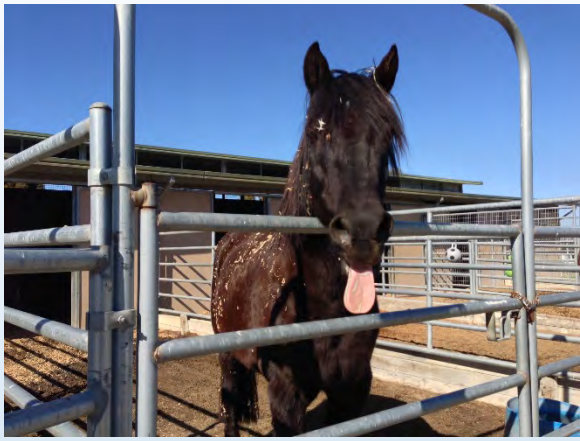
United States Department of Agriculture
Natural Resources Conservation Service

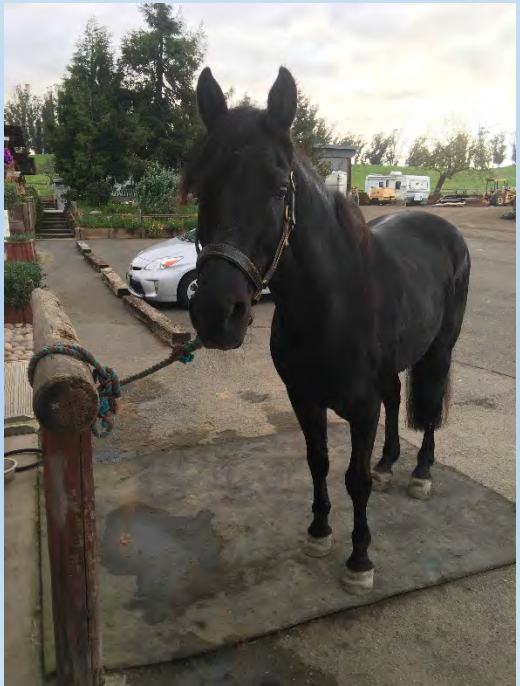
Best Management Practices to Protect Water Quality at Horse Facilities:

Managing Rain, Mud, and Manure

Maggie Sepulveda

Soil Conservation Technician with NRCS
Been with NRCS since 2006.
In Petaluma since 2015.
Most importantly, I've been riding since I was 10 years old and have owned my 27 year old Morgan, Toby, for almost 20 years now.





United States Department of Agriculture
Natural Resources Conservation Service

Who is NRCS?

- NRCS stands for “Natural Resources Conservation Service” and is a federal agency under the United States Department of Agriculture (USDA).

- NRCS was created in 1935 and back then was called the “Soil Conservation Service”. The federal government realized the need for an agency to give voluntary advice and technical assistance to farmers and ranchers because of the devastating effects of the dust bowl.

What Does NRCS Do?

- NRCS is a voluntary agency.
- NRCS offers free, science-based advice to farmers, ranchers, and private forestland owners.
- NRCS is non-regulatory and your information is confidential.
- NRCS helps create a **conservation plan** for your individual operation which can then be eligible for financial assistance to implement.

- NRCS has a number of professional scientific advisors within the agency including:
  - Soil Conservationists
  - Rangeland Specialists
  - Agriculture Engineers
  - Civil Engineers
  - Wildlife Biologists
  - Forest Specialists
  - Wetland Specialists
  - Soil Scientists
  - Agronomists
  - Air Quality Specialists
  - Archeologists
  - Geologists and more!

What is a NRCS Conservation Plan?

- A conservation plan is the record of decisions and supporting information for treatment of a unit of land meeting planning criteria for one or more identified natural resource concerns as a result of the planning process. The plan describes the schedule of implementation for practices and activities needed to solve identified natural resource concerns and takes advantage of opportunities.
- A Comprehensive Nutrient Management Plan (CNMP) is a component of your conservation plan!
  - More on this later…

- During the planning process we will:
  - Consider the needs and capabilities of each acre within the plan
  - Consider the client's facilities, machinery, and economic situation
  - Incorporate the client's willingness to try new practices
  - Consider the land's relationship to the entire farm, ranch, or watershed
  - Ensure the conservationist's presence out on the land

Types of NRCS Assistance

NRCS works with private farmers, ranchers and non-industrial forest landowners across the country to help conserve natural resources.

Technical assistance –

Conservation Technical Assistance (CTA):

- Offers expertise, technical planning, documentation, engineering, etc.
- Does not offer funding to clients

Financial assistance –

- Offer financial assistance to applicant in control of land (by deed, lease, or agreement)
- Financial assistance is contractual
- Financial assistance is only available for agricultural lands and forestlands

The NRCS Lens – "Resource Concerns"

NRCS National Planning and Procedures Handbook (NPPH)
(https://directives.sc.egov.usda.gov/viewerFS.aspx?hid=33232)

Natural resources are defined by NRCS to include soil, water, air, plants, animals, energy and human considerations (SWAPAE +H)

Resource Concern—"An expected degradation of the soil, water, air, plant, or animal resource base to the extent that the sustainability or intended use of the resource is impaired." – NPPH

****In order for an on-the-ground practice or treatment to receive financial assistance in an NRCS contract, it must be shown to be treating (or improving) an NRCS resource concern, or be part of a series or suite of practices that do so.**

NRCS Resource Concerns

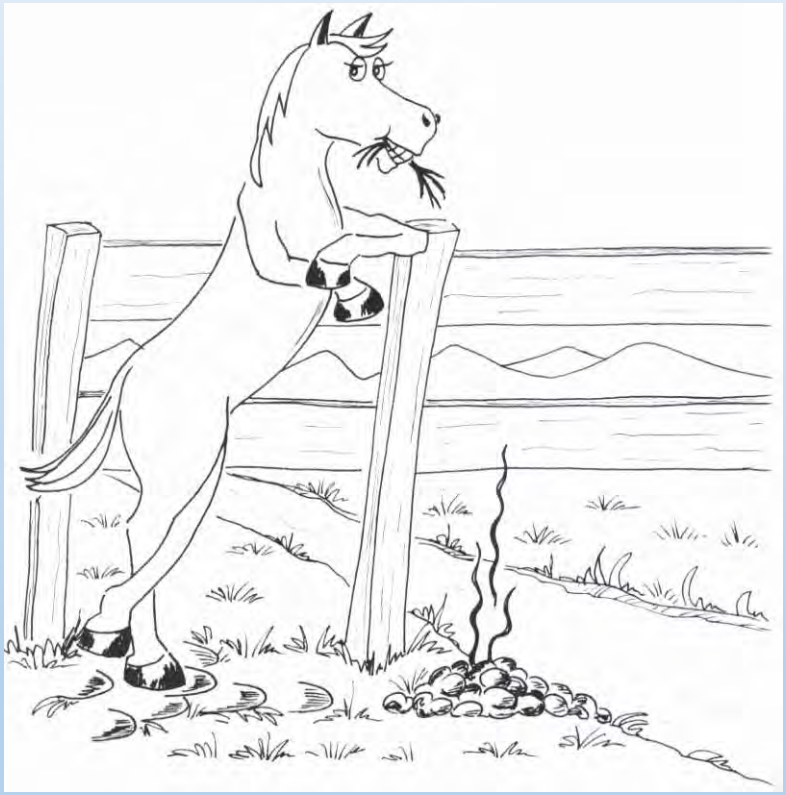
- Soil Erosion
  - Sheet, Rill, & Wind Erosion
  - Concentrated Flow Erosion
  - Excessive bank erosion from streams, shorelines, or water conveyance channels
- Soil Quality Degradation
  - Subsidence
  - Compaction
  - Organic Matter Depletion
  - Concentration of Salts or other Chemicals
- Excess Water
  - Ponding, flooding, seasonal high water table, seeps, and drifted snow
- Insufficient Water
  - Inefficient Moisture Management
  - Inefficient Use of Irrigation Water
- Livestock Production Limitations
  - Inadequate Feed and Forage
  - Inadequate Livestock Shelter
  - Inadequate Livestock Water
- Inefficient Energy Use
  - Equipment and Facilities
  - Farming/Ranching Practices and Field Operation
- Water Quality Degradation
  - Excess nutrients in surface and ground waters
  - Pesticides transported to surface and ground waters
  - Excess pathogens and chemicals from manure, bio solids or compost applications
  - Excessive salts in surface water and ground waters
  - Petroleum, heavy metals and other pollutants transported to receiving waters
  - Excessive Sediment in Surface Water
  - Elevated Water Temperature
- Air Quality Impacts
  - Emissions of Particulate Matter (PM) and PM Precursors
  - Emission of Greenhouse Gases (GHGs)
  - Emissions of Ozone Precursors
  - Objectionable Odors
- Degraded Plant Condition
  - Undesirable Plant Productivity and Health
  - Inadequate Structure and Composition
  - Excessive Plant Pest Pressure
  - Wildfire Hazard, Excessive Biomass Accumulation
- Inadequate Habitat for Fish and Wildlife
  - Habitat Degradation (food, water, cover/shelter, habitat continuity)


Does this look familiar?


Or this?


Or maybe this?

What parts of animal cause impacts?



- Mouths - eat grass, fences and facility
- Hooves – soil and vegetation trampling
- Bodies – weight compacts soil, transport weeds
- Manure – water quality, potential pollution source

Hoof Impact

- On pastures
  - Compaction
  - Trailing
  - Reduced productivity
- On stream banks
  - Trampling
  - Erosion
  - Pollution

Impacts From Manure

- Polluted Run-off
- Insects and parasites
- Odor
- Dust

How Do We Avoid These Impacts?

