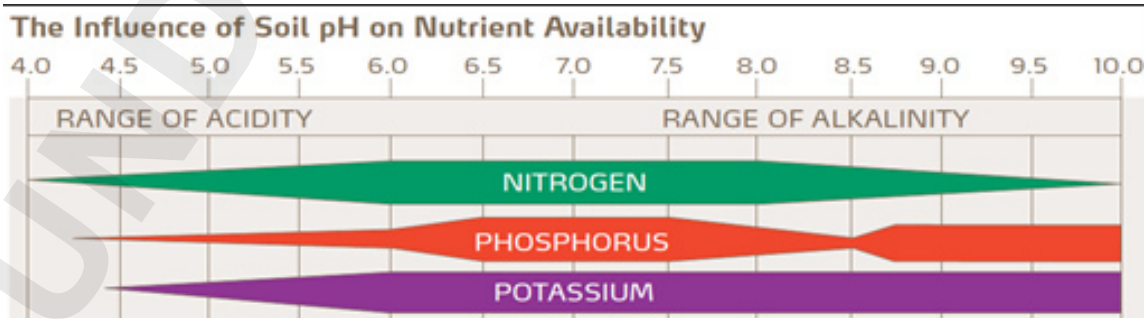
Additional Criteria to improve habitat for soil organisms.

Management of pH is a fundamental to all key soil health principles. Lime recommendations greater than 4000 lbs of CCE will be split applied.

Additional Criteria to improve surface water quality by increasing plant availability of applied nutrients.

Ensure the planned soil pH will result in the optimum range for essential nutrients. Applications are based on LGU recommendations for the most sensitive crop in the rotation.

Figure 2. Availability of Nitrogen, Phosphorus, and Potassium in soil as influenced by soil pH.



CONSIDERATIONS

On tilled crop fields with high lime requirements, consider split applying lime over a two-year period.

Consider the type of lime applied and nutrient deficiencies. For example, when soil Magnesium is low consider using dolomitic lime to help supply Magnesium.

If products such as biochar, fly ash, or other amendments are added to the soil after soil testing, they should be tested to determine their impact on soil pH.

To improve the effective placement of lime consider taking grid soil samples and apply using precision application technology.

To further improve soil health consider utilizing the following soil health principles.

- Minimize soil disturbance
- Maximize soil cover
- Maximize biodiversity
- Maximize presence of living roots

An evaluation of pesticide usage and impact of pH on pesticides should be a consideration as soil pH can affect the efficacy and degradation of pesticides.

Follow the Nutrient Management (590) CPS when applying plant nutrients.

PLANS AND SPECIFICATIONS

- Aerial site photograph(s), imagery, topography, or site map(s).
- Soil survey map of the site.
- Soil information including: soil type, surface texture, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and ponding frequency.
- Location of nearby residences, or other locations where humans may be present on a regular basis, that may be impacted by lime dust.
- Current and planned plant production sequence or crop rotation.
- Current soil test results with Lime Recommendations
- Lime test showing Effective Calcium Carbon Equivalent ECCE
- Rate, method, and timing of lime application
- Guidance for implementation, operation and maintenance, and recordkeeping

OPERATION AND MAINTENANCE

Monitor field pH with additional soil sampling to determine when additional lime may be needed.

Calibrate application equipment to ensure accurate distribution of material at planned rates.

Maintain application records to document plan implementation and maintenance.

REFERENCES

K-State Research and Extension. 2015. Kansas State University Soil Testing Lab: Agricultural lime testing procedure. Manhattan, KS. agriculture-lime-testing-procedure—-july-1-2015.pdf (ks.gov)

Leikam, D.F., R.E. Lamond, and D.B. Mengel. 2003. Soil test and interpretations and fertilizer recommendations. K-State Research and Extension. Manhattan, KS. MF-2586.

USDA-NRCS National Agronomy Manual 4th ed., Feb 2011

Whitney, D.A. and R.E. Lamond. 1993. Liming acid soils. K-State Research and Extension. Manhattan, KS. MF-1065.

USDA United States Department of Agriculture
Natural Resources Conservation Service

805 – Amending Soil Properties With Lime Implementation Requirements

Producer:		**Project or Contract:**	
Location:		**County:**	
Farm Name:		**Tract Number(s):**	

Practice Lifespan – 1 year

Practice Purpose(s): (check all that apply)

- ☐ Improve plant productivity and health
- ☐ Improve plant structure and composition
- ☐ Improve habitat for soil organisms
- ☐ Improve water quality by increasing plant availability of applied nutrients
- ☐ Improve aggregate stability

Safety precautions should be taken to prevent eye and lung exposure to lime dust.

Application rates of lime will be based on the most pH sensitive crop in the planned crop rotation.

The liming product must be supported by the local Land Grant University (LGU).

Lime application rates must be based on recent soil test analysis for the planned cropping/tillage system and follow local LGU recommendations. Soil tests must be no older than 2 years.

If you have questions about this planned Amending Soil Properties with Lime practice contact:

Name:		Tel:		Email:	

NRCS Use Only:

Designed By:		**Date**	
Checked By:		**Date**	
Approved By:		**Date**	

NRCS - GA
March 2023

805 – Amending Soil Properties with Lime
Implementation Requirements

PLANS AND SPECIFICATIONS:

Specifications shall be prepared for each field(s) where lime will be applied according to this practice standard.

Tract #					
Field(s) #					
Current Crop					
Planned Crop or Sequence					
Soil Test Date*					
Recommended Lime Type					
Lime test ECCE**					
Planned Ton/Ac Application Rate					
Planned Method of Application					
Planned Timing of Application					

*Must be less than 3 years old ** Effective Calcium Carbon Equivalent

☐ A map(s) showing all fields planned for Amending Soil Properties with Lime is attached.

☐ A soil map(s) and soils data for all fields planned for Amending Soil Properties with Lime is attached, including soil type, surface texture, drainage class, permeability, available water capacity, depth to water table, restrictive features, and flooding and ponding frequency.

☐ Map(s) is attached showing location of nearby residences, or other locations where humans may be present on a regular basis, that may be impacted by lime dust. ☐ (N/A)
Specific plans to mitigate human impacts include:

OPERATION AND MAINTENANCE:

- Monitor field pH with additional soil sampling to determine when additional lime may be needed.
- Calibrate application equipment to ensure accurate distribution of material at planned rates.
- Maintain application records to document plan implementation and maintenance.

Specific Additional Operation and Maintenance

Producer Agreement:

I understand the practice requirements per practice standard and implementation requirements sheet

Producer Signature_____ Date_____

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

SOIL CARBON AMENDMENT

CODE 808

(ac)

DEFINITION

Using amendments derived from plant or animal residues to improve the physical, chemical, and biological properties of the soil.

PURPOSE

This practice is used to accomplish one or more of the following purposes–

- Maintain, increase, or improve soil organic matter quantity and quality
- Maintain or improve soil aggregate stability
- Maintain or improve habitat for soil organisms
- Improve plant productivity and health
- Improve moisture management and enhance the efficient use of irrigation water
- Improve air quality by reducing emissions of particulate matter (PM) and PM precursors, GHGs, ozone precursors and airborne reactive nitrogen.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where organic carbon amendment applications will improve soil conditions, with the following exceptions:

- Do not use this practice to apply amendments to native grasslands or other areas where any resulting changes in the plant community would be undesirable
- Do not apply amendments to fields where nutrients in the amendment will not be utilized(*e.g.* fallow land or fields without an existing or planned cover crop or cash crop)

CRITERIA

General Criteria Applicable to All Purposes

Evaluate soils using appropriate planning criteria and assessment tools for the intended land use to determine where soil organic carbon amendments will improve the soil condition. The term “organic carbon amendments” refers to carbon-containing amendments derived from plant or animal residues and is not specifically related to the USDA National Organic Program or organic crop production methods. Plan, design, and implement carbon amendment applications in compliance with all federal, state, and local laws and regulations. The owner or operator is responsible for securing all required permits or approvals and for applying the amendment in accordance with such laws and regulations. Document physical and chemical amendment analysis. If the supplier does not provide an analysis, test the material using an appropriately credentialed laboratory prior to application. For operations following USDA’s National Organic Program, apply and manage amendments according to program regulations. Calculate total N and P applied with the amendment. Do not apply at rates that exceed the plant total N or P removal

rates for the next crop. On fields adjacent to surface water, follow all setbacks and spreading restrictions referenced in state specific NRCS Conservation Practice Standard (CPS) Nutrient Management (Code 590). Apply at a rate that will improve the soil condition and address the resource concerns without creating unacceptable risk of N or P loss during a single application. Time application of amendments and, where applicable, crop planting dates so that mineralization or immobilization of nutrients corresponds to crop nutrient needs. Amendments with C:N ratios greater than 30:1 can immobilize nutrients, especially nitrogen, and may necessitate supplemental nitrogen applications for plant growth. Amendments with C:N ratios below 20:1 are likely to mineralize N and should be used at a time when crop N demand will prevent N leaching or denitrification to oxides of nitrogen (NOx).Do not mix amendments with uncomposted manure or use amendments that have been pre-blended with soil. Do not use this practice for the application of amendments containing biosolids or sewage sludge, or for the application of inorganic amendments such as limestone. Do not operate heavy equipment on soils during wet conditions.Do not apply amendments:

- During high wind events
- To frozen or snow-covered fields, or when the top 2 inches of soil are saturated
- To slopes greater than 8% on rangeland or forestland
- To slopes greater than 15% on cropland or pasture.
- To sensitive areas, such as: wetlands, karst sinkholes, vernal pools, hydric soils, or naturally low fertility sites (*e.g.* serpentine soils, sage steppe, alkali sink or chaparral)
- Where the area will not be vegetated for longer than 3 months following application, or where nutrients from the amendment will cause leaching or runoff loss and water quality concerns

Compost: Use compost that meets the following criteria as determined by the Test Methods for the Examination of Composting and Compost (TMECC), or by Land Grant University (LGU) recognized methods:

- Carbon to nitrogen ratio (C:N) greater than 10:1 at maturity
- 40-60% moisture (60-40% solids) at maturity

Compost analyses must also report the carbon and nitrogen content, phosphorus, potassium, pH, soluble salts (electroconductivity), organic matter, and bulk density. Use laboratories successfully meeting the requirements and performance standards of the US Composting Council's Seal of Testing Assurance Program (STA), or use an alternative NRCS- or State-approved certification program that considers laboratory performance and proficiency to assure accuracy of laboratory analyses.Do not apply compost when a phosphorus risk assessment indicates a high or very high risk for phosphorus transport. Ensure mitigating conservation practices to prevent runoff are in place at the time of application if compost is spread on cropland with 8%-15% slopes and within 100 ft of a surface water body,

Biochar: Use biochar that is produced by heating biomass to a temperature in excess of 350°C under conditions of controlled and limited oxidant concentrations to prevent combustion (pyrolysis or gasification).

Biochar analysis must report:

- Country of origin of biochar and feedstock, and feedstock composition
- Production method (*e.g.* verification of temperature and limited oxygen conditions)
- Organic carbon, ash, nitrogen, pH, EC, liming equivalent, phosphorus, potassium, and pH of the final material.

Use laboratories successfully meeting the requirements and performance standards of the International Biochar Institute (IBI) Seal or use an alternative NRCS- or State-approved certification program that considers laboratory performance and proficiency to assure accuracy of laboratory analyses.

Do not use biochar produced from:

- Crop residues that could otherwise be left on the field to provide soil protection and improve soil organism habitat, or
- Woody residue needed to sustain forest health and wildlife habitat referenced in NRCS CPS Forest Stand Improvement (Code 666).

Other Carbon Amendments: Use regionally appropriate carbon-based materials, such as wood chips, pulverized paper, bagasse, coal ash, wood ash, or distillation residue to meet the conservation objective. Consult appropriate land-use specialists for assistance to plan for a specific conservation objective using alternative carbon amendments.

Ensure that materials are tested to identify any contaminants, and that supplemental N is applied as needed to avoid nutrient imbalances that may result from nitrogen immobilization with high C:N amendments.

Whole Orchard Recycling (WOR): Chip and incorporate orchard trees in place in the field in which they were grown. Do not export wood chips off site.

Distribute wood chips evenly and incorporate into the soil to a depth of at least six inches. WOR is applicable only to orchard trees, not to vineyards or bush crops. Use WOR in orchards where it will not pose an increased risk for disease, or where an increased risk of disease is managed by excluding diseased biomass or using similar cultural practices.

Additional Criteria to Improve Aggregate Stability

Apply amendments with minimal soil disturbance.

Additional Criteria to Improve Air Quality by Reducing Emissions of Oxides of Nitrogen (NOx) and Particulate Matter (PM) or by Reducing Emissions of Greenhouse Gases

Utilize whole orchard recycling on orchards greater than 10 years old as an alternative to agricultural burning to reduce emissions of NOx, PM, and GHG's. After incorporating wood chips into the soil, avoid creating anaerobic conditions by overwatering or by allowing ponded water, which could result in methane emissions.

To minimize fugitive PM emissions, do not apply soil amendments, operate chipping machinery, or disturb the soil during high wind events.

Additional Criteria to Improve Moisture Management and the Efficient Use of Irrigation Water

Ensure amendments will not introduce excessive salts and will not negatively affect soil water dynamics.

CONSIDERATIONS

General Considerations

When applying amendment to cropland where it will also serve as a nutrient source, apply amendments with C:N less than 20:1 to optimize nutrient availability for crop uptake.

Mix biochar and compost together prior to application to supply nutrients to nutrient-poor biochars and equilibrate nutrient interactions in the soil.

Using compost or biochar with the US Composting Council's Seal of Testing Assurance Program (STA) or the International Biochar Institute (IBI) Seal, respectively, may serve as an expedient alternative for amendment validation.

Where Whole Orchard Recycling is applied, large amounts of high C:N material incorporated as wood chips may result in nitrogen immobilization and low N availability for a following crop. If necessary, apply additional N according to the land grant university recommendations.

Apply biochar that contains more than 60% carbon to reduce nitrogen or phosphorus losses. Test the product on small acreage prior to widespread use.

Consider using set maintenance application rates that would meet the conservation objective, avoid any negative nutrient interactions, and reduce planning time.

Take appropriate measures to prevent soil erosion and compaction.

Where material is trucked onto land, timing of traffic must minimize potential soil compaction, and traffic routes must be closely examined to ensure that erosion is not caused and that vehicles do not spread noxious or invasive seed. Disturbed areas should be appropriately treated to minimize potential erosion.

When applying the amendment to the surface on cropland, review NRCS CPS Mulching (Code 484) Mulching to ensure the best standard is selected for the intended purpose.

Where salinity poses soil health issues, ensure that amendments do not contribute further salts.

Consider using diesel-powered equipment and vehicles powered by Tier 3 or Tier 4 emissions certified diesel engines to minimize NOx and PM emissions from diesel exhaust.

When applying amendments that may contain pathogens (e.g. biological soil amendments of animal origin including manure, composted manure, composted carcasses, etc.), consider potential contamination pathways to produce crops typically consumed raw, food contact surfaces, water distribution systems, and other soil amendment sources where it could become a potential source of contamination.

Soil organic carbon loss is related to the volume of soil disturbed, intensity of the disturbance, and the soil moisture content and soil temperature at the time the disturbance occurs. To make this practice more effective at reducing carbon loss:

- Perform any deep soil disturbance, such as ripping, subsoiling or fertilizer injection, so the vertical slot created by the implements is closed at the surface.
- Plant with a no-till drill to release less carbon dioxide (CO2) and reduce oxidation of organic matter compared to wide-point hoe/chisel opener seeder drill.
- Perform soil disturbance when exposed soil carbon is less likely to be oxidized and lost as CO_2 (*e.g*. when soil temperatures are below 50° For when the soil is dry)

PLANS AND SPECIFICATIONS

In the soil carbon amendment plan, document—

- Purpose of practice
- Assessment of soil health resource concerns using State approved tools for the appropriate land use, such as:
  - In-Field Soil Health Assessment for Cropland
  - Pasture Condition Score Sheet
  -

- Laboratory soil health tests that include at least soil carbon before application
- Planned fields receiving amendments and their planned rotations, aerial photos, including location of sensitive areas and setbacks
- Soil maps, including soil type, slope, drainage class
- Amendment analysis
- Application rate, method, timing, and method of incorporation (when applicable)
- Evaluation of carbon input effectiveness for the purpose(s) using appropriate assessment tools to interpret positive trends.

OPERATION AND MAINTENANCE

Monitor fields following LGU guidance and State law. Take a follow-up soil test that includes soil organic carbon at least a year after application to determine the effectiveness of the application for improving soil organic carbon. Consider testing at least 3 years after application to evaluate the impact of the amendment on other soil health-related resource concerns.

Inspect and evaluate surface applied applications after the first heavy precipitation event to assure that the material is stable and does not impact non-target areas.

Calibrate application equipment to ensure accurate distribution of material at planned rates.

Evaluate the effectiveness of the amendment (application, amount of cover provided, durability, etc.) and adjust future management or type of amendment to better meet the intended purpose(s).

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USDA United States Department of Agriculture
Natural Resources Conservation Service

808 – Soil Carbon Amendment Implementation Requirements

Producer:		**Project or Contract:**	
Location:		**County:**	
Farm Name:		**Tract Number:**	

Practice Lifespan – 1 year

Practice Purpose(s): (check all that apply)

- ☐ Maintain, increase, or improve soil organic matter quantity and quality
- ☐ Maintain or improve soil aggregate stability
- ☐ Maintain or improve habitat for soil organisms
- ☐ Improve plant productivity and health
- ☐ Improve the efficient use of irrigation water

Do not use this practice for the application of amendments containing biosolids or sewage sludge, or for the application of inorganic amendments such as limestone.

