

CARBON FARM PLAN TEMPLATE
for
RANGELANDS
VERSION 1

*Funding for the development of this template was made possible through a grant from the
California State Coastal Conservancy.*

Contents

1. Introduction & Background2

2. Ranch Information3

 Ranch Goals5

 Identification of Ecological Sites6

3. Grazing Management and Assessment8

4. Existing Carbon Beneficial Practices13

5. Recommended/Planned Carbon Beneficial Practices14

6. Tracking implementation of your Carbon Farm Plan.....15

7. Monitoring & Record Keeping16

 Soil Carbon Monitoring.....16

 Record Keeping16

8. Maps17

9. References18

10. Appendices.....19

 A: List of NRCS Practices Related to Carbon Farm Planning19

 B. Quantification Supporting Documentation22

 C. Worksheet for AUM Calculations23

11. Additional Resources for Landowner.....24

1. INTRODUCTION & BACKGROUND

The carbon cycle is the exchange of carbon among the Earth and its soils, oceans, rock and waterbodies, the atmosphere, and living things. Agriculture uses the carbon cycle to produce plant matter, both above and below ground. Agricultural activities can lead to increases or decreases of carbon dioxide (CO₂) in the atmosphere. For example, practices such as tillage, use of fossil fuel-based agrichemicals, and running fuel-burning agricultural equipment can increase atmospheric CO₂, while the growth of long-lasting plant material above and below the soil surface can lead to decreases of atmospheric carbon, through “carbon sequestration” in plant material and soil organic matter. Such increases in plant material and soil organic matter can have other benefits as well, such as improved soil health and wildlife habitat and farm productivity. The implementation of land management practices that reduce greenhouse gas (GHG) emissions and/or increase the amount of carbon sequestered in soils and plant material is often referred to as “Carbon Farming.”

This template is intended be a guide for the landowner and their technical specialist (RCD Staff, TSP, etc.) to utilize in the collaborative process of inventorying the ranch, including features such as rangelands, pastures, and waterways, and roadways, documenting conservation practices that are currently used, and helping the landowner to identify all opportunities to capture additional carbon on the farm/ranch landscape. The resulting plan is intended to be a working document to inform and record the landowner’s decisions and progress. Lastly, the plan will provide the landowner with an easy to reference summary of conservation practices that they use and that they intend to implement.

The implementation phase of this plan is the most exciting part. Some components of the plan can be implemented by the producer without the need for additional financial resources. A change in grazing schedule, for example, or reduced tillage. Where funding is needed, implementation of projects may be carried out using one or more of the following funding options:

- ✓ Personal Finances
- ✓ Grant Programs
- ✓ Mitigation Banks
- ✓ Voluntary Markets
- ✓ Cap and Trade Market

It is important to note that each of these options may require supplemental information related to baseline inventories, assessments, monitoring and verification of practice implementation. For example, to participate in the State’s Cap and Trade Market, specific protocols must be followed so that carbon credits may be realized. This document is intended to be a first step in realizing carbon capture potential, and additional documentation may be necessary depending on the landowner’s funding goals and opportunities.

The carbon plan contains all the elements of a conservation plan including:

- ✓ an inventory and analysis of current resource conditions,
- ✓ on-farm carbon sequestration and GHG mitigation potential,
- ✓ and the landowners decisions regarding the implementation of a conservation system that will address the identified resource concerns.

Purpose: Identify opportunities and related practices, currently in use or recommended for implementation, that reduce GHG emissions, improve soil health, and sequester carbon.

2. RANCH INFORMATION

Ranch Location			
Ranch Name:			
Ranch Physical Address:			
Mailing Address, or P.O. Box:		County:	
City, State, Zip Code:		What Water Board region(s) is the ranch/farm in? http://www.waterboards.ca.gov/waterboards_map.shtml	
Operation Type:	Size (acres):		
List all Assessor Parcel Numbers (APNs) or legal description (Township, Range, Sections) for each parcel, pasture, or silage field included in this plan:		What watershed is the ranch in? _____	
Lead Plan Preparer			
Name		Plan Date:	
Preparer's Affiliation			
Plan Sections Prepared	<input type="checkbox"/> All <input type="checkbox"/> Some (specify below) List Sections:		
Email	Phone	Fax	
Other Contributing Plan Preparers			
Name		Affiliation	
Plan Sections Contributed to (List Sections):			
Email		Phone	
Owner (if different from above)			
Name(s):			
Mailing Address or P.O. Box:		<input type="checkbox"/> same as ranch address	
City, State and Zip Code:			
Phone:		E-mail (optional):	