- Manage manure
- Control run-off
- Avoid over stocking in sensitive areas
- Livestock exclusions
- Rotate pastures

Horse Manure Production

- 1 horse = ~ 1000 pounds each
  - WEIGHT: 50 lbs/day
  - VOLUME: .81 cubic feet/day
- WEIGHT: 50 lbs/day x 30 days/month x 3 months = 4500 pounds of manure
- VOLUME: 0.81 cu ft/day x 30 days/month x 3 months = 73 cubic feet of manure

How Much Manure Will Your Animals Produce?

Animal	Volume cu ft/day	Weight lbs/day	Moisture percent
Beef	1.02	63	88
Ducks	0.73	46	75
Goats	0.63	40	75
Horse	0.81	50	78
Sheep	0.63	40	75

Manure Storage

Potential Run-Off Barrier

Small Storage

Large Covered Storage

Roll Off Storage

Manure Storage Considerations

- Distance from streams, ponds, wells, and waterways
- Prevailing wind direction
- Slope of ground
- Soil type

Best Management Practices (BMP) to Avoid Negative Impacts

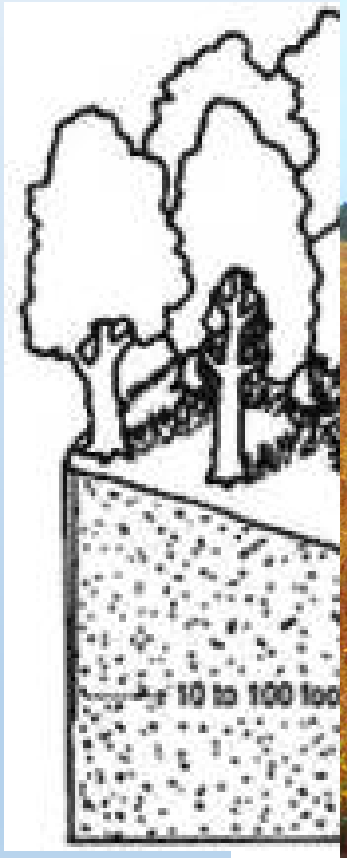
- Roof Runoff Structures (gutters)
- Buffer/Filter Strips
- Grassed Waterways
- Sediment Basins
- Animal Trails and Walkways
- Exclusionary Livestock Fencing
- Grazing Systems and Pasture Configurations
- Heavy Use Area Protection

Roof Runoff Management

- Gutters that are sized appropriately
- Diversions to prevent water from flowing through manure and sediment
- Buffers/Filter Strips

- **Slow it! Spread it! Sink it!**

Filter Strips



Grassed Waterway

Before

During (showing grade stabilization)

After

Lined Waterway

Lined Waterway

Sediment Basin

Before

Post Construction

After

Sediment Basin

Animal Trails and Walkways

Before

During

After

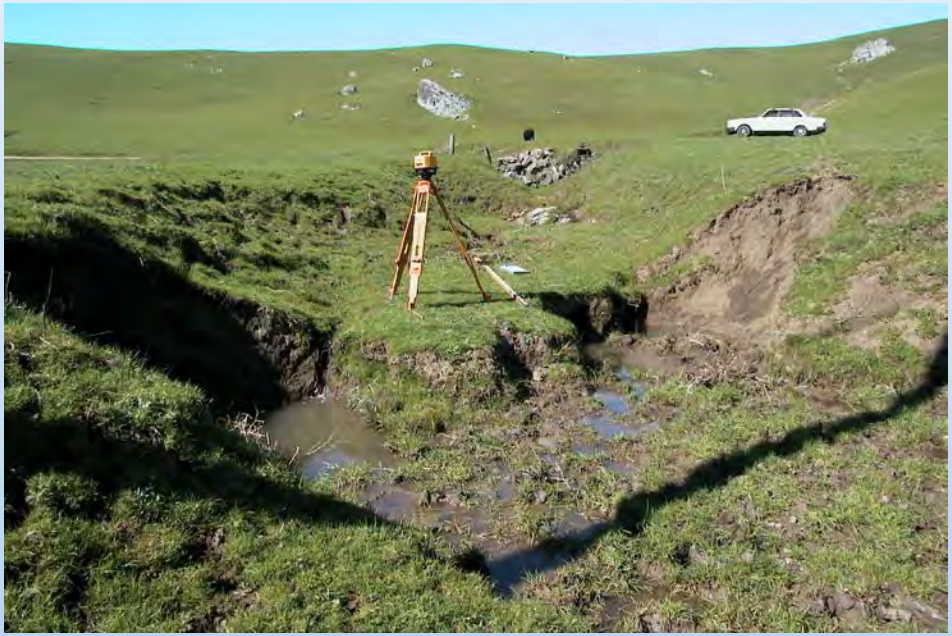
Critical Area Planting

Before

During

After

Grade Stabilization Structure



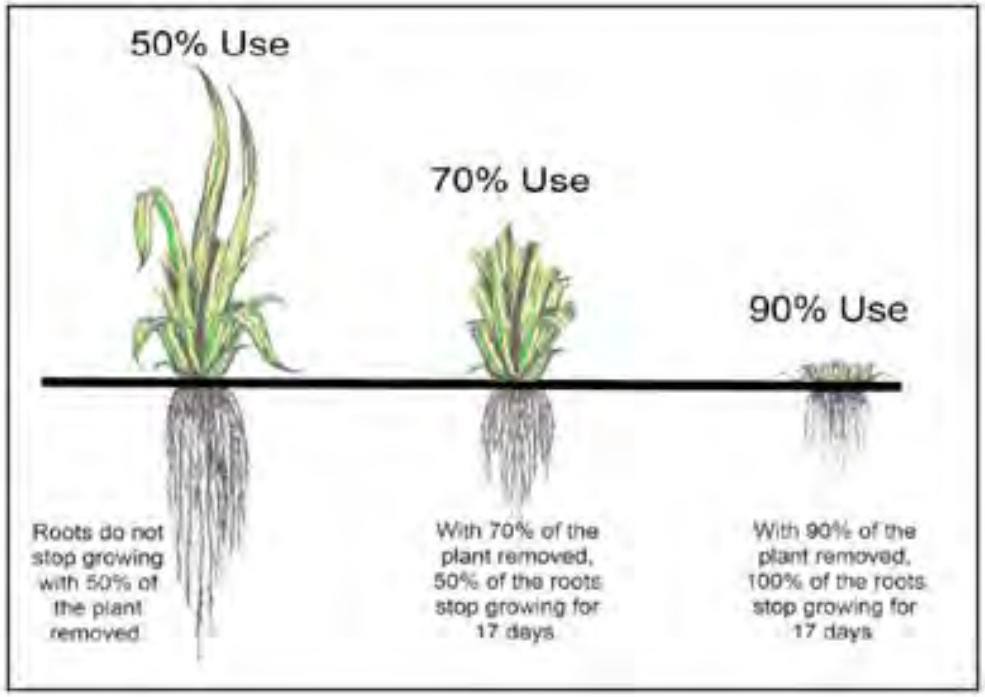
Before

After

Managed Grazing Benefits

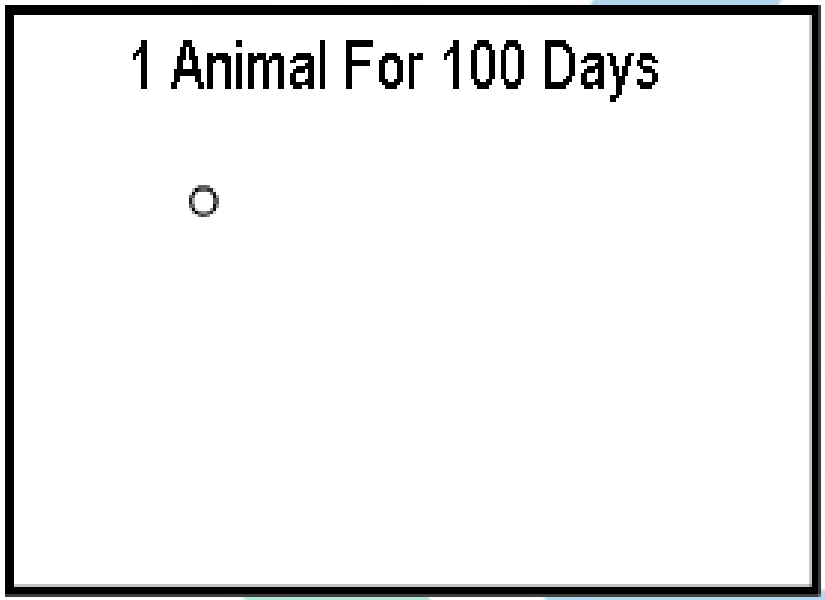
- Reduces erosion
- Improves water quality
- Improves range or pasture condition
- Increases forage production
- Increases grazing capacity
- Allows seed production of key grass species
- Maximizes efficiency of your time and resources

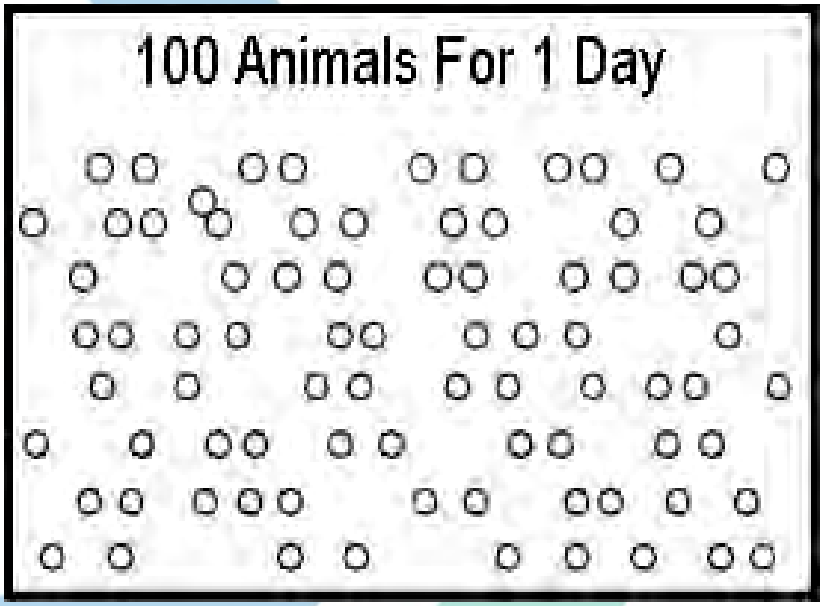
Steps to Effective Grazing Management



- Graze to the desired grass stubble height (take half, leave half)
- Allow adequate rest periods
- Don’t regraze a pasture until your key species has reached the desired height

Which Will Cause More Overgrazing?