Do not operate heavy equipment on soils during wet conditions.

Description of work:

Type of Soil Carbon Amendment to be used: _____

Source of Soil Carbon Amendment: _____

Material was produced in accordance with State guidelines (where applicable) Y/N: _____

In Field Soil Health Assessment report for all fields utilizing this practice is attached Y/N: _____

Lab soil health test that includes at least soil carbon prior to field application for all fields utilizing this practice is attached Y/N: _____

NRCS Review Only

Designed By:		**Date**	
Checked By:		**Date**	
Approved By:		**Date**	

NRCS - GA
March 2023

808 – Soil Carbon Amendment
Implementation Requirements

Biochar: Use biochar that is produced by heating biomass to a temperature in excess of 350°C under conditions of controlled and limited oxident concentrations to prevent combustion (pyrolysis or gasification).

Biochar analysis must report:

- Country of Origin of biochar and feedback, and feedstock composition
- Production Method (e.g. verification of temperature and limited oxygen conditions)

If biochar SCA, document source material used: _____ Pyrolysis temperature: _____ ☐ N/A
(Do not create biochar from crop residues that could otherwise be left on the field to provide soil protection and improve soil organism habitat.)
If biochar, show test results (and attach to plan):
Carbon: _____ Ash: _____ Nitrogen: _____ Phosphorous: _____ Potassium: _____ pH: _____
EC: ☐ Liming Equivalent: ☐
If biochar, any fields which utilize a current Nutrient Management Plan must be applied at rates within the specifications of the NMP.
☐ Planned application rate of SCA is determined to not be in excess of the NMP allowed rates for N and P. ☐ N/A

If compost SCA, approved analysis meets the following Y/N: ☐ **Y** ☐ **N** ☐ N/A

- ☐ Maturity index rating of "mature" or "very mature"
- ☐ Carbon to nitrogen ratio (C:N) between 10:1 and 30:1 at maturity
- ☐ 40-60% moisture (60-40% solids) at maturity

If compost SCA utilizing manure, any field where this practice is applied must have a current Nutrient Management Plan.

☐ Planned application rate of SCA is determined to not be in excess of the NMP allowed rates for N and P.

If compost, show test results (and attach to plan)**:**
Carbon: _____ Nitrogen: _____ Phosphorous: _____ Potassium: _____ pH: _____
Soluble Salts (electroconductivity): _____ Organic Matter: _____ Bulk Density: _____
Compost will not be applied if phosphorus risk assessments indicate a high or very high risk for phosphorus transport. Indicate fields where this applies. ☐ N/A

If Other type of SCA, Indicate type: _____ ☐ N/A
☐ Amendment analysis or certification is attached.
Any fields which utilize a current Nutrient Management Plan must be applied at rates within the specifications of the NMP.
☐ Planned application rate of SCA is determined to not be in excess of the NMP allowed rates for N and P. ☐ N/A

Planned Soil Carbon Amendment Fields and Specifications

Field Number	Acres	Soil SMU (Primary)	Planned Crop	Amendment Type	Method of Application	Rate of Application	Timing of Application	Method of Incorporation (if applicable)

808 – Soil Carbon Amendment
Implementation Requirements

Ensure mitigating conservation practices (such as filter strips) to prevent runoff are in place at the time of application if compost is spread on cropland with 8%-15% slopes and within 100 ft of a surface water body,

- Whole Orchard Recycling (WOR):
    - Chip and incorporate orchard trees in place in the field in which they were grown. Do not export wood chips off site.
    - Distribute wood chips evenly and incorporate into the soil to a depth of at least six inches. WOR is applicable only to orchard trees, not to vineyards or bush crops. Use WOR in orchards where it will not pose an increased risk for disease, or where an increased risk of disease is managed by excluding diseased biomass or using similar cultural practices

Operation and Maintenance:

- Monitor fields in accordance with Land Grant University guidance and State law. A follow-up soil analysis should be taken at least a year after application to determine the effectiveness of the application.
- Inspect and evaluate after the first heavy precipitation event to assure that material is stable and not impacting non-target areas.
- Calibrate application equipment to ensure accurate distribution of material at planned rates.
- Evaluate the effectiveness of the amendment (application, amount of cover provided, durability, etc.) and adjust future management or type of compost to better meet the intended purpose(s).
- Take a follow-up soil test that includes soil organic carbon at least a year after application to determine the effectiveness of the application for improving soil organic carbon.

Specific Additional Operation and Maintenance Requirements For Your Practice:

☐ A map(s) showing all fields planned for Soil Carbon Amendment is attached. The map shows:

The location of sensitive areas

Required setbacks,

Planned dates for implementation of SCA

☐ A soil map(s) for all fields planned for Soil Carbon Amendment is attached, The map(s) and any attached soils data includes: soil type, slope and drainage class.

If you have questions about this planned **Soil Carbon Amendments** practice contact:

Name:		Tel:		Email:	

Producer Agreement:

I understand the practice requirements per practice standard and implementation requirements sheet

Producer Signature:_____ Date_____

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

RAISED BEDS

CODE 812

(sf)

DEFINITION

Create an above ground growing environment.

PURPOSE

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

- Reduce concentration of salts or other chemicals in the soil that limit the desired use
- Reduce field operation-induced particulate emissions within the raised bed footprint
- Increase plant health and productivity

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to land in habited areas where the desired reuse is for crop and small livestock production and where the existing growing media is unsuitable for production.

The practice is applicable where soil conditions are degraded due to unsuitable growing substrate or due to the potential of heavy metals and other contaminates that pose an environmental and/or safety risk to the producer and/or the intended crop. The bed(s) will be used for managing the production of agricultural crops where in situ growing media is a limiting factor.

An above ground raised bed is needed for crop production on sites where it is impractical to regenerate soil condition or remove debris and obstructions from the site.

This practice does not apply to roof top agriculture, container gardening or indoor vertical farming. This practice does not apply to aquaculture production of fish or seafood.

CRITERIA

General Criteria Applicable to All Purposes

Create beds that are between 6 and 24 inches above the in-situ soil to support healthy root system development. Determine the required bed area and depth by analyzing the needs of planned crops.

The need for a barrier is needed regardless of raised bed depth. The soil depth may be determined by evaluating the potential for plant roots development and kept away from contaminants or debris and the upward movement of contaminants.

When detection of heavy metal contamination is within or exceeding the safety thresholds for residential use as defined by land grant university (LGU) research and recommendations, use a 4 oz. heavy duty non-woven landscape fabric to be placed between the in-situ soil and the new growing substrate to reduce

the exposure of plant roots to contaminants. Levels of contaminants will be determined by using a portable x-ray fluorescence (pXRF) or by implementing a Site Assessment and Soil Testing for Contaminants (CEMA 207) activity.

Beds may be framed or unframed. Framed beds will be used if equipment needed to make un-framed beds is not accessible, or the site is not accessible to the equipment.

Raised beds can be made into any shape desired.

Design the width of the raised bed to limit the need for stepping into or on the raised bed. The length of a raised bed varies by the available space.

Ground disturbing operations will be conducted in a manner that will not compromise the structural integrity of the barrier.

Framed beds should be constructed using untreated, rot resistant lumber such as cedar, white oak, locust, etc. Tires, chemically treated lumber, landscape timbers, railroad ties, and methyl bromide treated pallets are not suitable framing material.

Growing media free of debris and contaminants such as compost or a compost/clean soil mixture may be used. Characteristics of the chosen growing media will support the needs of the plants to be grown.

Designated walkways or travel lanes to control foot traffic and movement between beds should provide adequate width to accommodate foot traffic and equipment.

CONSIDERATIONS

Drainage of beds with non-woven barriers needs to be considered and discussed to prevent over saturation of the growing substrate.

Cover walkways and other areas of exposed soil to reduce dust migration and splash back onto crops and protect against human exposure while gardening. Refer to CPS 575 Trails and Walkways to establish pathways.

Consider CPS Mulching 484 to reduce dust emissions from small between-bed spaces.

Raised beds and travel walkways should consider accommodation for access by persons with limited or impaired mobility.

When growing crops that sprawl, such as squash or watermelon, plant in a bed by themselves.

Build Raised Beds for best light exposure, plan to build beds free of shade trees and any object that could shade especiall morning sun. (Plant taller plants in beds on the north side of beds with shorter plants to avoid shading smaller plants).

The producer may practice multispecies cropping, conservation crop rotation, cover cropping, and/or single species cropping. Other conservation practices such as micro irrigation NMP’s, IPM’s and other that is needed for conservation planning for plant health.

If disease carry over is a concern and crop rotation is not possible, crop residues should be removed and composted to the appropriate temperatures to avoid potential contamination of the next crop. If residues are removed, cover crops should be considered to prevent erosion and/or increase organic matter.

