



United States Department of Agriculture

NATURAL RESOURCES CONSERVATION SERVICE

Carbon Sequestration and Greenhouse Gas Mitigation Management Plan¹

Technical Guidance Document under

Conservation Planning Activity Code 199

DEFINITION

A Carbon Sequestration and Greenhouse Gas Mitigation Management Plan is a whole-operation conservation plan for cropland, rangeland, pastureland, forestland, and farmstead as applicable, that when fully implemented will increase carbon sequestration and reduce greenhouse gas (GHG) emissions.

CRITERIA

General Criteria

The Carbon Sequestration and Greenhouse Gas Mitigation Plan should address the overarching cause of global climate change that encompasses all NRCS resource concerns -Soil, Water, Air, Plants, Animals, Humans and Energy. The technical service provider and client develop the plan by addressing resource concerns with a focus on opportunities for enhanced carbon sequestration and/or GHG reduction across the entire operation. Resource concerns on the farm, ranch, or forestland are addressed through the application of targeted, site-specific conservation practices with quantifiable carbon sequestration and/or greenhouse gas benefits. A Carbon Sequestration and Greenhouse Gas Mitigation Plan can include supporting conservation practices that do not necessarily produce quantifiable, direct benefits but have co-benefits and/or ancillary benefits.

The Carbon Sequestration and Greenhouse Gas Mitigation Plan contains all the elements of a conservation plan including an inventory and analysis of current resource conditions (specifically on-operation carbon sequestration and GHG mitigation potential), formulation and evaluation of alternatives, and the client's decisions regarding the design and implementation of a conservation system that will address the identified resource concerns. Reducing greenhouse gas emissions and enhancing carbon sequestration on these lands can provide numerous co-benefits that improve ecosystem function and health. The purpose of this plan is to help clients mitigate the negative effects related to atmospheric carbon dioxide (CO₂) and other GHGs. The scope and criteria of this plan will be expanded in the future to include management that improves system adaptation and resilience to climate change as additional data regarding those benefits becomes available and quantifiable.

¹ This management plan is "Climate Smart" and intended to support the United States Nationally Determined Contribution (NDC) and reporting within the U.S. National Inventory of GHG Emissions and Sinks.



Below is a list of conservation practices that have quantifiable atmospheric benefits, plus the addition of the Soil Carbon Amendment Interim Practice Standard, which is commonly used in Carbon Sequestration and Greenhouse Gas Mitigation Management Plans. Planning is location-specific and in some situations, other practices may also enhance carbon sequestration and/or reduce GHG emissions. The technical service provider is expected to develop a plan that enables the agricultural producer to enhance soil carbon stocks, increase perennial biomass production, protect existing carbon stocks, and have access to voluntary carbon markets.

Climate Change Mitigation Practice Categories	Conservation Practice Standard
Soil Health	327 Conservation Cover (ac)
	328 Conservation Crop Rotation (ac)
	329 Residue and Tillage Management, No Till (ac)
	329A Strip Till (ac)
	329B Mulch Till (ac)
	330 Contour Farming (ac)
	332 Contour Buffer Strips (ac)
	340 Cover Crop (ac)
	345 Residue and Tillage Management, Reduced Till (ac)
	386 Field Border (ac)
	393 Filter Strips (ac)
	412 Grassed Waterways (ac)
	585 Stripcropping (ac)
	601 Vegetative Barriers (ft)
	603 Herbaceous Wind Barriers (ft)
808 Soil Carbon Amendment	
Nitrogen Management	590 Nutrient Management (ac)
Livestock Partnership	366 Anaerobic Digester (no.)
Grazing and Pasture	512 Forage and Biomass Planting (ac)
	528 Prescribed Grazing (ac)
	528A Prescribed Grazing (ac)
	550 Range Planting (ac)
Agroforestry, Forestry and Upland Wildlife Habitat	380 Windbreaks and Shelterbelts (ft)
	381 Silvopasture Establishment (ac)
	390 Riparian Herbaceous Buffer (ac)
	391 Riparian Forest Buffer (ac)
	612 Tree and Shrub Establishment (ac)
	645 Upland Wildlife Habitat (ac)
	650 Windbreak Renovation (ft)

Technical Criteria

Phase 1: Collection and Analysis of Information

Identify Client’s Objectives: Includes client’s short- and long-term goals for their operation including carbon sequestration, GHG emissions reduction, and participating in voluntary environmental markets.