Tenant/Manager (if not owner)			
Name(s):			
Mailing Address or P.O. Box: <input type="checkbox"/> same as ranch address			
City, State and Zip Code:			
Phone:		E-mail (optional):	
Other Plans & Certifications			
Other plans may have already been developed for the ranch that include information, assessments or evaluations that can aid in the development of this plan. Check the box for the plans, certifications or other documents that exist for the ranch and review and incorporate information into this plan as applicable:			
<input type="checkbox"/> Conservation Easement	<input type="checkbox"/> Dairy Quality Assurance Program	<input type="checkbox"/> Erosion Control Plan	<input type="checkbox"/> Fire Management Plan
<input type="checkbox"/> Fish Friendly Farming	<input type="checkbox"/> Grass-Fed Certification	<input type="checkbox"/> Grazing Management Plan	<input type="checkbox"/> UCCE Ranch Water Quality Plan
<input type="checkbox"/> Salmon Safe Certification	<input type="checkbox"/> NRCS Conservation Plan	<input type="checkbox"/> Dairy Nutrient Management	<input type="checkbox"/> Dairy Waste Management Plan
<input type="checkbox"/> Timber Harvest Plan	<input type="checkbox"/> Organic Certification	<input type="checkbox"/> Other (list)	<input type="checkbox"/> Other (list)

Ranch Goals

Ranch goals can be divided into production, quality of life and natural resource goals. These goals should reflect what the landowner is trying to accomplish on their property and should be identified in collaboration with the landowner. These goals are used to identify management strategies and practices for accomplishing the landowners' goals as well as to help them identify goals that might conflict with each other. Check any goal statements below which reflect the landowners' plans; reword or add additional goals as needed.

Production/Business
<input type="checkbox"/> pass on the farm/ranch to the next generation
<input type="checkbox"/> reduce family/farm debt
<input type="checkbox"/> expand farm/ranch enterprises
<input type="checkbox"/> develop new enterprises
<input type="checkbox"/> increase farm/ranch profitability
<input type="checkbox"/> reduce operating costs
<input type="checkbox"/> purchase or lease more ranch/farm property
<input type="checkbox"/> build a climate-smart/green brand or story for your farm or ranch
<input type="checkbox"/> other:
Quality of Life
<input type="checkbox"/> reduce energy consumption in the farm/ranch operation
<input type="checkbox"/> provide for our children's college education
<input type="checkbox"/> provide financial or other support for community organizations
<input type="checkbox"/> reduce household operating expenses
<input type="checkbox"/> build an emergency fund
<input type="checkbox"/> raise livestock or crops during retirement
<input type="checkbox"/> build a retirement fund
<input type="checkbox"/> be part of the climate change solution through carbon farming
<input type="checkbox"/> other:
Natural Resources & Water Quality
<input type="checkbox"/> manage rangeland to protect soil from erosion and increase production
<input type="checkbox"/> manage cropland, pastureland or forestland to protect soil from erosion and increase production
<input type="checkbox"/> manage ranch roads to reduce movement of sediment into streams and other water bodies
<input type="checkbox"/> reduce erosion of streambanks and gullies
<input type="checkbox"/> manage to increase tree cover and/or ground cover in riparian areas or along streams
<input type="checkbox"/> reduce concentration of livestock in or near streams, wetlands, or other water bodies
<input type="checkbox"/> manage to reduce entry of sediment, nutrients and pathogens to streams or wetlands
<input type="checkbox"/> reduce wildfire hazard
<input type="checkbox"/> maintain or enhance oak woodland, native grass, or other plant communities
<input type="checkbox"/> maintain or enhance wildlife or fisheries habitat or other aquatic resources