The stocking rate of both paddocks is identical: 100 Animal Days per acre.
The effect on the paddocks will be much different.

Grazing and Rest Periods

Before making decisions about grazing periods, know how much rest is needed:

- Walk the pastures that animals have already grazed to evaluate regrowth
- If grass has grown a couple of inches in 1 to 2 weeks, plan relatively short rest periods (30-45 days)
- If not much regrowth has occurred in 1 to 2 weeks, plan for longer rest (60-120 days)

Ways NRCS Can Help Equine Facilities

- Free Technical Advice
- Financial Assistance for a Comprehensive Nutrient Management Plan (CNMP)
  - What is a CNMP? Next slide!
- Financial Assistance to help make structural and/or vegetative improvements as identified in the CNMP
  - Roof Runoff Structures, Filter Strips, Sediment Basins, Concrete Pads, etc.

What is a Comprehensive Nutrient Management Plan (CNMP)?

A Comprehensive Nutrient Management Plan (CNMP) is a component of the conservation plan that is unique to animal feeding operations. The objective of a CNMP is to document the Animal Feeding Operation (AFO) owner's and/or operator's plan to manage water, manure and organic by-products by combining conservation practices and management activities into a conservation system that will help achieve the goals of the producer, control soil erosion, and protect or improve water and air quality.

- A CNMP will focus on the management of nutrients (organic or synthetic)
- Includes an estimated manure & fertilizer distribution plan.
- Does NOT try to precisely predict the actual amount of manure or nutrients that should be applied.
    - NRCS does NOT do prescriptive recommendations.
- Includes an implementation plan (Record of Decision) for structural and/or management practices associated with crop or livestock production areas to ensure that the purposes of crop or livestock production and the preservation of natural resources are compatible
- Does NOT include designs for facility / infrastructure improvements.

When Is A CNMP Required

FA and TA

- EQIP Manual (M_440_515_I, Amend. 110, January 2017)
  - "If an EQIP schedule of operations includes animal waste storage or treatment facility on an animal feeding operation (AFO), the participant must develop and provide a copy of a NRCS approved CNMP **prior** to implementation of any waste storage and handling facility or nutrient management activities."
- CNMP Policy (GM_190_405_B, Amend. 31, October 2015)
  - "Prepare a CNMP when NRCS or NRCS-designated agents are providing technical **or** financial assistance to an AFO/CAFO to address manure or wastewater handling and storage, treatment and nutrient management that involves the application of manure and wastewater associated with the AFO/CAFO."

Resource Concerns

- Soil Erosion
- Water Quality
- Air Quality

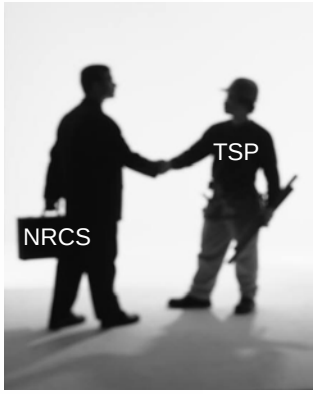
CNMP Format

- The client copy:
  - Signature Page
  - Section 1, Farmstead/Production Area
  - Section 2, Crop, Forest, Range, and Pasture Lands/Land Treatment Area
  - Section 3, Nutrient Management Plan
    (NRCS Conservation Practice Standard 590)

CNMP Format

- Signature Page to include:
  - Contains basic information about the farm
    - Name, Address, Plan Period, Total Acres
  - Client Signature
  - CNMP Planner
    - NRCS certified CNMP Planner – OR –
    - CAP 102 – CNMP Technical Service Provider
  - Professional Engineer licensed in California

What is a TSP?



- TSP = Technical Service Provider
  - Non-USDA third party providers of technical assistance
  - Work on NRCS' behalf to provide conservation planning
  - Individuals or businesses with technical expertise in conservation planning and design for conservation activities
  - TSPs are hired by farmers, ranchers, private businesses, nonprofit organizations, or public agencies to provide services on behalf of the Natural Resources Conservation Service (NRCS).
  - Online registry: https://www.nrcs.usda.gov/wps/portal/nrcs/main/national/programs/technical/tsp/

TSP ~ 'Subcontractor' of NRCS

Farmstead

- “Ensure that all necessary engineering work is properly documented with necessary signatures.”
- Signature of Professional Engineer licensed in California REQUIRED

Farmstead (Section 2)

- Record of Decisions
- Conservation Plan Map
- Soils Map(s) and Descriptions
- Brief Description of the AFO
  - Animal Inventory
  - Manure Storage
- Planned Imports, Exports, and On-Farm Transfers
- Reference Implementation Requirements / Engineering Plans

Farmstead

- Record of Decisions
  - We'll Cover Later

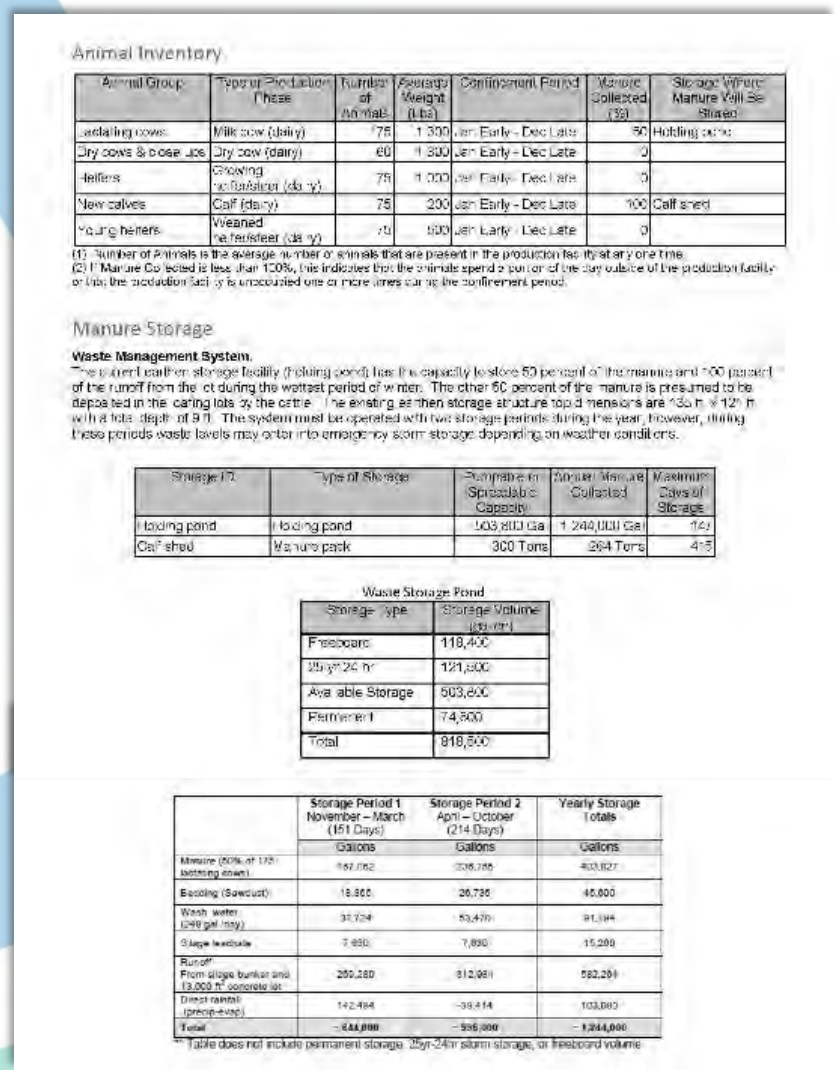
Farmstead

- Conservation Plan Map
  - One map covering all CNMP components or multiple maps covering land use areas separately
  - May include a supporting farmstead map with livestock support facilities and features to complement description of AFO (this example)

- Soils Map(s) and Descriptions
  - One map covering all CNMP components or multiple maps covering land use areas separately

Farmstead

- Brief Description of the AFO
  - Narrative
  - Table Format
- Planned Imports, Exports, and On-Farm Transfers
  - If Applicable (Not Shown)



Animal Inventory

Animal Group	Type or Production Phase	Number of Animals	Average Weight (Lbs)	Confinement Period	Manure Collected (%)	Storage Where Manure Will Be Stored
Lactating cows	Milk cow (dairy)	75	1,300	Jan Early - Dec Late	50	Holding pond
Dry cows & close ups	Dry cow (dairy)	60	1,300	Jan Early - Dec Late	0	
Heifers	Growing heifer/steer (dairy)	75	1,000	Jan Early - Dec Late	0	
New calves	Calf (dairy)	75	200	Jan Early - Dec Late	100	Calf shed
Young heifers	Weaned heifer/steer (dairy)	75	600	Jan Early - Dec Late	0	

(1) Number of Animals is the average number of animals that are present in the production facility at any one time.
(2) If Manure Collected is less than 100%, this indicates that the animals spend a portion of the day outside of the production facility or that the production facility is unroofed one or more times during the confinement period.