Inventory Resources

A. Background and Site Information:

- Landowner information – name, address, operation type, size
- Location and plan map of parcel

B. Document Existing Conditions:

- Resource inventory map – boundaries, fields, surface waters, wetlands, fences, land uses, slope, elevation or aspect, Ecological Site map, etc.
- Soils map, appropriate soil descriptions, and interpretations
- Current management activities, existing practices, and history
- Identify all resource concerns that do not currently meet NRCS planning criteria.

Analyze Resource Data

- A. Core resource concerns identified for each land use must be addressed in the plan. Many of the conservation practices have direct atmospheric benefits and co-benefits for additional resource concerns. In addition to the climate-related resource concerns, list secondary resource concerns for each land use that may be identified during the planning process and if addressed could provide additional benefit.

The plan should be developed as comprehensively as possible based on the client's willingness and ability.

- B. Resource assessments must include the results of all appropriate tools. COMET-FARM is required to estimate the carbon sequestered and GHGs reduced. Additional tools to assess other associated resource concerns may include Soil testing, Soil Conditioning Index, Soil Health In-Field Assessment, Interpreting Indicators of Rangeland Health, Pasture Condition Score, and other NRCS approved methodologies, as applicable.
- C. Resource assessments for soil carbon sequestration and soil health for system adaptation and resilience include Soil health testing (Conservation Evaluation and Monitoring Activity 216), In-Field Soil Health Assessment, Interpreting Indicators of Rangeland Health, Pasture Condition Score and other NRCS-approved methodologies as applicable.

Phase II: Formulating and Evaluating Alternatives

Formulate and evaluate alternatives with the client considering the following:

- Evaluate the alternatives to determine their effects on the identified resource concerns and whether they meet the client's objectives. Look at short-term and long-term ability of conservation practices to reduce greenhouse gases and sequester carbon.
- Practices may be beneficial for addressing certain resources but could potentially have adverse effects on others. Additional practices or



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management changes may be needed to mitigate these potential adverse effects. Quantification tools are critically important to estimate the overall net carbon sequestration and GHG emission reductions under the management plan.

Based on the alternatives selected, develop the carbon plan that includes the following:

- A record of the conservation practices that have been selected to address the identified resource concerns.
- Any necessary specifications and maintenance requirements to implement the practices.
- A schedule of planned practice implementation.
- A plan map showing the record of the client's decisions and location(s) of planned conservation practices. Map includes boundaries, fields, scale, north arrow, appropriate map symbols for existing and planned conservation practices, land use designations, and other features such as streams, surface water, and sensitive areas.
- Quantify the amount of greenhouse gas reduction and/or enhanced carbon sequestration using COMET-FARM or other approved NRCS quantification methods and tools.

Carbon Sequestration and Greenhouse Gas Mitigation Management Plan may be used in addition to a Soil Health Management Plan (CPA 116 and DIA 162), a Grazing Management Plan (DIA 159), and/or a Forest Management Plan (CPA 106 and DIA 165), depending on client objectives and land use.

Phase III: Implementation and Evaluation of the Plan

Practices must be monitored and maintained so that the benefits associated with carbon sequestration and greenhouse gas reductions will continue to be realized.

Additional Criteria by Landuse

Cropland

1. Address core resource concerns for:
 - Air quality: Emissions of greenhouse gases (nitrous oxide, methane, and carbon dioxide)
 - Soil health: Soil organic matter depletion, aggregate instability, soil organism habitat loss or degradation
 - Water quality: Nutrients transported to surface and groundwater
 - Excessive or insufficient water quantity: ponding and flooding, seasonal high-water table, moisture management, drought susceptibility, inefficient irrigation



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water use.