<input type="checkbox"/> reduce/manage invasive weeds
<input type="checkbox"/> reduce/manage predator impacts on the ranching operation
<input type="checkbox"/> meet water quality regulations
<input type="checkbox"/> improve water holding capacity of your soil, increase forage production
<input type="checkbox"/> utilize alternative water storage, water conservation strategies
<input type="checkbox"/> increase farm resilience to drought, flood and climate change
<input type="checkbox"/> be part of the climate change solution through carbon farming
<input type="checkbox"/> other

Identification of Ecological Sites

Implementation of conservation practices with the Carbon Farm framework is based upon the grouping of land management activities by ecological site. Refer to NRCS's ecological site descriptions where available and appropriate, otherwise use the approach outlined here. An ecological site is determined by slope class, soil type, and aspect, so that each ranch can be described using just a few ecological sites, which commonly reoccur on the farm landscape. Similar ecological sites can be expected to respond similarly to similar management, and to support similar types of vegetation and ecosystem processes, including carbon sequestration potential, assuming similar management history and similar management in the future. Ecological site delineation helps identify those sites most likely to yield significant carbon benefits give specific practices and those for which specific practices may not be particularly productive.

Ranch Map Summary

Maps are an important part of a Carbon Farm Plan and serve as an easy reference for the landowner and technical service provider. Maps should be prepared using a topographic map, an aerial photograph, or a Google Earth image (minimum 1" = 1,000' or 1:12,000 scales) as a base map. More than one map may be used to display the information in the plan. A more detailed map (scale of 1" = 500' or 1:6,000') may be needed to accurately depict stream channels, riparian corridors, or other small scale features. Each map should have a legend and should clearly display the features that are identified in the plan (See example map: [map link inserted here](#)).

The table below provides a summary of features mapped for inclusion in a Carbon Farm Plan. Please indicate below which features are displayed on the Ranch Plan map(s) by checking the boxes as indicated. Maps should be kept with the Carbon Farm Plan.

✓		Indicate Map Name/#
	Parcel Boundaries	
	CFP Plan Boundaries	
	Soil type(s) with interpretations*	
	Topography (identify slope areas such as 0-10%, 10-20%, 20-30% and 40%+)	

	Annual Forage Production*	
	Soil Organic Matter *	
	Vegetation Cover	
	Aspect	
	Land Use	
	Field/pasture/paddock identifiers	
	Sensitive plant and animals species (CNDDDB) (if available)	
	Waterways: streams, creeks, rivers, ponds	
	Sensitive areas: swales, wetlands, native plant communities	
	Water sources: Springs, wells, troughs, tanks, pipelines, reservoirs	
	Erosion features on land associated with the ranch facility (i.e. gullies, rills, landslides, mudflows, rock falls, streambank erosion, channel incision)	
	Existing/current Carbon Beneficial Practices	
	Location of Potential/Planned Carbon Beneficial Practices	
	Photo-monitoring points (i.e. vegetation and soil monitoring)	
	Other key ranch features (identify i.e. fencing)	

*This can be mapped through the USDA's Web Soil Survey at <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

HISTORIC USE AND MANAGEMENT

Questions to discuss can include but are not limited to: What is known about the property prior to current ownership? What have tillage practices been? What pastures have been tilled and what was the frequency? What is the current grazing plan or management strategy with grazed animals? What were the historic nutrient management practices such as manure application? What is the cropping history of the ranch?

3. GRAZING MANAGEMENT AND ASSESSMENT

This section combines overall ranch livestock carrying capacity with ecological site potentials and limitations to manage for optimum carbon capture- as forage production and soil carbon – within site-specific management constraints. In general, increasing forage production from permanent pastures on a ranch will tend to result in an increase in soil carbon, assuming good or excellent pasture management. Practices that reduce or repair soil erosion, reduce area of bare soil, reduce trailing and provide grazed vegetation sufficient rest for recovery and regrowth between grazing periods will tend to result in both more overall forage production and more carbon sequestered in both vegetation and soils.