Manure Storage

Waste Management System.

The current earthen storage facility (holding pond) has the capacity to store 50 percent of the manure and 100 percent of the runoff from the lot during the wettest period of winter. The other 50 percent of the manure is presumed to be deposited in the caring lots by the cattle. The existing earthen storage structure top dimensions are 130 ft x 120 ft with a total depth of 9 ft. The system must be operated with two storage periods during the year, however, during these periods waste levels may enter into emergency storm storage depending on weather conditions.

Storage I.D.	Type of Storage	Summary of Spreadable Capacity	Annual Manure Collected	Maximum Days of Storage
Holding pond	Holding pond	503,800 Gal	1,244,000 Gal	147
Calf shed	Manure pack	300 Tons	264 Tons	415

Waste Storage Pond

Storage Type	Storage Volume (gallons)
Freeboard	118,400
25yr-24 hr	121,600
Available Storage	503,600
Permanent	74,500
Total	818,500

	Storage Period 1 November – March (151 Days)	Storage Period 2 April – October (214 Days)	Yearly Storage Totals
	Gallons	Gallons	Gallons
Manure (50% of 125 lactating cows)	167,062	236,765	403,827
Bedding (Sawdust)	18,900	26,736	45,600
Wash water (248 gal/day)	37,324	53,470	91,194
Silage leachate	7,890	7,890	15,200
Runoff From silage bunker and 13,000 ft² concrete lot	260,280	312,981	582,261
Direct rainfall (precip-evap)	142,484	-39,414	103,070
Total	~644,000	~596,000	~1,244,000

** Table does not include permanent storage, 25yr-24hr storm storage, or freeboard volume

Farmstead

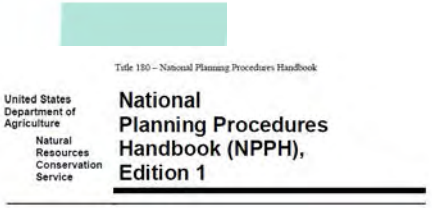
- Reference Implementation Requirements or Engineering Plans
  - Practices Already Implemented

Farmstead

- Record of Decisions
  - How were these decisions made?

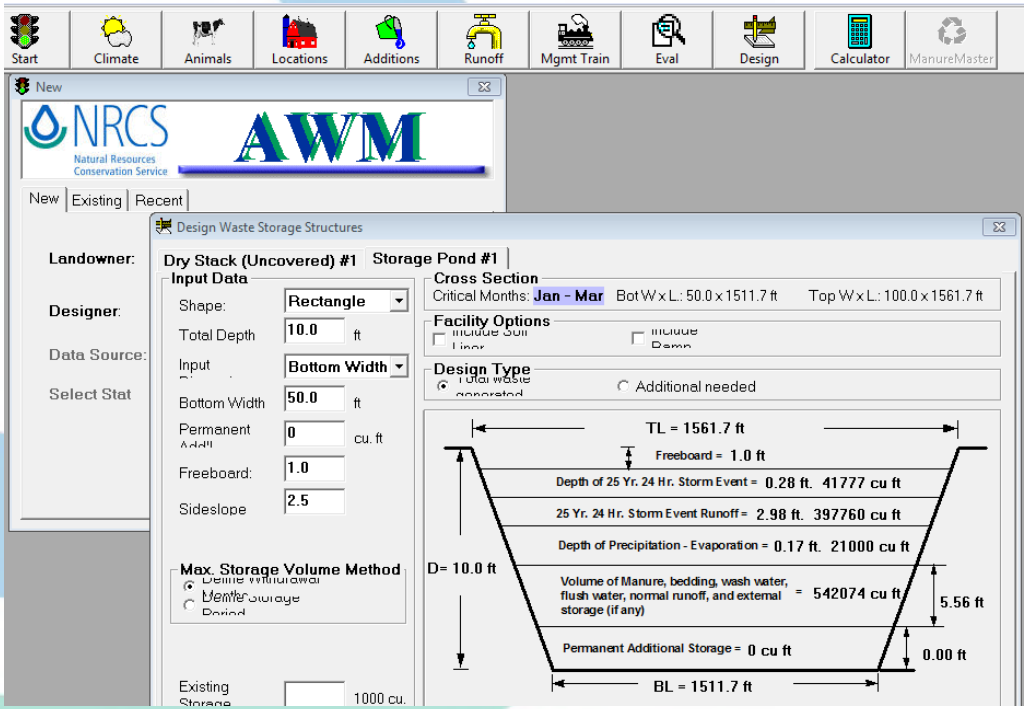
Farmstead

- The Conservation Planning Process
  - It's not all in the plan document
  - Plan should only contain meaningful and useful information to the client – Everything else in NRCS Case File including
    - Forms and Worksheets
    - Inventory and Analysis
      - Assessments



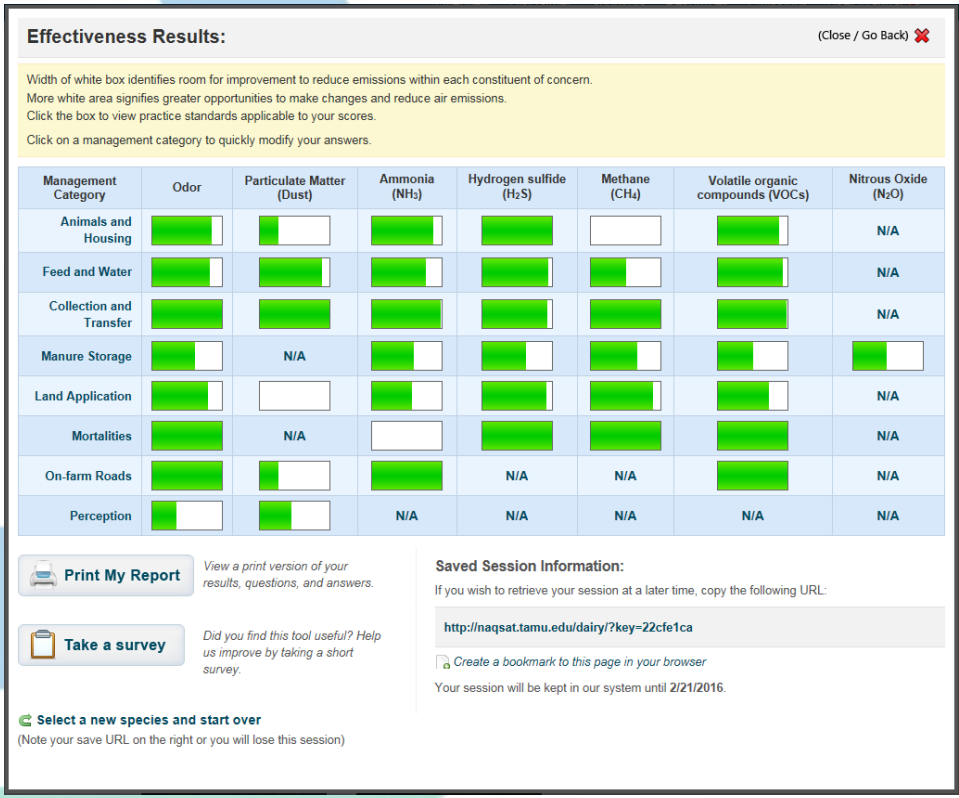
Farmstead

- Assessment Tools
  - Waste Storage Pond Capacity Evaluation



Farmstead

- Assessment Tools
  - National Air Quality Site Assessment Tool (NAQSAT)
    - NI_190_309, 2nd Ed., July 2015
    - Required for confined animal operations 300+ AU
    - Encouraged for confined animal operations <300 AU
    - Develop baseline and plan mitigation measures



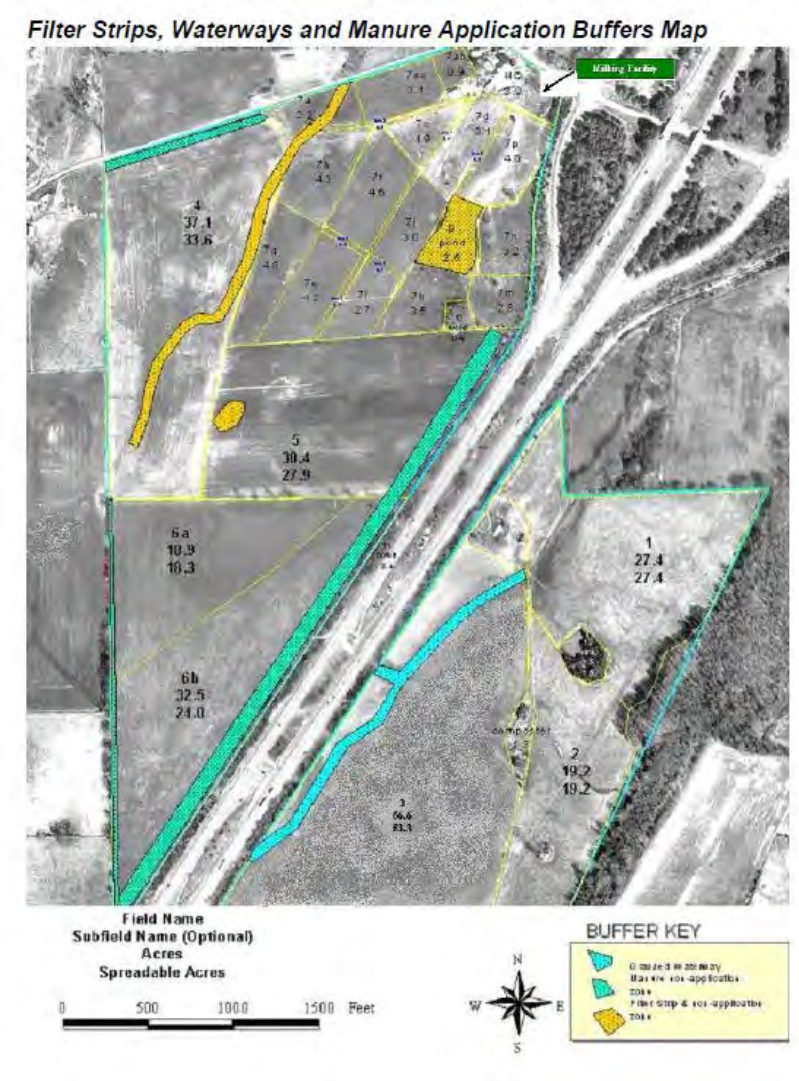
Section 3 Crop, Pasture, Range, other Lands (Land Treatment)