Where in-situ soil is formed from construction debris materia, l it is possible to find elevated concentrations of salts derived from the decomposition of concrete or other materials, these conditions could produce elevated pH levels. Consider adjusting pH levels to prevent the mobility of known heavy metals.

PLANS AND SPECIFICATIONS

Plans and specifications will be prepared for the practice site. Plans and specifications for the installation and placement of raised beds may be recorded in narrative form, on job sheets, or on other forms. Plans will include the following:

- Location of raised beds on the tract
- Height, width, and length of each bed
- Types of growing media material. (Refer to information on soil material for raised beds)
- Framing material (if used)
- Mulch Type
- Space in between beds needed to accommodate all users
- Barrier specifications, if applicable

OPERATION AND MAINTENANCE

An operation and maintenance plan will be provided to and reviewed with the operator/landowner. The plan will include the following items and others as appropriate.

Monitor and maintain height of raised beds and material within the raised beds.

- If framed beds are used, periodically check all frame joints and boards, and repair/replace any failures as soon as possible.
- When compost or high organic matter material is utilized as growing media, material should be replenished to maintain the minimum of 6 inches above the surrounding soil to optimize drainage and up to 24 inches above the surrounding soil when roots must be separated from the in-situ soil.
- Inspect and maintain associated surface and subsurface drainage practices to manage erosion and concentrated flows.
- Monitor site erosion and implement needed conservation practices as applicable as soon as possible.
- Soil testing will occur every 3 years or as determined by university recommendations at a minimum test for known contaminants found within the region and soil organic matter.
- Maintain all travel and working surfaces in a smooth and graded condition, free of ruts and depressions that can collect and hold water.

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United States Department of Agriculture

812 – Raised Bed Implementation Requirements

Producer:		**Farm/Tract:**	
Address:		**Date:**	
County:		**Planner:**	

Definition: The creation of an above ground growing environment.

Practice Purpose(s): (check all that apply)

- ☐ Reduce concentration of salts or other chemicals in the soil that limit the desired use.
- ☐ Reduce field operation-induced particulate emissions within the raised bed footprint
- ☐ Increase plant health and productivity

Producer's Goals, objectives, planned crops and need for practice:

Also indicate source and plan for watering.

Planning Criteria:

Sizing

- Soil Depth: 6 to 24 inches above the in-situ soil (12 inches typical) , depending on the rooting depth of the planned crops.
- Width: Enables working from the bed edge/walkway without the need to step in the bed.
- Length: Fits the site and available space; no limitations.
- Spacing between beds: Provides adequate space for the mobility of people and equipment.

Construction

- Growing media: A soil or a compost/soil mixture, free of debris and contaminants. Refer to http://hgic.clemson.edu/factsheet/raised-beds/ for additional information.

812 – Raised Bed
Implementation Requirements

Field	Bed (ID)	Planned Dimensions (L x W)	Bed area (SF)	Soil Depth (in)	Barrier specifications

Construction cont…

- Framing (Optional): Untreated, rot resistant lumber such as cedar, white oak, locust, or other materials that do not present a soil contamination risk. Tires, chemically treated lumber, landscape timbers, railroad ties, and methyl bromide treated pallets are not suitable framing material.
- Barrier (required): 4 oz. heavy-duty, non-woven landscape fabric (geotextile). *Ground disturbing activities must not compromise the integrity of the barrier.

Raised Bed Plan and Specifications: See map for planned location(s) of beds

Spacing between Beds:	
Framing Material (if planned):	

Growing media:

Growing media planned:	
Source: (on site, brought in):	

Site Protection: Identify associated practices needed to reduce dust emissions, erosion and soil exposure. Covering the soil is particularly important when the soils are contaminated.

Associated practices (Check if required)	**Purpose** (Describe reason practice is needed)
342 - Critical Area Planting	
484 - Mulching	
575 - Trails and Walkways	

Other Notes, if needed:

Operation and Maintenance:

- Monitor and maintain height of raised beds and material within the raised beds.
- If framed beds are used, periodically check all frame joints and boards, and repair/replace any failures as soon as possible.
- When compost or high organic matter material is utilized as growing media, material should be replenished to maintain the minimum of 6 inches above the surrounding soil to optimize drainage and up to 24 inches above the surrounding soil when roots must be separated from the in-situ soil.
- Inspect and maintain associated surface and subsurface drainage practices to manage erosion and concentrated flows.
- Monitor site erosion and implement needed conservation practices as applicable as soon as possible.
- Soil testing will occur every 3 years or as determined by university recommendations at a minimum test for known contaminants found within the region and soil organic matter.
- Maintain all travel and working surfaces in a smooth and graded condition, free of ruts and depressions that can collect and hold water.
- Other:

Producer Agreement:

I understand the practice requirements per Practice Standard and Implementation Requirements Sheet:

Producer Signature: _____ Date: _____

NRCS Office Use only:

Planning:

Project JAA level Required: _____

Planned by:	**Planner JAA:**	**Date:**
Designed by:	**Designer JAA:**	**Date:**

812 – Raised Bed
Implementation Requirements

Record of Completion and Check Out Certification:

☐ Map attached with installed location of raised bed(s) within the planned fields.

☐ Photos of raised beds

Practice Installation

Installed SF of Raised Beds	

Installation Notes (Document any changes from the plans)

Certification Statement:

I certify that implementation of this conservation practice is complete, meets criteria for the stated purpose(s), and meets the NRCS conservation practice standard and specifications.

◯ Yes ◯ No

Certified by:	**Planner JAA:**	**Date:**

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

LOW TUNNEL SYSTEMS

CODE 821

(sf)

DEFINITION

An enclosed polyethylene, polycarbonate, plastic, or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold, and to extend the growing season or to reduce pest pressure.

PURPOSE

This practice is used to accomplish one or more of the following purposes–

- Improve plant productivity and health
- Reduce plant pest pressure

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to land capable of producing crops. This practice applies where sun or wind intensity, frost, or insect pests may damage crops, or where an extension of the growing season is needed due to climatic conditions.

Use the High Tunnel System CPS (Code 325) when a tunnel height greater than 4 feet is needed.

CRITERIA

General Criteria Applicable to All Purposes

Plan supportive conservation practices to address all resource concerns associated with the installation and use of the low tunnel system such as erosion, irrigation, and runoff.

Low tunnel systems may be applied over crops grown inside of a high tunnel system.

Tunnels may be used prior to planting or over already established crops, raised beds, and containers.

Locate structures to avoid buried public utilities.

Locate the tunnels near a viable water source when irrigation is needed.

Low Tunnel Systems may be floating row covers or hoop-supported covers with one or more planting rows or cover over individual plants.

Supported systems must have frames or hoops constructed of metal, 9 to 10-gauge wire, electrical conduit, or durable plastic such as polyvinylchloride (PVC) tubing; and be less than 4 feet in height at the peak.

Select the low tunnel covering material of a significant thickness to withstand the temperature change for the period required and to sustain the 1-year-minimum lifespan. For polyethylene covers, use a minimum 4 mil greenhouse grade material.

For organic producers, it will be the responsibility of the producer to make sure that all permissible activities, design, material used, and material specifications are consistent with the USDA Agricultural Marketing Service National Organic Program, National Standards on Organic Agricultural Production and Handling.

Construct low tunnel structures on level grade where possible.

Remove snow accumulation from the cover soon after the snow event to prevent damage to plants.

Select the tunnel cover and anchoring for the cover to withstand expected wind loads

Outside the low tunnel, control soil erosion when appropriate with vegetation or mulch

Where the intensity or duration of sunlight can shorten the growing season, the appropriate thickness of shade cloth may be used in place of, or in addition to other covers.

Low tunnels can collect and shed water. Remove or drain water that has ponded on the cover. When covers are in place for long periods of time, they can create drainage and ponding issues where none previously existed. Direct runoff away from the low tunnel to avoid ponding.

Complete groundwork and tillage, if needed, prior to installation of a low tunnel.

Additional Criteria to Extend the Growing Season

Early season extension by selecting the covering material of a significant thickness to facilitate warming of the soil temperature.

For polyethylene covers, use a minimum 4-mil greenhouse grade material.

When using polyethylene ensure plants do not come in direct contact with the cover.

During colder temperatures, a second layer of row cover or a heavier weight row cover or cover blanket can be used to provide greater protection. Additional hoops or frames may be added to support the double layer.

For spun-bound covers, use the fabric thickness that achieves the objectives:

Weight	Density	Light Transmittance	Degrees Protection (below freezing)	Best for:
Heavy	1.5-2.2 oz/yd	30-50%	8°F	Overwintering
Medium	0.5-1.0 oz/yd	70-85%	4-6°F	Spring/fall crops, overwintering
Light	0.45 oz/yd	90-95%	2° F	Light frost protection.

Remove cover or roll up the cover sides at the appropriate time to facilitate pollination and improve air movement.

Insect netting with a fine mesh may be used as a cover to reduce plant pest pressure or damage to plants.

Properly clean and store the cover material when not in use.