Use the table below to help determine the ranch's carrying capacity in the form of Animal Unit Months (AUM) and Animal Unit Years (AUY) (see appendix excel spreadsheet to carry out these calculations). An example is provided below. While NRCS soil survey information is helpful to derive a rough estimate of site carrying capacity, results should be confirmed using producer historical stocking rate information, site condition assessment, and actual production values if available. Actual range/pasture production will vary depending on inputs, historical use and management, etc. Dairies or other intensively managed livestock systems are likely to have significantly higher production on a per acre basis than suggested by soil survey data alone. Whenever possible, this analysis should be conducted in coordination with a range management professional.

Table 1: Estimated Annual Forage Production and Available Forage (see Appendix C for AUM Excel sheet, with imbedded formulas).

SOIL TYPE*	SLOPE CLASS (%)*	ACRES	FORAGE PRODUCTION* (LBS/AC/YR)			RESIDUAL DRY MATTER** (LBS/ACRE X ACRES)	AVAILABLE FORAGE (FORAGE PRODUCTION – RDM)		
			LOW YEAR	NORMAL YEAR	FAVORABLE YEAR		LOW YEAR	NORMAL YEAR	FAVORABLE YEAR
A	9-15	24.6	1,500	2,400	2,800	700 X 24.6 =17,220	(24.6 X 1,500) – 17,220	(24.6 X 2,400) -17,220	(24.6 X 2,800) -17,220
TOTAL		24.6				17,220	19,680	41,820	51,660
ANIMAL UNIT MONTHS (AUM) (LBS AVAILABLE FORAGE/900 LBS/AUM) 21.8 TO 57.4 AUM***							19,680/900= 21.8	46.5	57.4
ANIMAL UNIT YEARS (AUY) (AUM/12) 1.8 TO 4.78 AUY							21.8/12= 1.8	3.87	4.78

*This value can be determined through mapping the specific ranch property in USDA's Web Soil Survey at <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

**Residual Dry Matter (RDM) is the amount of above ground biomass retained on rangeland or pastures at the end of the grazing season (typically considered the end of the water year). Recommended RDM values are based on guidelines set out in the following publication <http://anrcatalog.ucanr.edu/pdf/8092.pdf>

***One animal unit month (AUM) is the amount of forage needed to support a 1,000lb cow and her calf for one month; here it is assumed to be 900 lbs of dry forage. One animal unit year (AUy) is the amount of forage needed to support a 1,000 lb cow and her calf (or equivalent) for one year.

Grazing Management and Pasture Productivity (*this evaluation should be conducted by or in collaboration with a trained rangeland professional*)

1. What is the overall condition and apparent trend of pastures/rangelands on the ranch?

2. Which pastures/areas have potential for increased productivity? Identify on site maps_____

3. What is the minimum RDM recommended for the ranch pastures? [Refer to Table 1 above.]

4. Do RDM goals appear to have been met in the past? Clarify which pastures.

5. What is the estimated livestock carrying capacity based on RDM recommendations and Forage Production based on Table 1 above?

6. Describe the current grazing regime. Which pastures/areas might benefit from a change in grazing regime? Identify those on site maps.

7. Identify and discuss areas of wildfire hazard or excessive biomass accumulation. Identify on site maps

Describe opportunities for improved grazing management and/or pasture productivity:

Water Resources and Management

1. Describe the fresh water infrastructure on the ranch and identify on site maps. _____

2. Is water or waste water available for irrigation purposes? If so, describe the irrigation system;

3. Are there additional pastures/areas that could be irrigated to increase forage production?

4. Identify and discuss opportunities for improved water use efficiency on site (water development/infrastructure.

5. Identify areas of sheet, rill or gully erosion, if any, on the site map.

Describe opportunities for improved distribution of water resources:

Soil Health

1. Conduct a soil health assessment by using NRCS's guide, Interpreting Indicators of Rangeland Health http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/stelprdb1043944.pdf to evaluate soil health indicators such as rills, water flow patterns, gullies, litter movement, soil surface loss or degradation, residual dry matter, reproductive capability of perennial plants, pedestals and terracettes, and plant mortality. Discuss which pastures/areas have opportunities for improved soil health and identify areas on site maps.