- Plan Map(s)
- Soil Map(s)
- Record of Decisions
- Assessments
  - Predicted Soil Erosion *
  - Air Quality
  - Other
- Implementation Requirements (IRs)

* TSPs just data collection, if needed

Crop, Pasture, Range, other Lands (Land Treatment)

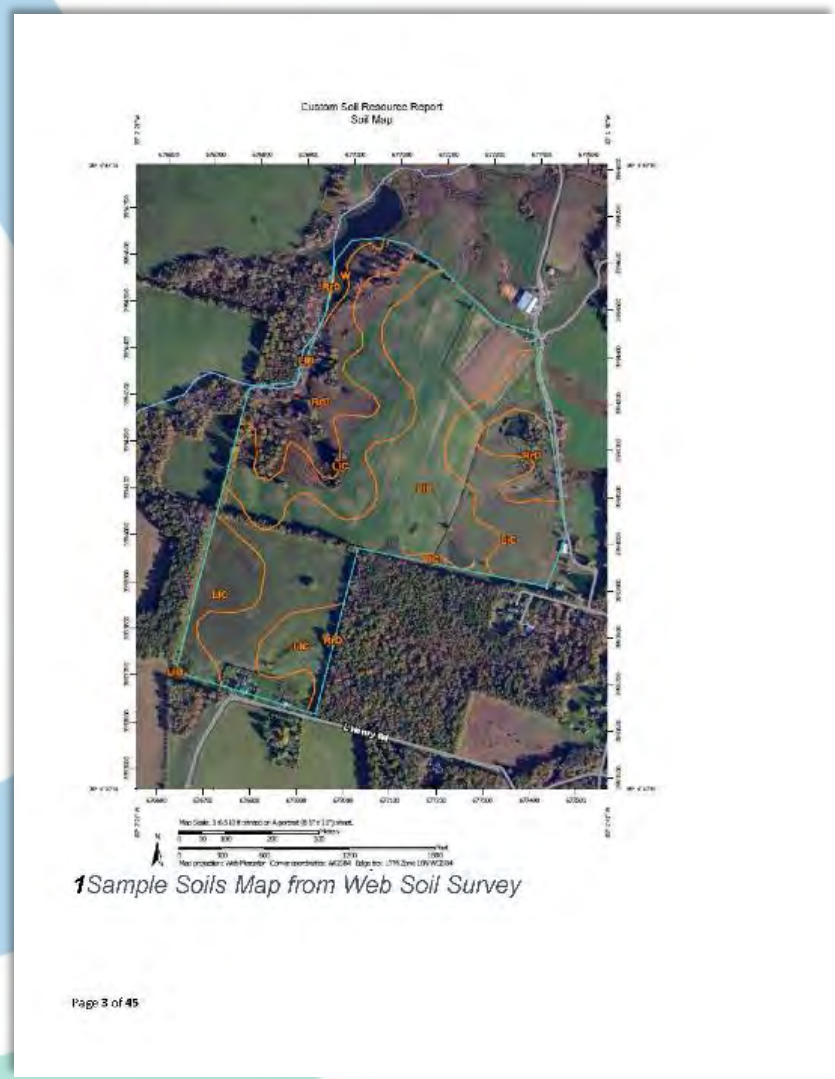
- Plan Map(s)
  - Show existing and proposed practices
  - Shows all of the planning area
- Not necessary to duplicate if already addressed



Crop, Pasture, Range, other Lands (Land Treatment)

- Soil Map(s)
  - Soil Descriptions
- Other Resource Maps (as needed)
  - Wetlands / water bodies, Karst
  - Topography
  - Populated facilities (residence, schools, parks, etc.

Not necessary to duplicate if already addressed



1 Sample Soils Map from Web Soil Survey

Crop, Pasture, Range, other Lands (Land Treatment)

- Record of Decisions
  - We'll Cover Later

Crop, Pasture, Range, other Lands (Land Treatment)

- Assessment Tools
  - **RUSLE2**

USDA NRCS

RUSLE2 Profile Erosion Calculation Record

Info:

File: profiles\default

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\North Carolina\Guilford County	Guilford County, North Carolina\ApB Appling sandy loam, 2 to 6 percent slopes\Appling Sandy loam 92%	150	6.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 66\b Multi-year Rotation Templates\A01 GRAIN or COTTON\01 CORN + SOYBEAN\A01 2YR CORN / SOYBEAN (w fall covers)	vegetations\Corn, grain	bushels	125.00
managements\CMZ 66\b Multi-year Rotation Templates\A01 GRAIN or COTTON\01 CORN + SOYBEAN\A01 2YR CORN / SOYBEAN (w fall covers)	vegetations\Rye, winter cover, mid south	pounds	5000.0
managements\CMZ 66\b Multi-year Rotation Templates\A01 GRAIN or COTTON\01 CORN + SOYBEAN\A01 2YR CORN / SOYBEAN (w fall covers)	vegetations\Soybean, southern 7in rows	bu	40.000
managements\CMZ 66\b Multi-year Rotation Templates\A01 GRAIN or COTTON\01 CORN + SOYBEAN\A01 2YR CORN / SOYBEAN (w fall covers)	vegetations\Rye, winter cover, mid south	pounds	4500.0

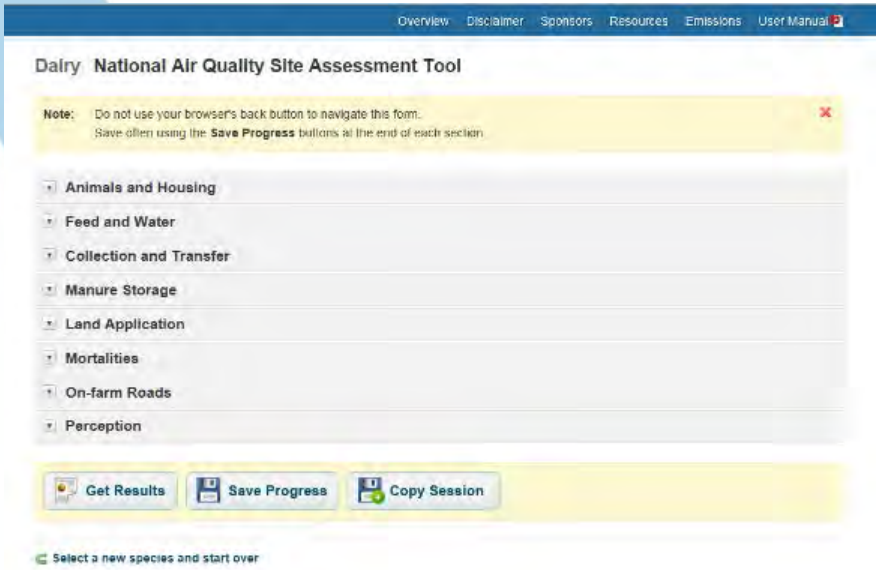
Contouring	Strips/barriers	Diversion/terrace, sediment basin	Subsurface drainage	Adjust res. burial level	General yield level	Rock cover, %
a, rows up-and-down-hill	(none)	(none)	(none)	Normal res. burial	Base yield	0

Outputs:

T value	Soil loss erod. portion	Detachment on slope	Soil loss for cons. plan	Sediment delivery	Net C factor	Net K factor	Crit slope length	Surf cover after planting, %
5.0	0.54	0.54	0.54	0.54	0.018	0.20	150	

Crop, Pasture, Range, other Lands (Land Treatment)

- Assessment Tools
  - RUSLE2
  - **National Air Quality Site Assessment Tool (NAQSAT)**
  - Other (as needed)



	Odor	Particulate Matter	Ammonia	Hydrogen sulfide	Methane	Volatile organic compounds (VOCs)	Nitrous Oxide (N_2O)
Animals and Housing							N/A
Feed and Water	*Sheet not completed.*						
Collection and Transfer							N/A
Manure Storage		N/A					
Land Application		N/A					N/A
Mortalities		N/A					N/A
On-farm Roads				N/A	N/A		N/A
Perception			N/A	N/A	N/A	N/A	N/A

Crop, Pasture, Range, other Lands (Land Treatment)

- Implementation Requirements
  - Include if part of the assessment process

USDA NRCS
United States Department of Agriculture
Natural Resources Conservation Service

340 - Cover Crop
Implementation Requirements

Producer: John Doe
Location: Holstein, TN
Farm Name:
Project or Contract:
County: Morgan
Tract Number: 1234

Practice Location Map

(showing detailed aerial view of where practice is to be installed on farm/site, showing all major components, stationing, relative location to any landmarks, and survey benchmarks)

Index

- ✓ Cover Sheet
- ✓ Specifications
- Cost Estimate and Project Bid Form
- ✓ Operation & Maintenance

Utility Safety / One-Call System Information

Description of work:
Establish cover Crops after Corn Silage on all crop fields

NRCS Review Only

Designed By:	Norman Widman	Date: 2/26/2015
Checked By:	J Roberts	Date: 2/26/2015
Approved By:	Norman Widman	Date: 2/26/2015

NRCS
February 2013

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340 - Cover Crop
Implementation Requirements

The Practice Purpose(s):

- ✓ Reduce erosion from wind and water.
- ___ Increase soil organic matter content.
- ✓ Capture and recycle or redistribute nutrients in the soil profile.
- ___ Promote biological nitrogen fixation and reduce energy use.
- ___ Increase biodiversity.
- ___ Suppress weeds.
- ___ Manage soil moisture.
- ___ Minimize and reduce soil compaction.