2. Other co-benefits and ancillary benefits include but are not limited to soil erosion, soil compaction, plant condition, efficient energy use, precision nitrogen application, rice water management, and other atmospheric benefits that do not currently meet planning criteria.
3. Meet the client's objectives.
4. Comply with federal, state, tribal, and local laws, regulations and permit requirements.

Rangeland

1. Address core resource concerns for:
 - Air quality: Emissions of greenhouses gases (nitrous oxide, methane, and carbon dioxide)
 - Soil health: Soil organic matter depletion, aggregate instability, soil organism habitat loss or degradation
 - Water quality: Nutrients transported to surface and groundwater
 - Excessive or insufficient water quantity: ponding and flooding, seasonal high-water table, moisture management, drought susceptibility, inefficient irrigation water use.
 - Degraded plant condition: Plant health and productivity and inadequate structure and composition
 - Fire Management: Wildfire hazard from biomass accumulation
2. Other co-benefits and ancillary benefits include but are not limited to soil erosion, soil compaction, plant condition and other atmospheric benefits that do not currently meet planning criteria.
3. Determine baseline animal unit month (AUM) and/or vegetation productivity.
4. Meet the client's objectives.
5. Comply with federal, state, tribal, and local laws, regulations, and permit requirements.

Pastureland

1. Address core resource concerns for:
 - Air quality: Emissions of greenhouses gases (nitrous oxide, methane, and carbon dioxide)
 - Soil health: Soil organic matter depletion, aggregate instability, soil organism habitat loss or degradation
 - Water quality: Nutrients transported to surface and groundwater
 - Excessive or insufficient water quantity: ponding and flooding, seasonal high-water table, moisture management, drought susceptibility, inefficient irrigation water use.



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- Degraded plant condition: Plant productivity and health, and inadequate structure and composition
 - Fire Management: Wildfire hazard from biomass accumulation
2. Other resource concerns for consideration: soil erosion, soil compaction, efficient energy use, and other resource concerns that do not currently meet planning criteria.
 3. Determine baseline animal unit month (AUM) and/or vegetation productivity.
 4. Meet the client's objectives.
 5. Comply with federal, state, tribal, and local laws, regulations and permit requirements.

Forestland

1. Address core resource concerns for:
 - Air quality: Emissions of greenhouses gases (carbon dioxide)
 - Soil health: Compaction
 - Excessive or insufficient water quantity: ponding and flooding, moisture management, drought susceptibility
 - Pest Pressure: Excessive plant pest pressure and invasive species
 - Degraded plant condition: Plant health and productivity, inadequate structure and composition
 - Fire Management: Wildfire hazard from biomass accumulation
2. Meet the client's objectives.
3. Comply with federal, state, tribal and local laws, regulations, and permit requirements.

References

USDA Natural Resources Conservation Service. Field Office Technical Guide.

USDA Natural Resources Conservation Service. National TSP Website.

<https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/>

USDA Natural Resources Conservation Service. National TSP Resources.

<https://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/programs/technical/tsp/?cid=nrcseprd1417414>

DELIVERABLES

A hard copy and electronic copy of the plan that includes:

- Cover page – name, address, phone of client and Technical Service Provide (TSP);



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NRCS conservation practices including planned implementation dates for selected alternative by client; total acres of the plan, signature blocks for the TSP, client, and a signature block for the NRCS acceptance.

- Plan map – boundaries, fields, scale, north arrow, appropriate map symbols for existing and planned conservation practices, land use designations, and other features such as streams, surface water, and sensitive areas.
- Soils map and appropriate soil descriptions. The Web Soil Survey can provide the needed information: <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>
- Complete list of selected practices and locations.
- Implementation requirements and maintenance requirements of selected practices.
- Quantify the amount of greenhouse gas reduction and/or enhanced carbon sequestration using COMET-FARM. Include a copy of COMET-FARM report for the final selected alternatives.