Additional Criteria to Protect from Sun

Apply shade cloth appropriate to treat the objectives and site conditions. 10% - 60% shade cloth exists; selection will depend on crops grown, climate, and other site-specific conditions.

When using as protection from direct sunlight, leave airspace between the fabric and your plants to improve air circulation and keep the plants cooler. Use hoops or plant stakes to elevate the row cover above plant tops.

Additional Criteria to Reduce Plant Pest Pressure

Utilize fine mesh pest netting to protect plants from insect damage during the critical period for the target pest.

For pest pressure not addressed by pest netting, use Conservation Practice Standard Pest Management Conservation System (595) to identify target pests (plants, insects and pathogens) and implement control measures.

When the crop height is greater than the tunnel height, use Conservation Practice Standard Pest Management Conservation System (595) to identify target pests (plants, insects and pathogens) and implement control measures.

CONSIDERATIONS

Leave rows uncovered during periods of rest to prevent accumulation of salts and other minerals in the soil.

For polypropylene or polyethylene covers, weigh down the edges of the covering with soil, wood, sandbags, bricks, or other materials that will not damage the covering. The material at the ends of the rows can be tied to rods driven into the ground. Anchor more sturdy structures (PVC) with rods.

In high wind areas consider keeping row cover length short (50’)

Row cover may trap moisture; sides may need to be lifted to facilitate ventilation to reduce plant damage.

Low tunnels used to extend the season and protect overwintering crops from frost damage require regular maintenance, especially during periods of fluctuating temperatures. Growers may need to ventilate the tunnel during the daytime to avoid overheating the crop. Options for ventilating include utilizing pre-cut slits in the covering material, a “seam” running down the center top of the tunnel that can be opened on hot days or raising one side of the tunnel covering. The cover is returned to its original position to provide nighttime frost protection.

Use during winter can assist by increasing soil temperature for spring planting. Perform soil tests regularly to monitor nutrients and to monitor salt build-up. The soils may require periodic “flushing” to remove salt build-up. This is accomplished by removing the cover to allow natural precipitation to infiltrate, or by artificially flooding the ground under cover.

Consider managing the low tunnel system to maintain or improve soil health by following a soil management system that creates a favorable habitat for soil microbes by:

- minimizing soil disturbance
- maintaining plant diversity throughout the rotation to increase diversity below ground
- keeping a living root growing year-round
- keeping the soil covered with residue and growing plants year-round

PLANS AND SPECIFICATIONS

Specifications for establishment and operation of this practice will be prepared for each field or treatment unit. Record the specifications using the implementation requirements document. The specifications will identify at a minimum the following:

- Identify purpose.
- Document the planned growing season and crops to be covered.
- Identify the type and quality of cover required.
- Layout and location(s) of the low tunnel system.
- Any required site preparations.
- Planned type and size of the system (e.g., length and width of covering, number of individual coverings, etc.)
- Actions and management needed to operate the cover to achieve the desired objective.
- Identify required supporting practices.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for the operator responsible for the practice. As a minimum include:

- Properly clean and store the cover material when not in use.
- Plan for proper disposal of the system cover at the end of its useful life.
- Check low tunnels and repair as needed after wind, rain and snow events.
- Periodically inspect the low tunnel and repair, reinstall, or replace, as needed to accomplish the intended purpose.
- Manage the structure in a manner that limits wind and/or snow damage.
- If needed, vegetate all disturbed earth surfaces outside of the low tunnel and maintain the vegetation throughout the structure's life.
- Removal of cover materials shall be consistent with the intended purpose and site conditions.
- Operation of equipment near and on the site shall not compromise the intended purpose of the low tunnel structure or its cover.

REFERENCES

Oregon State University Extension. 2021. Low Tunnels for Season Extension in Oregon: Design, Construction and Costs. https://extension.oregonstate.edu/pub/em-9333

University of New Hampshire. 2010. Using Row Covers in the Garden. https://extension.unh.edu/blog/2020/10/using-row-covers-garden

West Virginia University Extension. Low Tunnels For Beginners.

https://extension.wvu.edu/lawn-gardening-pests/gardening/gardening-101/low-tunnels-for-beginners

USDA United States Department of Agriculture

Natural Resources Conservation Service

821 – Low Tunnel Systems Implementation Requirements

Producer:		**Contract:**	
Location:		**County:**	
Farm Name:		**Farm/Tract:**	

Practice Lifespan – 1 year



Practice Purpose(s): (check all that apply)

- ☐ Improve plant productivity and health
- ☐ Reduce plant pest pressure

Definition:

An enclosed polyethylene, polycarbonate, plastic, or fabric covered structure that is used to cover and protect crops from sun, wind, excessive rainfall, or cold, and to extend the growing season or to reduce pest pressure.

This practice only applies to tunnel heights of 4 feet or less.
Use the High Tunnel System CPS (Code 325) when a tunnel height greater than 4 feet is needed.

Additional Information:

Low tunnels used to extend the season and protect overwintering crops from frost damage require regular maintenance, especially during periods of fluctuating temperatures. Growers typically need to ventilate the tunnel during the daytime to avoid overheating the crop. Options for ventilating include utilizing pre-cut slits in the covering material, a "seam" running down the center top of the tunnel that can be opened on hot days or raising one side of the tunnel covering. The cover is returned to its original position to provide nighttime frost protection.

When using polyethylene, ensure plants do not come in direct contact with the cover.

☐ A map(s) showing all planned layout and locations for Low Tunnels is attached.

Identify Planned Crops to be covered and growing season									
Crop	Spring	Summer	Fall	Winter		Crop	Spring	Summer	Fall	Winter

Comments or Additional Requirements:

821 – Low Tunnel Systems
Implementation Requirements

Low Tunnel Installation Specifications:

Select fabric thickness and type that achieves the objectives (check all that apply)					
Select	Weight	Density	Light Transmittance	Degrees Protection (below freezing)	Best for:
	Heavy	1.5 - 2.2 oz/yd	30 - 50%	8° F	Spring/fall crops
	Medium	0.5 - 1.0 oz/yd	70 - 85%	4 -6° F	Spring/fall crops
	Light	0.45 oz/yd	90 - 95%	2° F	Light frost protection

☐ Polyethylene (min 4 mil) ☐ Shade Cloth ☐ Fine mesh pest netting

Frame Material Planned

☐ 9 or 10 gauge wire ☐ Electrical Conduit ☐ PVC tubing
☐ No Frame (Floating) ☐ Metal

Low Tunnels are planned on Field# ☐. There will be ☐ low tunnels installed on this site.
The tunnels will be approximately ☐ (L) x ☐ (W) x ☐ (H) feet.

Additional planned specifics (number of individual types of coverings, etc.)

There site prep needed for the low tunnel installation. Site prep is described below, if applicable:

Additional conservation practices that will be installed with this practice include:

☐ Mulching (484) ☐ Cover Crop (340)
☐ Pest Management Conservation System (595) ☐ Soil Carbon Amendment (808)
☐ Nutrient Management (590) ☐ Irrigation System, Microirrigation (441)
☐ High Tunnel System (325) ☐ Conservation Cover (327)
☐ Other:

Additional management and/or mitigation required for the low tunnels:

Low Tunnel Operation and Maintenance:

- Properly clean and store the cover material when not in use.
- Plan for proper disposal of the system cover at the end of its useful life.
- Check low tunnels and repair as needed after wind, rain and snow events.
- Periodically inspect the low tunnel and repair, reinstall, or replace, as needed to accomplish the intended purpose.
- Manage the structure in a manner that limits wind and/or snow damage.
- If needed, vegetate all disturbed earth surfaces outside of the high tunnel and maintain the vegetation throughout the structure's life.
- Removal of cover materials shall be consistent with the intended purpose and site conditions.
- Operation of equipment near and on the site shall not compromise the intended purpose of the low tunnel structure or its cover.

821 Low Tunnel Systems Signatures
Practice Specifications Approval and Completion Certification

DESIGN AND INSTALLATION / LAYOUT APPROVAL:

I have appropriate job approval authority, and certify this practice has been designed to meet the conservation practice standard, and that the client has been advised of installation and layout elements:

NRCS Representative name and title (type or print):		
NRCS Representative Signature:		Date:

LANDOWNER / OPERATOR ACKNOWLEDGES:

a. They have received a copy of the implementation requirements, and understand the contents, including the scope and location of the practice.
b. They have, or will obtain, all necessary permits and/or rights in advance of practice application, and will comply with all ordinances and laws pertaining to the application of this practice, if required.
c. No changes will be made in the installation of the job without prior concurrence of the NRCS.
d. Maintenance of the installed work is necessary for proper performance during the life of the practice.