Seeding and Management: *Fill in the following table with the appropriate cover crop information for each field.*

Field #	Acres	Species	Seeding rate (lbs/ac PLS*)	Seeding date range	Seeding method	Termination date or stage	Termination method
1, 2, 6b	66.9	Rye	80	Sept	No Till Drill	Harvest Silage April	Chemical Kill
3, 4, 5, 8a	137.7	Rye	80	Sept	No Till Drill	1 Wk Prior to Plant Corn	Chemical Kill

** To figure Pure Live Seed (PLS) rates, multiply the percent purity by the percent germination. Divide the seeding rate by the percent PLS to find the bulk seed needed per acre. For example: 98% purity X 60% germination = 0.588% PLS 10 lbs/acre X 0.588% PLS = 17 lbs/acre.*

340 - Cover Crop
Implementation Requirements

Soil Amendments, if needed. *Apply soil amendments prior to seedbed preparation or before seeding if a no-till drill is used.*

Field	N fertilizer needed (lbs/acre)	K20 fertilizer needed (lbs/acre)	P2O5 fertilizer needed (lbs/acre)
	NA	NA	NA

Additional specifications:

OPERATION AND MAINTENANCE

- ✓ Control growth of the cover crop to reduce competition from volunteer plants and shading.
- ___ Control weeds in cover crops by mowing or by using other pest management techniques.
- ___ Control soil moisture depletion by selecting water efficient plant species and terminating the cover crop before excessive transpiration.
- ✓ Evaluate the cover crop to determine if the cover crop is meeting the planned purpose(s). If the cover crop is not meeting the purpose(s) adjust the management, change the species of cover crop, or choose a different technology.

Crop, Pasture, Range, other Lands (Land Treatment) Implementation Requirements

- Implementation Requirements for inclusion in plan
  - Nutrient Management,
  - Residue & Tillage Management
  - Cover practices,
  - Tillage practices,
  - Etc.

- Implementation Requirements <u>not</u> generally included in plan
  - Engineering practices

Nutrient Management Plan

- Effective, understandable and helpful plans
- Fair balance of production and environmental interests

Photo credit Steven Wayne

Nutrient Management Plan

- Risk Analyses (Soil Erosion, Nitrogen, and Phosphorous)
- Manure Application Setback Distances
- Soil Test Data
- Manure Nutrient Analyses
- Planned Crops, Fertilizer Recommendations, Nutrient Applications
- Field Nutrient Balance
- Annual Summary – Manure Inventory
- Annual Summary – Fertilizer Material
- Plan Nutrient Balance

Nutrient Management Plan

- Risk Analyses Results
  - Soil Erosion
  - Nitrogen
  - Phosphorous

Implementation Requirements

Nutrient Management (Code 590)

Nitrogen and Phosphorus Risk Analyses

Tennessee Phosphorus Index

Field	Crop Year	Site and Transport Factor	Mgmt. and Source Factor	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
1	2008	13	2	26	26	Low
1	2009	13	2	26	26	Low
1	2010	13	2	26	26	Low
2	2008	13	2	26	26	Low
2	2009	13	2	26	26	Low
2	2010	13	2	26	26	Low
3	2008	6	4	24	24	Low
3	2009	6	4	24	24	Low
3	2010	6	4	24	24	Low
4	2008	6	20	24	120	Medium
4	2009	6	20	24	120	Medium
4	2010	6	20	24	120	Medium
5	2008	15	27	120	405	Very High
5	2009	15	27	120	405	Very High
5	2010	15	27	120	405	Very High
6a	2008	15	18	60	270	High
6a	2009	15	18	60	270	High
6a	2010	15	18	60	270	High

Nutrient Management Plan

- Risk Analyses Results
  - Soil Erosion
  - Nitrogen
  - Phosphorous

Implementation Requirements
Nutrient Management (Code 590)

Nitrogen and Phosphorus Risk Analyses

Tennessee Phosphorus Index

Field	Crop Year	Site and Transport Factor	Mgmt. and Source Factor	P Index w/o P Apps	P Index w/ P Apps	P Loss Risk
1	2008	13	2	26	26	Low
1	2009	13	2	26	26	Low
1	2010	13	2	26	26	Low
2	2008	13	2	26	26	Low
2	2009	13	2	26	26	Low
2	2010	13	2	26	26	Low
3	2008	6	4	24	24	Low
3	2009	6	4	24	24	Low
3	2010	6	4	24	24	Low
4	2008	6	20	24	120	Medium
4	2009	6	20	24	120	Medium
4	2010	6	20	24	120	Medium
5	2008	15	27	120	405	Very High
5	2009	15	27	120	405	Very High
5	2010	15	27	120	405	Very High
6a	2008	15	18	60	270	High
6a	2009	15	18	60	270	High
6a	2010	15	18	60	270	High

Nutrient Management Plan

- Manure Application Setback Distances

Manure Application Setback Distances and Buffers

Field	Distance to Water (Feet)	Slope Length (Feet)	Buffer Width (Feet)	Tillage/Cover Type
1	31	50	None	Pasture/Hay
2	101	50	None	Pasture/Hay
3	32	100	30	No-till w/ heavy residues
4	33	100	30	No-till w/ heavy residues
5	212	50	None	No-till w/ heavy residues
6a	350	50	None	No-till w/ heavy residues
6b	1,068	50	None	Pasture/Hay
7	31	100	30	Pasture/Hay

Nutrient Management Plan

- Soil Test Data
- Manure Nutrient Analyses

Soil Test Data

Field	Test Year	OM (%)	P Test Used	P	K	Mg	Ca	Units	Soil pH	Buffer pH	CEC (meq/100g)
1	2003		Mehlich-1	40	128			lbs/a	6.3		
2	2003		Mehlich-1	40	128			lbs/a	6.3		
3	2003		Mehlich-1	76	196			lbs/a	7.0		
4	2003		Mehlich-1	220	340			lbs/a	6.4		
5	2003		Mehlich-1	250	488			lbs/a	5.6		
6a	2003		Mehlich-1	86	208			lbs/a	6.0		
6b	2003		Mehlich-1	86	208			lbs/a	6.0		
7	2003		Mehlich-1	362	688			lbs/a	6.0		

Manure Nutrient Analyses

Manure Source	Dry Matter (%)	Total N	NH_4-N	Total P_2O_5	Total K_2O	Avail. P_2O_5	Avail. K_2O	Units	Analysis Source and Date
Holding pond		10.0	5.0	3.0	12.5	3.0	12.5	Lb/1000Gal	Lab analysis 11/08/2003; no NH4-N so assume 50%.
Calf shed		6.1	1.2	2.3	2.7	2.3	2.7	Lb/Ton	MMP Estimate

(1) Entered analysis may be the average of several individual analyses.
(2) Tennessee assumes that 100% of manure phosphorus and 100% of manure potassium is crop available. First-year per-acre nitrogen availability for individual manure applications is given in the Planned Nutrient Applications table. For more information about nitrogen availability in Tennessee, see "Manure Application Management," Tables 3 and 4, Tennessee Extension, PB1510, 2/94 (http://wastemgmt.ag.utk.edu/Pubs/PB1510.pdf).

Nutrient Management Plan

- Planned Crops
- Realistic Yield Goals
- Fertilizer Recommendations

Planned Crops and Fertilizer Recommendations

Field	Crop Year	Planned Crop	Yield Goal (per Acre)	N Rec (Lbs/A)	P_2O_5 Rec (Lbs/A)	K_2O Rec (Lbs/A)	N Removed (Lbs/A)	P_2O_5 Removed (Lbs/A)	K_2O Removed (Lbs/A)	Custom Fert. Rec. Source
1	2008	Corn silage	22.0 Ton	150	0	160	183	79	183	
1	2009	Grass-clover hay new	4.0 Ton	30	0	60	200	60	240	
1	2010	Grass-clover hay maint	6.0 Ton	60	0	30	300	90	360	
2	2008	Grass-clover hay maint	6.0 Ton	60	0	30	300	90	360	
2	2009	Corn silage	22.0 Ton	150	0	160	183	79	183	
2	2010	Grass-clover hay new	4.0 Ton	30	0	80	200	60	240	
3	2008	Small grain cover*		0	0	0	0	0	0	
3	2008	Corn silage	22.0 Ton	150	0	0	183	79	183	
3	2009	Small grain cover*		0	0	0	0	0	0	
3	2009	Corn silage	22.0 Ton	150	0	0	183	79	183	
3	2010	Small grain cover*		0	0	0	0	0	0	
3	2010	Corn silage	22.0 Ton	150	0	0	183	79	183	
4	2008	Small grain cover*		0	0	0	0	0	0	
4	2008	Corn silage	22.0 Ton	150	0	0	183	79	183	
4	2009	Small grain cover*		0	0	0	0	0	0	
4	2009	Corn silage	22.0 Ton	150	0	0	183	79	183	
4	2010	Small grain cover*		0	0	0	0	0	0	
4	2010	Corn silage	22.0 Ton	150	0	0	183	79	183	
5	2008	Small grain cover*		0	0	0	0	0	0	
5	2008	Corn silage	22.0 Ton	150	0	0	183	79	183	
5	2009	Small grain cover*		0	0	0	0	0	0	
5	2009	Corn silage	22.0 Ton	150	0	0	183	79	183	
5	2010	Small grain cover*		0	0	0	0	0	0	
5	2010	Corn silage	22.0 Ton	150	0	0	183	79	183	