2. Which pastures/areas historically and currently have received applications of manure or compost; how much, and at what frequency? (identify on site maps)

3. Are there pasture areas with low organic matter soils (<5%) that would benefit from compost application? *Refer to Soil Organic Matter map on Web Soil Survey. Compost application recommendations should be based on actual field sample data. Limit applications to slopes that can be safely accessed with spreading equipment; typically < 25%. A 30-foot vegetated buffer from surface water is recommended.*

4. Which pastures/areas are accessible for compost application?

5. Which pastures/areas are not accessible and not conducive for spreading compost with an amendment spreader, and would require manual labor to apply compost?

Describe opportunities to improve soil health:

Planting Opportunities

1. Discuss opportunities for hedgerow, windbreak or shelterbelt planting and identify these areas on the map. *(Areas to be considered could include along property lines, permanent fence lines, roadways or other permanent features and should consider location based on need for wind protection and access to water for irrigation). For further guidance see NRCS Conservation Practice Standards (CPSs) for Hedgerow Planting (422), Windbreak/Shelterbelt Establishment (380), and/or Windbreak/Shelterbelt Renovation (650) available at <https://efotg.sc.egov.usda.gov/treemenuFS.aspx>*

2. Discuss opportunities for riparian, wetland and/or vernal pool protection, enhancement or restoration and identify these on the map. Make sure to consider current and future grazing operations in these areas. *For guidance please refer to California Department of Fish & Wildlife's Salmonid Stream Habitat Restoration Manual, NRCS CPSs Wetland Restoration (657) or Wetland Enhancement (659).*

Based on answers above and Table 1, discuss any other opportunities for carbon sequestration and GHG reduction. *Use the Potential Carbon Beneficial Practices table included in Section 9: Appendix for reference.*

4. EXISTING CARBON BENEFICIAL PRACTICES

[BRIEF DISCUSSION OF EXISTING NRCS Conservation PRACTICES with Greenhouse Gas benefits THAT CAN BE QUANTIFIED]

Table 2: Estimated Annual Carbon Sequestration and Greenhouse Gas Emission Reductions [date] to [date]

<i>Conservation Practice (applicable NRCS Practice Standard #)</i>	<i>Description (List Location ID on Map)</i>	<i>Size (specify dimensions)</i>	<i>Carbon Dioxide (CO₂)</i>	<i>Quantification Method*</i>	<i>Implementation Notes</i>
<i>Hedgerow (PS#)</i>	<i>HR #1 Field 5</i>	<i>50' x 500'</i>	<i>100</i>	<i>COMET- Planner</i>	<i>½ acre hedgerow width used to derive acres for COMET-Planner input.....species list, see appendix....</i>
Totals					

* USDA GHG model, COMET-Farm (NRCS recommended), COMET-Planner, or similar tool

5. RECOMMENDED/PLANNED CARBON BENEFICIAL PRACTICES

[BRIEF DISCUSSION OF EACH PROPOSED OR RECOMMENDED PRACTICE.]

Identify these proposed practices on a separate map.

1 MgCO₂e = 2,397 passenger car miles. To compare results with EPA GHG Equivalencies Calculator visit <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Table 3: Estimated Annual Carbon Sequestration and Greenhouse Gas Emission Reductions Associated with Implementation of Suggested Conservation Practices

<i>Conservation Practice (applicable NRCS Practice Standard #)</i>	<i>Description (List Location ID on Map)</i>	<i>Size (specify dimensions)</i>	<i>Total Acres Per practice</i>	<i>Carbon Dioxide (tons CO₂/acre/year)</i>	<i>20 year CO₂e</i>	<i>Quantification Method*</i>	<i>Landowner Prioritization (H, M, L or timeframe for implementation)</i>
<i>Riparian Restoration</i>	<i>Field 7</i>	<i>½ mile (2,650 feet) x 75 feet</i>	<i>4.5</i>	<i>100</i>		<i>COMET-Planner; Lewis et al 2015 recommended for Sonoma County</i>	<i>H, year 1&2</i>
Totals							

* USDA GHG model, COMET-Farm (NRCS recommended), COMET-Planner, or similar tool

6. TRACKING IMPLEMENTATION OF YOUR CARBON FARM PLAN

Background: Use this table to track implementation of the actions identified in the previous sections. This table can be used to list additional conservation practices not identified in previous chapters that are part of the management goals for the property. Additional copies of this page can be made as needed to adequately document all practices that are planned or have already been implemented.