I have reviewed all specifications and agree to install as specified:

Landowner / operator name and title (type or print):		
Landowner / operator Signature:		Date:

RECORD OF COMPLETION AND CHECK OUT CERTIFICATION:

Square Feet Completed:	Date Completed by Client:	Date Certified:	Approver's Initials:

I have this job approval authority, and certify this practice has been applied and meets design specifications:

NRCS Representative name and title (type or print):		
NRCS Representative Signature:		Date:
Notes:		

Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

ORGANIC MANAGEMENT

CODE 823

(ac)

DEFINITION

Managing and improving natural resources on land in and adjacent to organic production using methods which integrate cultural, biological, and mechanical practices that foster cycling of resources, promote ecological balance, and conserve biodiversity.

PURPOSE

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

- Improve soil health
- Reduce soil erosion
- Reduce emissions of greenhouse gases (GHG)
- Reduce transport of pesticides and nutrients transported to surface water, groundwater and air
- Improve moisture management
- Improve plant productivity and health
- Reduce plant pest pressure
- Enhance habitat for wildlife, pollinators, and other beneficial invertebrates
- Improve livestock feed and forage imbalance
- Improve or maintain quantity and/or quality of forage for grazing, browsing and productivity

CONDITIONS WHERE PRACTICE APPLIES

This practices applies to all lands where organic management methods are used.

CRITERIA

General Criteria Applicable to All Purposes

Must adhere to the USDA's National Organic Program (NOP) Standards.

Producers must coordinate all activities/inputs with NOP approved Organic Certifiers.

Protect organic production areas from unintended introduction of prohibited substances through defined boundaries, buffer zones or diversions. Establish or maintain at least one perennial conservation buffer planting to address specific concerns and follow the appropriate NRCS Conservation Practice Standard (CPS) such as Conservation Cover (Code 327), Hedgerow Planting (Code 422) etc., to protect production areas, enhance biodiversity, and/or provide habitat for wildlife and beneficials.

All inputs and other materials must follow the National List of allowed and prohibited substances, methods, and ingredients. .Within annual production fields, implement a diverse crop rotation to maintain

or improve soil organic matter (SOM) content , increase biodiversity, and control erosion to tolerable levels.

Use Land Grant University (LGU) or other science-based nutrient recommendations to manage soil fertility and crop nutrients through crop rotations, cover crops, and the application of nutrient sources, including manure, compost and other organic by products. Nutrient applications must follow NRCS CPS Nutrient Management (Code 590) and any State level nutrient management requirements. Apply organic soil amendments at rates that do not overload phosphorus (P) or other nutrients.

Use certified organic seed for all crops including cover crops, unless organic seed is not commercially available, then use untreated, non-genetically modified organism (GMO), conventionally produced seed.

Pests are managed through an integrated strategy of prevention, avoidance, monitoring, and suppression (PAMS). Pest management must follow NRCS CPS Pest Management Conservation System (Code 595). Utilize NOP-allowed pest control materials only when other tactics have not provided needed control.

Manage animals and manure to prevent contamination of crops, soil, and water resources by nutrients and pathogens. Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion.

Burn crop residues only to suppress the spread of disease or to stimulate seed germination.

Ash obtained from the burning of a plant or animal material may be applied only when the material burned has not been treated or combined with a prohibited substance or the ash is not included on the National List of Prohibited Substances for Use in Organic Crop Production.

When livestock are a part of the operation, manage stocking rates and grazing periods to adjust the intensity, frequency, timing, duration, and distribution of grazing and/or browsing to meet the planned objectives for the plant communities, and the associated resources, including the grazing and/or browsing animals.

Manage animals and manure to prevent contamination of crops, soil, and water resources by nutrients and pathogens. Minimize concentrated livestock areas, trailing, and trampling to reduce soil compaction, excess runoff and erosion.

Manage pastures to provide ruminant livestock with sufficient forage to comprise at least 30% of dry matter intake during the grazing season.

Must comply with all federal, state, and local regulations that apply.

Additional Criteria to Improve or Maintain Quantity and/or Quality of Forage for Grazing, Browsing and Productivity

Manage pastures to provide ruminant livestock with sufficient forage to comprise at least 30% of dry matter intake during the grazing season, while protecting water resources and minimizing soil erosion.

Build and maintain a Pasture Condition Score (PCS) of 4 or higher. Follow a pasture and grazing management plan that meets the criteria of NRCS CPS Prescribed Grazing (Code 528). Use optimum stocking rates and sufficient rest periods to build soil health and minimize soil erosion and compaction. Protect surface water and groundwater from transported nutrients, pathogens, and other contaminants.

When livestock obtain their diet by grazing pastures as well as from mechanically harvested and processed feeds, pasture forages will be tested for nutrient content and accounted for in the feed ration and balance of nutrients. All feeds, including grazed pasture will be included in an analysis to meet the livestock's nutrient requirements and avoid excess nutrients being fed. Forage tests will meet the LGU acceptance and certification process.

Provide supplemental feed and/or minerals as needed to balance with forage consumptions to meet the desired nutritional level for the kind and class of grazing and/or browsing livestock.

Base the dietary needs of livestock on the National Academies of Science, Engineering, and Medicine's Nutrient Requirements of Animals series or similar scientific sources.

Design and install livestock feeding, handling, and watering facilities to minimize stress, the spread of disease, parasites, contact with harmful organisms, and toxic plants.

Additional Criteria to Reduce Erosion and Improve Soil Health

Cropland management must result in a soil erosion rate of Tolerable (T) rates or less, minimized soil compaction, a positive Soil Conditioning Index (SCI) of 0.1 or higher (or equivalent positive trend shown by a soil health assessment).

The SCI, or other NRCS approved, science-based soil health assessments may be used in lieu of SCI. The SCI value for each field must equal or exceed zero indicating that SOM is maintained or improving for the crop rotation and management. Adjust crop rotation, cover crops, tillage practices, organic inputs, and other management factors, as needed, to build or maintain SOM.

Enhance SOM quality and quantity, habitat for beneficial soil organisms, and soil aggregate stability:

- Follow a crop rotation and use cover crops to maintain year-round soil coverage, biomass production, living roots, and plant diversity.
- Limit fallow periods in the rotation to less than 25 percent of the available growing season (e.g., when temperatures or soil moisture are not adequate to sustain plant growth).
- Minimize soil disturbances by tillage, livestock, concentrated nutrients, and crop protection materials.

Reduce the number and intensity of tillage and cultivation operations and manage timing and sequence of crops and field operations to minimize physical disruption to soil structure and soil life. Cropland management for the rotation must achieve a Soil Tillage Intensity Rating (STIR) of 80 or less. In annual cropping systems where crop production and weed management creates a high STIR, include a perennial sod phase for at least 2 years to lower mean annual STIR to 80 or less.

Crops in rotation must include at least three crops representing three different plant families *or* three of the four main crop types (warm season grass, warm season broadleaf, cool season grass, and cool season broadleaf) with at least one cover crop per rotation cycle. Adhere to (CPS) Conservation Crop Rotation (Code 328) and (CPS) Cover Crop (Code 340).

In rotations dominated by vegetables or other low-residue production crops, integrate sufficient higher-residue production crops (e.g., specialty grains), high-biomass cover crops, and perennial sod crops to meet the above criteria for soil erosion and soil health.

Include at least one cover crop meeting the criteria of NRCS CPS Cover Crop (Code 340) every two years in the rotation and grow cover crops long enough to achieve canopy closure and at least 1 ton (dry) above ground biomass per acre. Terminate cover crops with no or minimal tillage whenever practical, by roller-crimping, mowing, winterkill, or strip tillage.

Maintain floors and alleys in orchards, vineyards, berries, and other perennial horticultural crops in year-round living plant cover; or in dormant vegetation, residues, or organic mulch during the dry season in rainfall-limited regions.

Limit the use of concentrated organic nitrogen (N) sources such as poultry litter, manure slurry, feather meal, and blood meal to provide not more than 50% of total crop N requirement. Provide the balance of N through legume N fixation, slow-release sources and SOM mineralization. When high soil phosphorus (P) limits the use of manure and compost, increase use of legumes for N.

Additional Criteria to Reduce Plant Pest Pressure and Prevent Transport of Pesticides to Surface and Groundwater

Provide nectar, pollen, and habitat for natural enemies of crop pests by planting and maintaining diversified mixes of flowering plants meeting the criteria of NRCS CPS Conservation Cover (Code 327) or other appropriate NRCS CPS.

Use NOP-allowed pest control products judiciously and only when monitoring indicates they are needed, to minimize environmental risks and development of pest resistance. Utilize the Windows Pesticide Screening Tool (WIN-PST) to estimate risks to water and non-target organisms, and to consider the lowest-impact materials that meet pest management goals. Follow pesticide label instructions to optimize efficacy and minimize environmental and human health risks. Avoid application or drift of pesticides onto beneficial habitat and make applications when pollinators and other non-target organisms are least active.

Implement pesticide mitigation techniques as needed, as described in NRCS directive Agronomy Technical Note (TN) 190, AGR 5, “Pest Management in the Conservation Planning Process,” and Agronomy TN 190, AGR 9, “Preventing or Mitigating Potential Negative Impacts of Pesticides on Pollinators Using Integrated Pest Management and Other Conservation Practices.”