Nutrient Management Plan

- Planned Nutrient Applications
- Manure-spreadable fields

Planned Nutrient Applications (Manure-spreadable Area)

Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/ Acre	Loads, Speed or Time	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P_2O_5 (Lbs/A)	Avail K_2O (Lbs/A)
1	Oct 2007	Corn silage	0-0-60	Surface broadcast	1-yr K	266 Lbs		0 Lbs	0.0	0	0	160
1	Jun 2008	Corn silage	28-0-0	Surface band	1-yr N	51 Gal		0 Gal	0.0	152	0	0
1	Oct 2008	Grass-clover hay new	0-0-60	Surface broadcast	1-yr K	100 Lbs		0 Lbs	0.0	0	0	60
5	Mar 2009	Corn silage	Holding pond	Aerway unit, Not incorporated	Custom	22,000 Gal	1.1 mph	539,900 Gal	24.5	99	66	275
5	Apr 2009	Corn silage	Holding pond	Aerway unit, Not incorporated	Custom	22,000 Gal	1.1 mph	50,600 Gal	2.3	99	66	275
6a	Oct 2007	Corn silage	Calf shed	Flail spreader, Not incorporated	Custom	15 Ton	84.5 Lds	253.5 Ton	16.9	36	35	41
6a	Jun 2008	Corn silage	28-0-0	Surface band	Supp. N	39 Gal		659 Gal	16.9	116	0	0
6a	Oct 2008	Corn silage	Calf shed	Flail spreader, Not incorporated	Custom	15 Ton	84.5 Lds	253.5 Ton	16.9	36	35	41
6a	Jun 2009	Corn silage	28-0-0	Surface band	Supp. N	36 Gal		608 Gal	16.9	107	0	0

Nutrient Management Plan

- Planned Nutrient Applications
- Fields not receiving manure

Planned Nutrient Applications (Non-manure-spreadable Area)

Field	App. Month	Target Crop	Nutrient Source	Application Method	Rate Basis	Rate/Acre	Total Amount Applied	Acres Cov.	Avail N (Lbs/A)	Avail P_2O_5 (Lbs/A)	Avail K_2O (Lbs/A)
1	Oct 2007	Corn silage	0-0-60	Surface broadcast	1-yr K	266 Lbs	7,608 Lbs	28.6	0	0	160
1	Jun 2008	Corn silage	28-0-0	Surface band	1-yr N	51 Gal	1,459 Gal	28.6	152	0	0
1	Oct 2008	Grass-clover hay new	0-0-60	Surface broadcast	1-yr K	100 Lbs	2,860 Lbs	28.6	0	0	60
1	Jun 2009	Grass-clover hay new	33-0-0	Surface broadcast	1-yr N	90 Lbs	2,574 Lbs	28.6	30	0	0
1	Oct 2009	Grass-clover hay maint	0-0-60	Surface broadcast	1-yr K	50 Lbs	1,430 Lbs	28.6	0	0	30
1	May 2010	Grass-clover hay maint	33-0-0	Surface broadcast	1-yr N	181 Lbs	5,177 Lbs	28.6	60	0	0
2	Oct 2007	Grass-clover hay maint	0-0-60	Surface broadcast	1-yr K	50 Lbs	1,040 Lbs	20.8	0	0	30
2	May 2008	Grass-clover hay maint	33-0-0	Surface broadcast	1-yr N	181 Lbs	3,765 Lbs	20.8	60	0	0
2	Oct 2008	Corn silage	0-0-60	Surface broadcast	1-yr K	266 Lbs	5,533 Lbs	20.8	0	0	160
2	Jun 2009	Corn silage	28-0-0	Surface band	1-yr N	51 Gal	1,061 Gal	20.8	152	0	0
2	Oct 2009	Grass-clover hay new	0-0-60	Surface broadcast	1-yr K	100 Lbs	2,080 Lbs	20.8	0	0	60
2	Jun 2010	Grass-clover hay new	33-0-0	Surface broadcast	1-yr N	90 Lbs	1,872 Lbs	20.8	30	0	0
3	Jun 2008	Corn silage	28-0-0	Surface band	1-yr N	51 Gal	2,764 Gal	54.2	152	0	0
3	Jun 2009	Corn silage	28-0-0	Surface band	1-yr N	51 Gal	2,764 Gal	54.2	152	0	0
3	Jun 2010	Corn silage	28-0-0	Surface band	1-yr N	51 Gal	2,764 Gal	54.2	152	0	0

Nutrient Management Plan

- Field Nutrient Balance
- Manure-spreadable fields
- Fields not receiving manure

Field Nutrient Balance (Manure-spreadable Area)

Year	Field	Size	Crop	Yield Goal	Fertilizer Recs[1]			Nutrients Applied[2]			Balance After Recs[3]			Balance After Removal[4]	
		Acres		/Acre	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	P_2O_5 Lb/A	K_2O Lb/A
2008	4	33.9	Small grain cover		0	0	0								
2008	4	33.9	Corn silage	22	150	0	0	152	57	238	2	57	238	-22	55
2009	4	33.9	Small grain cover		0	0	0								
2009	4	33.9	Corn silage	22	150	0	0	137	57	238	0[1]	114	476	-22	110
2010	4	33.9	Small grain cover		0	0	0								
2010	4	33.9	Corn silage	22	150	0	0	131	57	238	0[1]	171	714	-22	165
Total	4				**450**	**0**	**0**	**420**	**171**	**714**					
2008	5	26.8	Small grain		0	0	0								
														-13	92
														-13	184
														-13	276
														-44	-142
														-44	-142
														-44	-142

Field Nutrient Balance (Non-manure-spreadable Area)

Year	Field	Size	Crop	Yield Goal	Fertilizer Recs[1]			Nutrients Applied[2]			Balance After Recs[3]			Balance After Removal[4]	
		Acres		/Acre	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	N Lb/A	P_2O_5 Lb/A	K_2O Lb/A	P_2O_5 Lb/A	K_2O Lb/A
2008	1	28.6	Corn silage	22	150	0	160	152	0	160	2	0	0	-79	-23
2009	1	28.6	Grass-clover hay new	4	30	0	60	30	0	60	0	0	0	-60	-180
2010	1	28.6	Grass-clover hay maint	6	60	0	30	60	0	30	0	0	0	-90	-330
Total	1				**240**	**0**	**250**	**242**	**0**	**250**					
2008	2	20.8	Grass-clover hay maint	6	60	0	30	60	0	30	0	0	0	-90	-330
2009	2	20.8	Corn silage	22	150	0	160	152	0	160	2	0	0	-79	-23
2010	2	20.8	Grass-clover hay new	4	30	0	60	30	0	60	0	0	0	-60	-180
Total	2				**240**	**0**	**250**	**242**	**0**	**250**					
2008	3	54.2	Small grain cover		0	0	0								
2008	3	54.2	Corn silage	22	150	0	0	152	0	0	2	0	0	-79	-183
2009	3	54.2	Small grain cover		0	0	0								
2009	3	54.2	Corn silage	22	150	0	0	152	0	0	2	0	0	-79	-183
2010	3	54.2	Small grain cover		0	0	0								
2010	3	54.2	Corn silage	22	150	0	0	152	0	0	2	0	0	-79	-183
Total	3				**450**	**0**	**0**	**456**	**0**	**0**					

Nutrient Management Plan

- Annual Summary – Manure Inventory

Manure Inventory Annual Summary

Manure Source	Plan Period	On Hand at Start of Period	Total Generated	Total Imported	Total Trans-ferred In	Total Applied	Total Exported	Total Trans-ferred Out	On Hand at End of Period	Units
Holding pond	Sep '07 - Aug '08	450,000	1,244,000	0	0	1,234,600	0	0	459,400	Gal
Calf shed	Sep '07 - Aug '08	220	264	0	0	254	0	0	231	Ton
Holding pond	Sep '08 - Aug '09	459,400	1,244,000	0	0	1,234,400	0	0	469,000	Gal
Calf shed	Sep '08 - Aug '09	231	264	0	0	254	0	0	241	Ton
Holding pond	Sep '09 - Aug '10	469,000	1,244,000	0	0	1,232,200	0	0	480,800	Gal
Calf shed	Sep '09 - Aug '10	241	264	0	0	254	0	0	252	Ton

Nutrient Management Plan

- Annual Summary – Fertilizer Material

Fertilizer Material Annual Summary

Product Analysis	Plan Period	Product Needed Sep - Dec	Product Needed Jan - Aug	Total Product Needed	Units
0-0-60	Sep '07 - Aug '08	8,648	0	8,648	Lbs
28-0-0	Sep '07 - Aug '08	0	6,115	6,115	Gal
33-0-0	Sep '07 - Aug '08	4,446	35,753	40,199	Lbs
0-0-60	Sep '08 - Aug '09	8,393	0	8,393	Lbs
28-0-0	Sep '08 - Aug '09	0	5,362	5,362	Gal
33-0-0	Sep '08 - Aug '09	4,446	36,637	41,083	Lbs
0-0-60	Sep '09 - Aug '10	3,510	0	3,510	Lbs
28-0-0	Sep '09 - Aug '10	0	5,326	5,326	Gal
33-0-0	Sep '09 - Aug '10	4,446	36,985	41,431	Lbs