Practice ID (location shown on Map)	Applicable NRCS Practice Standard	Date (Implemented and/or Maintained)	CO₂ equivalent Reduction/Sequestration Potential (calculated using COMET-Farm, COMET Planner, Lewis et al. 2015, etc.)	Details/Notes (include reference to photos)	Potential/Actual Funding Source

7. MONITORING & RECORD KEEPING

The plan will help the landowner to identify locations where photo monitoring should be conducted to document use of conservation practices. These photos along with records the landowner keeps can help evaluate how various conservation practices work within the ranch and, if needed, they can help demonstrate to others the steps that have been taken to protect and improve natural resources and sequester carbon.

Note any types of monitoring that are currently being conducted that will assist in monitoring for recommended practices [i.e. organic certification monitoring for forage production, conservation easement annual monitoring (SLT, Open Space), etc.].

Soil Carbon Monitoring

Purpose: To document your monitoring of carbon farming practices and track changes in soil organic carbon over time.

Label on Map	Date Sample Taken (m/d/y)	Photo Taken? Y or N	Soil Organic Carbon Content (data from lab)	Notes
HR #1 Soil	2/8/2016	Y	0.36 mg/kg; tons/acre % SOC; % SOM	
Name of laboratory used to process samples: (Describe or Cite Sampling and Lab Methodology used)				

*Other types of monitoring may include vegetation monitoring, and photo monitoring

Record Keeping

Attach additional plan record keeping documents in this section as necessary.

8. MAPS

Map 1: Ranch Property Soils & Slope Map

Map 2: Ecological Site Delineation

Map 3: Current and Planned Conservation Practices

Map 4: Planned Conservation Practices with Monitoring Locations

9. REFERENCES

Bartolome, James, et al., 2006. ANR Publication 8092. Guidelines for Residual Dry Matter on Coastal and Foothill Rangelands in California. <http://anrcatalog.ucanr.edu/pdf/8092.pdf>

COMET-Planner <http://www.comet-planner.com/>

COMET-Farm <http://cometfarm.nrel.colostate.edu/>

EPA GHG Calculator <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

Lewis et al. 2015. *Creek Carbon, Mitigation Greenhouse Gas Emissions through Riparian Revegetation*. University of California Cooperative Extension. (For Riparian Vegetation)

NRCS, electronic Field Office Technical Guide <https://efotg.sc.egov.usda.gov/treemenuFS.aspx>

NRCS, Sampling Soil for Carbon to Support Carbon Farming Plans, April 2016 [Attach to template if not available online]

NRCS, Guidelines for Soil Quality Assessment in Conservation Planning, January 2001. http://www.nrcs.usda.gov/Internet/FSE_DOCUMENTS/nrcs142p2_051259.pdf

Ryals, Rebecca and Whendee Silver. 2013. *Effect of organic matter amendments on net primary productivity and greenhouse gas emissions in annual grasslands*. Ecological Applications. (for compost application)

USDA's Web Soil Survey <http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm>

10. APPENDICES

A: List of NRCS Practices Related to Carbon Farm Planning

Following is a list of conservation practices that may be useful in a carbon plan. In some situations other practices may also enhance carbon sequestration and/or reduce GHG emissions. Planning is location-specific. A list of all NRCS Conservation Practices are located in Section IV for eFOTG, <https://efotg.sc.egov.usda.gov/treemenuFS.aspx>.

<i>Conservation Activity</i>	<i>NRCS Practice Title</i>	<i>Co- Benefits</i>
Establish and maintain permanent vegetative cover	Conservation Cover (327) ^{CP}	
Monitor for Residual Dry Matter		
Irrigate pastures for forage production		
Regulate (audit) water (fresh or wastewater) distribution to avoid over-watering/over-fertilizing	Irrigation Water Management (449); or Nutrient Management (590)	
Management of grazing animals to improve available forage	Prescribed Grazing (528) ^{CP}	
Favor perennial grasses and increase pasture production	Range Management/Prescribed Grazing (528) ^{CP}	
Increase forage production by seeding into existing vegetation	Range Planting (550) ^{CP}	
Fencing to divide pastures for rotational grazing	Fencing (328); Access Control (472); or Prescribed Grazing (528) ^{CP}	
Additional water for livestock	Water Development (516, 614)	
Restore degraded areas	Pasture Planting (512); or Range Planting (550) ^{CP}	