Additional Criteria to Enhance Habitat for Wildlife, Pollinators, and other Beneficial Invertebrates

Establish and maintain perennial habitat plantings on at least 5% of the total acreage of the organic operation.

Select a diversity of primarily native plant species that provide food, shelter, nesting sites, and other habitat needs for desired wildlife, pollinators, and other beneficial organisms.

Plant material specifications shall include only high quality and adapted species.

Site preparation, planting dates, and planting methods shall optimize vegetation survival and growth.

Protect habitat plantings from unintended application, drift, or runoff from pesticide applications.

Equipment movement and other disturbance to habitat shall be restricted during critical periods such as nesting, brood rearing, fawning or calving seasons. States may establish exceptions when certain disturbance causing activities are necessary to maintain the health of the plant community and control noxious weeds.

CONSIDERATIONS

Reliance on tillage and cultivation to manage weeds and cover crops without herbicides can accelerate oxidation of SOM and compromise soil health.

Organic nutrient sources require biological processes to release N and tend to be rich in P relative to N.

Organic amendments feed soil organisms and abstinence from soluble fertilizers and synthetic crop protection chemicals protects soil life and functional biodiversity. Organic crop rotations generally build more SOM than conventional systems and can sustain top yields on N, P, potassium application rates below standard LGU recommendation.

Managing pests, weeds, and diseases through a combination of strategic and diversified crop rotations, use of disease-resistant and weed competitive crop varieties, best organic soil health practices, and low-impact physical and biological controls can reduce the need for pesticide applications or cultivation for weeds. Specific microbial biopesticides and bio-fungicides that attack the target pest or pathogen generally have lower environmental and resource impacts than NOP-allowed botanical or mineral pesticides and fungicides.

Maximize the percentage of the year livestock spend on pasture and range (within the climate constraints of the locale of the operation), and the percentage of dry matter intake derived from grazing to reduce

livestock feed costs, lessen the volume of animal waste that must be stored and managed, and mitigate associated environmental risks including water quality impairment and GHG emissions.

Use to facilitate transition to organic production or to enhance conservation benefits of a certified or exempt organic operation.

For fields or production areas where topography and inherent soil properties (erodibility) make it impractical to maintain positive SCI or reduce soil erosion rates to Tolerable rates or below during annual crop production, consider converting the area to perennial production (orchard, vineyard, pasture, silvopasture, agroforestry) or conservation plantings.

Apply compost, organic mulches, biochar, or other carbon-based soil amendments to organic cropland soils at the suggested minimum rate of one ton (dry) per acre to enhance the soil health benefits of living vegetation.

Provide livestock with organically produced feed and forage, clean drinking water, organic bedding (as applicable), and year-round access to outdoors, sun, shade, shelter, fresh air, and exercise areas.

Other NRCS CPS that may be utilized in conjunction with this practice to create organic system management plans include, but not limited to:

- Access Control (472)
- Composting Facility (Code 317)
- Diversion (Code 362)
- Feed Management (592)
- Field Border (Code 386)
- Filter Strip (Code 393)
- Forage Harvest Management (Code 511)
- Forest Stand Improvement (Code 666)
- Heavy Use Area Protection (561)
- High Tunnel System (Code 325)
- Irrigation Water Management (Code 449)
- Mulching (Code 484)
- Silvopasture (Code 381)
- Upland Wildlife Habitat Management (Code 645)
- Vegetated Treatment Area (Code 635)
- Windbreak/Shelterbelt Establishment and Renovation (Code 380)
- Wildlife Planting (Code 420)

PLANS AND SPECIFICATIONS

Develop plans and specifications for each field, production area, or treatment unit within the operation according to the Criteria and Operation and Maintenance requirements of this standard.

Maintain records to meet NOP Organic System Plan requirements connected to natural resource management.

The plan documentation should include:

- Purpose(s)
- Activities planned to meet the criteria for each purpose.
- Aerial site photograph(s) or site map(s).

- Location of designated sensitive areas and associated setbacks.
- Soil survey map and inherent soil properties of each map unit for all managed areas.
- Initial benchmark and planned rotation data including, as applicable:
  - soil test reports
  - source water analysis for pathogens and nutrient content
  - nutrient analysis or estimates for all inputs (compost, manure, organic by-product, and plant tissue)
  - water and wind erosion rate estimates
  - SCI or other soil health assessment
  - STIR
  - PCS
- As applicable for the operation, all component plans (e.g., nutrient, pest, and grazing management etc.).
- Organic inputs, including NOP-allowed synthetic materials if needed.
- Monitoring Activities.
- Sanitation measures to remove disease vectors, weeds, seeds and habitat for pests.
- Any mitigation activities needed for anticipated impacts of to water, soil, or other natural resources.
- Guidance for implementation, monitoring operation and maintenance, and recordkeeping.

OPERATION AND MAINTENANCE

For transitioning operations, the plan should extend, and be adjusted as needed, through the time to meet the required period of prohibited substance application, typically three years but can be less with proper documentation.

Review or revise plans periodically to determine if adjustments or modifications are needed.

Implement the plan continuously throughout the duration of this practice.

Monitor, evaluate, and document outcomes in relation to conservation purposes on a regular schedule.

Monitor fields receiving animal manures and biosolids for the accumulation of heavy metals and P in accordance with LGU guidance and State law. Other contaminants that are rapidly emerging as a concern in the application of biosolids are per- and poly-fluorinated alkyl substances (PFAS). The Environmental Protection Agency has created a roadmap of strategic action to address the environmental and health implications posed by PFAS, which will provide guidance to a currently evolving situation.

Annually inspect and repair structural and vegetative components of this practice

REFERENCES

National Organic Standards:

https://www.ecfr.gov/current/title-7/subtitle-B/chapter-I/subchapter-M/part-205?toc=1

Websites with additional information:

Extension eOrganic at https://eorganic.info/

NCAT/ATTRA website at https://attra.ncat.org/ has information on crops, pest control, etc.

Organic Materials Review Institute at https://www.omri.org has lists of allowed products.

Organic Farming Research Foundation at https://ofrf.org/resesarch/reports/. Series of Guidebooks on Soil Health and Organic Farming.

NRCS Organic Farming Handbook, updated 2022 (in process)

NRCS Organic Crosswalk, updated 2022 (in process)

NRCS Organic Resources web page

EPA PFAS Explained

Summaries of OFRF Soil Health Guidebooks written for NRCS (in press)

NRCS Guidebook on Organic Tillage and Cultivation Practices (yet to be drafted – part of OFRF/NRCS project)

Bowles, T. M., A. D. Hollander, K. Steenwerth, and L. E. Jackson. 2015. Tightly Coupled Plant-Soil Nitrogen

Cycling: Comparison of Organic Farms across an Agricultural Landscape. PLOS ONE

http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0131888.

Cavigelli, M. A., J. R. Teasdale, and J. T. Spargo. 2013. Increasing Crop Rotation Diversity Improves Agronomic, Economic, and Environmental Performance of Organic Grain Cropping Systems at the USDA-ARS Beltsville Farming Systems Project. Crop Management 12(1) Symposium Proceedings: USDA Organic Farming Systems Research Conference. https://dl.sciencesocieties.org/publications/cm/tocs/12/1.

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Prescott, C. E., Y. Rui, M. F. Cotrufo, and S. J. Grayston. 2021. *Managing plant surplus carbon to generate soil organic matter in regenerative agriculture*. Journal of Soil and Water Conservation 76(6): 99A-104A.

Cavigelli MA, Mirsky SB, Teasdale JR, Spargo JT, Doran J. Organic grain cropping systems to enhance ecosystem services, Renewable Agriculture and Food Systems, 2013, vol. 28 (pg. 145-159)

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Mallory, E.B., N. Halberg, L. Andreasen, K. Delate, and M. Ngouajio. 2015. Innovations in organic food systems for sustainable production and ecosystem services: An introduction to the special issue of Sustainable Agriculture Research. Sustainable Agriculture Research 4(3):

Kloot, Robin. 2018. Using adaptive nutrient management to answer “how much fertilizer do you actually need?” NRCS webinar May 8, 2018. Science and Technology Training Library

Bowles, T.M., Jackson, L.E., Loeher, M., Cavagnaro, T.R. Ecological intensification and arbuscular mycorrhizas: a meta-analysis of tillage and cover crop effects. Journal of Applied Ecology 54: 1785-1793.