Nutrient Management Plan

- Plan Nutrient Balance
- Manure-spreadable fields

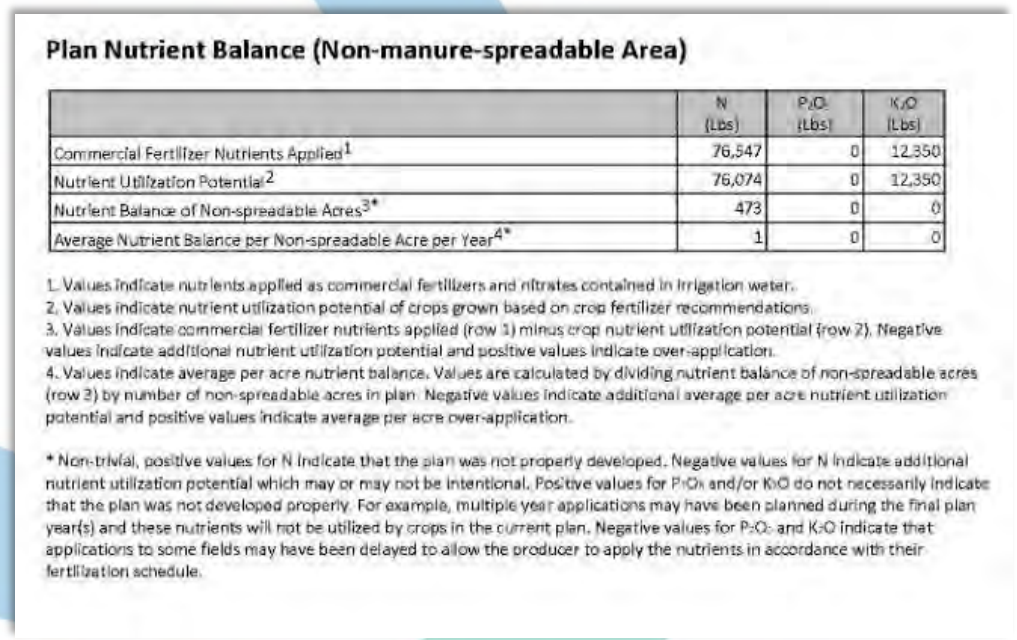
Plan Nutrient Balance (Manure-spreadable Area)

	N (Lbs)	P2O5 (Lbs)	K2O (Lbs)
Total Manure Nutrients on Hand at Start of Plan[1]	5,842	1,856	6,219
Total Manure Nutrients Collected[2]	42,151	13,018	48,788
Total Manure Nutrients Imported[3]	0	0	0
Total Manure Nutrients Exported[4]	0	0	0
Total Manure Nutrients Gained/Lost In Transfer[5]	0	0	0
Total Manure Nutrients on Hand at End of Plan[6]	6,342	2,021	6,689
Total Manure Nutrients Applied[7]	41,675	12,878	48,398
Available Manure Nutrients Applied (Utilized by plan's crops)[8]	20,862	12,878	48,398
Available Manure Nutrients Applied (Not utilized by plan's crops)[9]	1,878	0	0
Commercial Fertilizer Nutrients Applied (Utilized by plan's crops)[10]	14,154	0	0
Commercial Fertilizer Nutrients Applied (Not utilized by plan's crops)[11]	0	0	0
Available Nutrients Applied (Manure and fertilizer; utilized by plan's crops)[12]	35,116	12,878	48,398
Nutrient Utilization Potential[13]	34,920	18,391	42,602
Nutrient Balance of Spreadable Acres[14]*	196	-5,513	5,796
Average Nutrient Balance per Spreadable Acre per Year[15]*	1	-24	25

1. Values indicate total manure nutrients present in storage(s) at the beginning of the plan.
2. Values indicate total manure nutrients collected on the farm.
3. Values indicate total manure nutrients imported onto the farm.
4. Values indicate total manure nutrients exported from the farm to an external operation.
5. Values indicate changes in total manure nutrients due to internal transfers between storage units with differing analyses.
6. Values indicate total manure nutrients present in storage(s) at the end of plan.
7. Values indicate total nutrients present in land-applied manure. Losses due to rate, timing and method of application are not included in these values.
8. Values indicate available manure nutrients applied on the farm based on rate, time and method of application. These values are based on the total manure nutrients applied (row 7) after accounting for state-specific nutrient losses due to rate, time and method of application. Nutrients which will not be utilized by crops in the plan (row 9) are excluded from these values.
9. Values indicate manure nutrients applied that will be utilized by crops outside the plan.
10. Values indicate nutrients applied as commercial fertilizers and nitrates contained in irrigation water. Nutrients that will not be utilized by crops in the plan (row 11) are excluded from these values.
11. Values indicate nutrients applied as commercial fertilizer which will be utilized by crops outside the plan.
12. Values are the sum of available manure nutrients applied (row 8) and commercial fertilizer nutrients applied (row 10).

Nutrient Management Plan

- Plan Nutrient Balance
- Fields not receiving manure



Plan Nutrient Balance (Non-manure-spreadable Area)

	N (Lbs)	P_2O_5 (Lbs)	K_2O (Lbs)
Commercial Fertilizer Nutrients Applied[1]	76,547	0	12,350
Nutrient Utilization Potential[2]	76,074	0	12,350
Nutrient Balance of Non-spreadable Acres[3]*	473	0	0
Average Nutrient Balance per Non-spreadable Acre per Year[4]*	1	0	0

1. Values indicate nutrients applied as commercial fertilizers and nitrates contained in irrigation water.
2. Values indicate nutrient utilization potential of crops grown based on crop fertilizer recommendations.
3. Values indicate commercial fertilizer nutrients applied (row 1) minus crop nutrient utilization potential (row 2). Negative values indicate additional nutrient utilization potential and positive values indicate over-application.
4. Values indicate average per acre nutrient balance. Values are calculated by dividing nutrient balance of non-spreadable acres (row 3) by number of non-spreadable acres in plan. Negative values indicate additional average per acre nutrient utilization potential and positive values indicate average per acre over-application.

* Non-trivial, positive values for N indicate that the plan was not properly developed. Negative values for N indicate additional nutrient utilization potential which may or may not be intentional. Positive values for P_2O_5 and/or K_2O do not necessarily indicate that the plan was not developed properly. For example, multiple year applications may have been planned during the final plan year(s) and these nutrients will not be utilized by crops in the current plan. Negative values for P_2O_5 and K_2O indicate that applications to some fields may have been delayed to allow the producer to apply the nutrients in accordance with their fertilization schedule.

Nutrient Management Plan

- Effective, understandable and helpful plans
- Fair balance of production and environmental interests

Contents – Case File

- Supporting Information kept in the case file:
  - In addition to NPPH Title 180 part 600.31 Section C include:
    - Conservation Plan and record of decisions (practice schedule) with planner, decision maker and other required signatures
    - Maps used in the CNMP / NMP development process—e.g. soils, map of farmstead, land treatment maps and any other maps needed to communicate existing and planned practices
    - Forms and worksheets used in developing and evaluating alternatives, notes and computations to support all practice design documentation

Contents – Case File

- Supporting Information kept in the case file:
  - In addition to NPPH Title 180 part 600.31 Section C include:
    - Inventory and analysis information (includes all resource concern assessments (e.g. erosion, N leaching index, P index, water quality assessments, livestock inventory, manure/waste estimated production, manure imports/exports, irrigation assessments, manure storage and evaluation of their integrity/capacity, site feasibility data if needed such as topographic survey, soil boring or flood zone info)
    - All completed implementation requirements/engineering plans
    - All electronic files used for design and nutrient management planning
    - Record keeping as appropriate

Contents – Case File

- Supporting Information kept in the case file:
  - Certain Assessments and budget need to run twice:
    - Based on current management and condition (to determine need for improvements)
    - To develop “planned” or future action to improve management

Communication is Key

- Site Visits are essential for a good quality CNMP
- Communication between involved parties

Financial Assistance from NRCS

- Financial assistance is available for implementing conservation practices identified in your conservation plan (or CNMP) when resource concerns will be improved.
- The most common program is the Environmental Quality Incentives Program (EQIP).
- The incentive payment rate is fixed.
- Applications are screened and ranked to ensure the projects with the most benefit are funded first.

Program Eligibility

- Applicant must be an agriculture producer
  - Equine facilities have always been a “gray” area since they do not fall under the four f’s of ag production (food, fiber, fuel, and forage) but they are a confined animal feeding operation with livestock
- Applicant must have control of the land (deed/lease)
- Comply with Adjusted Gross Income limitation (AGI) provisions ($900,000 ALL income for last 3 tax years)
- Socially disadvantaged, beginning and limited resource farmers, Indian tribes and veterans are eligible for an increased payment rate

Application Process

- Make an appointment with Heather Cuevas (contact info at the end of the presentation!) to complete or submit an application packet. Applications are accepted year round.

- NRCS planner will make an appointment for a site visit to assess resource concerns and potential projects.

- High/Medium ranked applications will be required to create/update farm records with Farm Service Agency.

- Once in “eligible” status, client will work with planner on a potential plan to be submitted for next funding selection (multiple batching periods throughout the year)

If NRCS is unable to help you, we probably know someone who can! We work with many different partners in the area!

SONOMA RESOURCE CONSERVATION DISTRICT

GOLD RIDGE RESOURCE CONSERVATION DISTRICT

USDA FSA FARM SERVICE AGENCY
United States Department of Agriculture
Farm Service Agency

Point Blue Conservation science for a healthy planet℠

UC CE University of California Cooperative Extension Marin County

MARIN RESOURCE CONSERVATION DISTRICT

UC CE University of California Cooperative Extension UCCE Sonoma County

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