Establishment of trees in grazed grassland	Silvopasture (381) ^{CP}	
Conduct soil analysis for organic matter nutrient and organic matter status	Nutrient Management (590) ^{CP}	
Compost onsite	Compost Management/Facility (370)	
Compost application (particularly area w/ low OM (<5%))	Compost Application (484/590); or Restoring Degraded Rangeland with Compost Addition ^{CP}	
Replace silage/hay production w/ permanent pasture	Forage and Biomass Planting (512) ^{CP}	
Plant and/or renovate hedgerows, windbreaks or shelterbelts on the ranch property	Hedgerow Planting (422) ^{CP} ; Windbreak/Shelterbelt Establishment/Renovation (380) ^{CP} ; Herbaceous Wind Barriers (603) ^{CP} ; Alley Cropping (311) ^{CP} ; or Multistory Cropping (379) ^{CP}	
Manage/enhance wetland areas for permanent vegetation cover	Wetland Restoration (657); or Wetland Enhancement (659)	
Assess Natural Waterways, Ditches, and Spillways	Complete LandSmart® Waterways Chapter	
Stabilize gullies	Critical Area Planting (342/380/391) ^{CP}	
Enhance or establish native riparian vegetation	Riparian Forest Buffer (391) ^{CP} ; Riparian Herbaceous Cover (390) ^{CP} ; Tree/Shrub Establishment (612) ^{CP} ; Riparian Forest Buffer Establishment (391) ^{CP} ; or Riparian Restoration ^{CP}	

Plant/maintain a vegetative buffer to filter runoff	Vegetative Barriers (601) ^{CP}	
Plant a strips of permanent herbaceous vegetative cover to reduce erosion on hill slopes	Contour Buffer Strips (332) ^{CP}	
Plant/maintain a vegetative buffer along the field perimeter	Field Border (386) ^{CP}	
Plant a vegetative filter strip	Filter Strip (393) ^{CP} ;	
Plant a vegetative filter waterway	Grassed Waterway (412) ^{CP}	
Land Reclamation	Abandoned Mine Land (543) ^{CP} ; Currently Mined Land (544) ^{CP} ; or Landslide Treatment (453) ^{CP}	
Cropland Management	Conventional Tillage to No Till (329) ^{CP} ; Conventional Tillage to Reduced Till (345) ^{CP} ; Conservation Crop Rotation (328) ^{CP} ; Cover Crops (340) ^{CP} ; Strip cropping (585) ^{CP} ; or Mulching (484) ^{CP}	
Improve Fuel Efficiency of Farm Equipment	Combustion System Improvement (372) ^{CP}	
Other:		

^{CP}: GHG emissions for this practice are quantifiable within COMET-Planner (www.comet-planner.com)

B. Quantification Supporting Documentation

Attach quantification supporting documentation as necessary.

C. Worksheet for AUM Calculations

		Estimated Forage production* (lbs/acre)			Recommen ded Residual Dry Matter**	AUM (Estimated Forage Production – Recommended RDM)/900			AUY (AUM/12)		
NRCS Soil Map Unit*	Acr es*	Low Year Productio n	Normal Year Productio n	Favorable Year Production	(lbs/acre)	Low Production Year	Normal Production Year	Favorable Production Year	Low Production Year	Normal Production Year	Favorable Production Year
Exmpl A	10	1600	2000	2400	800	17.78	22.22	26.67	1.488	1.85	2.22
Exmple B	100	1400	1800	2200	600	155.56	200	244.44	12.96	16.667	20.37
TOTAL						173.33	222.22	271.11	14.44	18.52	22.59
* values from NRCS soil survey/websoilsurvey: http://websoilsurvey.sc.egov.usda.gov/App/HomePage.htm											
** from UCCE publication: http://anrcatalog.ucanr.edu/pdf/8092.pdf											

11. ADDITIONAL RESOURCES FOR LANDOWNER

Reference to NRCS or other Soil Sampling Protocol used and lab method used to derive Total Soil Organic Carbon.