National Academies of Sciences, Engineering, and Medicine. 2022. Animal Nutrition Series. Washington, DC: The National Academies Press. https://nap.nationalacademies.org/collection/63/nutrient-requirements-of-animals

USDA United States Department of Agriculture

823 (Interim Practice) Organic Management Implementation Requirements

Producer:		**Project or Contract:**	
Location:		**County:**	
Farm Name:		**Tract Number:**	

Practice Lifespan – 1 year



Practice Purpose(s):

This practice is used to accomplish one or more of the following purposes (check all that apply):

- ☐ Improve soil health
- ☐ Improve soil health
- ☐ Reduce soil erosion
- ☐ Reduce emissions of greenhouse gases (GHG)
- ☐ Reduce transport of pesticides and nutrients transported to surface water, groundwater and air
- ☐ Improve moisture management
- ☐ Improve plant productivity and health
- ☐ Reduce plant pest pressure
- ☐ Enhance habitat for wildlife, pollinators, and other beneficial invertebrates
- ☐ Improve livestock feed and forage imbalance
- ☐ Improve or maintain quantity and/or quality of forage for grazing, browsing and productivity

Producer's Goals and Objectives:

☐ The following map(s) are attached to this organic management plan:

- ☐ All fields or locations planned for Organic Management
- ☐ Location of designated sensitive areas and associated setbacks, buffer zones and diversions
- ☐ Soil survey map and inherent soil properties of each map unit for all managed areas

If you have questions about this planned practice contact:

Name:		Tel:		Email:	

NRCS Review Only

Designed By:		**Date**	
Checked By:		**Date**	
Approved By:		**Date**	

823 – Organic Management (Interim Practice)
Implementation Requirements

823 Organic Management Requirements (check whether currently being met or is still needed)**:**

Met / Need

☐ ☐ The Organic Management plan adheres to the USDA's National Organic Program (NOP) Standards.

☐ ☐ The producer(s) is coordinating all organic management activities/inputs with a NOP approved Organic Certifier(s).

Organic certifier name: _____

☐ ☐ Prior to certification of the 823 practice, contact between NRCS and the NOP Certifier is required for verification the organic plan is being properly implemented.

☐ ☐ Organic production areas are protected from unintended introduction of prohibited substances through defined boundaries, buffer zones or diversions.

☐ ☐ All inputs and other materials follow the National List of allowed and prohibited substances, methods, and ingredients.

☐ ☐ Nutrient applications are being managed to follow NRCS CPS Nutrient Management (Code 590) and any State level nutrient management requirements.

☐ Nutrient Management Plan is attached (or is in the NRCS client folder and customer has original copy)

☐ ☐ The use of concentrated organic nitrogen (N) sources such as poultry litter, manure slurry, feather meal, and blood meal is managed to provide not more than 50% of total crop N requirement. The balance of N is provided through legume N fixation, slow-release sources and SOM mineralization. When high soil phosphorus (P) limits the use of manure and compost, the use of legumes for N is increased.

☐ ☐ Only certified organic seed is used for all crops including cover crops (unless organic seed is not commercially available, then untreated, non-genetically modified organism (GMO), conventionally produced seed is used).

☐ ☐ Pests are managed through an integrated strategy of prevention, avoidance, monitoring, and suppression (PAMS) and following NRCS CPS Pest Management Conservation System (Code 595). NOP-allowed pest control materials are utilized only when other tactics have not provided needed control.

☐ Pest Management Plan is attached (or is in the NRCS client folder and customer has original copy)

☐ ☐ Crop residues are only burned to suppress the spread of disease or to stimulate seed germination.

☐ ☐ Ash obtained from the burning of a plant or animal material are applied only when the material burned has not been treated or combined with a prohibited substance or the ash is not included on the National List of Prohibited Substances for Use in Organic Crop Production.

☐ ☐ Establish and maintain perennial habitat plantings on at least 5% of the total acreage of the organic operation.

☐ ☐ Provide nectar, pollen, and habitat for natural enemies of crop pests by planting and maintaining diversified mixes of flowering plants meeting the criteria of NRCS CPS Conservation Cover (Code 327) or other appropriate NRCS CPS.

☐ ☐ The operation follows all applicable federal, state, and local regulations.

If livestock are a part of the operation: ☐ N/A

Met / Need

☐ ☐ Livestock and manure are managed to prevent contamination of crops, soil, and water resources by nutrients and pathogens. Concentrated livestock areas, trailing, and trampling are minimized to reduce soil compaction, excess runoff and erosion.

☐ ☐ Stocking rates and grazing periods are managed to adjust the intensity, frequency, timing, duration, and distribution of grazing and/or browsing to meet the planned objectives for the plant communities, and the associated resources, including the grazing and/or browsing animals.

☐ ☐ A Pasture Condition Score (PCS) of 4 or higher is being maintained. ☐ PCS analysis is attached

☐ ☐ A pasture / grazing management plan meeting the criteria of NRCS CPS Prescribed Grazing (Code 528) is being followed. ☐ Grazing plan is attached (or is in the NRCS client folder and customer has original copy)

823 – Organic Management (Interim Practice)
Implementation Requirements

☐ ☐ Pastures are managed to provide ruminant livestock with at least 30% of dry matter intake during the grazing season.

☐ ☐ When livestock obtain their diet by grazing pastures as well as from mechanically harvested and processed feeds, pasture forages are tested for nutrient content and accounted for in the feed ration and balance of nutrients. All feeds, including grazed pasture are included in an analysis to meet the livestock's nutrient requirements and avoid excess nutrients being fed. Forage tests meet the LGU acceptance and certification process.

☐ ☐ Supplemental feed and/or minerals are provided as needed to balance with forage consumptions to meet the desired nutritional level for the kind and class of grazing and/or browsing livestock.

☐ ☐ Dietary needs of livestock are based on the National Academies of Science, Engineering, and Medicine's Nutrient Requirements of Animals series or similar scientific sources.

☐ ☐ Livestock feeding, handling, and watering facilities are designed and installed to minimize stress, the spread of disease, parasites, and contact with harmful organisms, and toxic plants.

<u>If crops in rotation are a part of the operation</u>: ☐ N/A

Met / Need

☐ ☐ Crops in rotation include at least three crops representing three different plant families or three of the four main crop types (warm season grass, warm season broadleaf, cool season grass, and cool season broadleaf) with at least one cover crop per rotation cycle.

☐ ☐ Cropland management results in a soil erosion rate of Tolerable (T) rates or less, minimized soil compaction, a positive Soil Conditioning Index (SCI) of 0.1 or higher (or equivalent positive trend shown by a soil health assessment). ☐ Soil erosion analysis is attached ☐ SCI analysis is attached

☐ ☐ Enhancements to SOM quality and quantity, habitat for beneficial soil organisms, and soil aggregate stability are applied:

- Follow a crop rotation and use cover crops to maintain year-round soil coverage, biomass production, living roots, and plant diversity.
- Limit fallow periods in the rotation to less than 25 percent of the available growing season (e.g., when temperatures or soil moisture are not adequate to sustain plant growth).
- Minimize soil disturbances by tillage, livestock, concentrated nutrients, and crop protection materials.

☐ ☐ The number and intensity of tillage and cultivation operations and timing and sequence of crops and field operations are managed to minimize physical disruption to soil structure and soil life. A Soil Tillage Intensity Rating (STIR) of 80 or less is achieved. ☐ STIR analysis is attached

☐ ☐ At least one cover crop meeting the criteria of NRCS CPS Cover Crop (Code 340) is included in the rotation every two years. Cover crops are grown long enough to achieve canopy closure and at least 1 ton (dry) above ground biomass per acre. Cover crops are terminated with no or minimal tillage whenever practical, by roller- crimping, mowing, winterkill, or strip tillage.

☐ ☐ In rotations dominated by vegetables or other low-residue production crops, sufficient higher- residue production crops (e.g., specialty grains), high-biomass cover crops, and perennial sod crops are integrated to meet the above criteria for soil erosion and soil health. ☐ N/A

☐ ☐ Floors and alleys in orchards, vineyards, berries, and other perennial horticultural crops are maintained in year-round living plant cover; or in dormant vegetation, residues, or organic mulch during the dry season in rainfall-limited regions. ☐ N/A

Additional Organic Management Requirements Information:

823 – Organic Management (Interim Practice)
Implementation Requirements

Associated Conservation Practices:

The following associated conservation practices are needed and will be implemented (list all that apply).

☐ **Implementation Requirements (IR) and specifications for these practices are attached:**

Operation and Maintenance:

- For transitioning operations, the plan will extend, and be adjusted as needed, through the time to meet the required period of prohibited substance application, typically three years but can be less with proper documentation.
- Review or revise plans periodically to determine if adjustments or modifications are needed. Implement the plan continuously throughout the duration of this practice.
- Monitor, evaluate, and document outcomes in relation to conservation purposes on a regular schedule.
- Monitor fields receiving animal manures and biosolids for the accumulation of heavy metals and P in accordance with LGU guidance and State law. Other contaminants that are rapidly emerging as a concern in the application of biosolids are per- and poly-fluorinated alkyl substances (PFAS). The Environmental Protection Agency has created a roadmap of strategic action to address the environmental and health implications posed by PFAS, which will provide guidance to a currently evolving situation.
- Annually inspect and repair structural and vegetative components of this practice.

Specific Additional Operation and Maintenance Requirements for Your Practice:
