



Firely Conservation Plan

Owner

As the owner of this conservation plan I, as the decision maker, have been involved in the planning process and will ensure my farm's operator agrees that the items/practices listed in each element of the conservation plan are needed and will be implemented. I understand that I am responsible for keeping all necessary records associated with the implementation of this conservation plan. I intend to implement/accomplish this conservation plan promptly as described in the plan.

Signature: _____

Date:

Marty Firely

Farm location: 40.29241, -75.58372

2782 Leidy Road, Gilbertsville, Pennsylvania, 19525 (New Hanover Township)

Parcel identification numbers: 47-00-04324-00-3, 47-00-04324-00-9, 47-00-04324-01-2,
47-00-04324-02-1

Conservation Planner

As a conservation planner, I certify that I have reviewed the Farm Conservation Plan and that the elements of the document are technically compatible, reasonable, and can be implemented.

Signature:

Date:

John Kluthe

TSP Certification Number TSP-18-22247, expiration date 3/31/2026, Montgomery Co., PA

Conservation District

As a Conservation District representative, I have reviewed the Conservation Plan and concur that the plan meets the District's conservation goals.

Signature:

Date:

Name:

Title:



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Farm Description

The owner, Marty Firely, of 2782 Leidy Road, Gilbertsville, Pennsylvania, 19525 (New Hanover Township), parcel identification numbers: 47-00-04324-00-3, 47-00-04324-00-9, 47-00-04324-01-2, 47-00-04324-02-1 has requested a conservation plan to fulfill the requirements of the preserved farm deed of easement.

This conservation plan for the farm, which integrates diverse agricultural activities, aims to sustainably manage their resources while supporting the brewery operations, crop cultivation, and livestock. The farm includes fields planned to grow barley, hops, and pumpkins, which are essential for our brewery's production and public interface. They also maintain livestock for various agricultural purposes and as a way to enhance the farm's community engagement and educational outreach.

Their conservation strategy begins with a comprehensive assessment of land use across the farm, identifying specific areas dedicated to crop production and livestock grazing activities. Each land use category is evaluated for potential resource concerns, such as soil health and stability, water quality and availability, plant health, animal welfare, and air quality.

For their crop fields, they focus on soil conservation techniques and efficient water use to ensure healthy, productive harvests of barley, hops, and pumpkins. Currently, the farm is in a hay rotation. As a transition between hay and specialty crops, they will implement a corn/soybean rotation.

Their livestock management practices are designed to promote animal health and minimize environmental impact, including proper waste management and pasture rotation. An animal concentration area (ACA) is maintained with a focus on animal welfare and safety, alongside measures to manage visitor impact on the land. By addressing each specific resource concern and implementing sustainable practices, this conservation plan aims to enhance the farm's productivity, environmental health, and educational value, ensuring a balanced and resilient operation.

Objective

This conservation plan addresses the soil, water, and other resources managed on the associated land. The purpose of this document is twofold: 1) to document the farm's current resource concerns from the NRCS planning perspective, and 2) to identify conservation practices that address these concerns, ensuring they meet the criteria for conservation planning.



Operation Information:

Acreage Owned:

- Cropland, 16.3 ac
- Pasture, 6.7 ac
- Forest and Associated Ag Land, 4.3 ac
- Farmstead and Developed Land, 4.1 ac
- Total 31.4 acres.

Acreage Rented: 0 acres.

Crop Rotations, Tillage, and Planting Methods

Current

Crops: All crop fields are currently in a hay rotation.

Livestock: 2- alpacas (150 lb), 30- chickens (4 lb), 420 lb total, 0.42 AU

Planned

Note: Years 1 and 2 can be repeated indefinitely.

Note: Years 3 and 4 can be repeated indefinitely - and independently of years 1 and 2.

All crop fields can be maintained in hay indefinitely.

Overview

Crops:

- Year 1 Corn

Planting Corn into Standing Vegetation with Chemical Burndown and No-Till

1. Preparation and Burndown:

- Timing: Begin in early spring, when the standing vegetation is actively growing.
- Chemical Burndown: Apply a suitable herbicide (such as glyphosate) to kill the existing vegetation. This step ensures that the vegetation does not compete with the emerging corn for nutrients, water, and sunlight.
- Herbicide Selection: Choose an herbicide that targets the vegetation present without residual soil activity that could harm the corn.

2. No-Till Planting Corn:

- Equipment: Use a no-till planter equipped with row cleaners, double-disc openers, and closing wheels to ensure proper seed placement and soil contact.



- Seeding Depth: Plant corn seeds at a depth of 1.5 to 2 inches to ensure good soil-to-seed contact and adequate moisture for germination.
- Row Spacing: Maintain optimal row spacing, typically 30 inches, to balance plant population and sunlight interception.

Following the Corn Crop with No-Till Cereal Rye

1. Harvest and Preparation:

- Corn Harvest: After corn harvest in late summer or early fall, remove the crop residue to facilitate the next planting.
- Soil Condition: The soil should be left undisturbed after harvest to preserve its structure and organic matter.

2. No-Till Planting Cereal Rye:

- Timing: Plant cereal rye as soon as possible after corn harvest to ensure establishment before winter.
- Equipment: Use a no-till drill to plant cereal rye seeds. Ensure the drill is properly calibrated to the recommended seeding rate (around 50-70 pounds per acre).
- Seeding Depth: Plant cereal rye at a depth of 0.5 to 1 inch to ensure rapid germination and establishment.

- Year 2 Soybeans

1. Preparation:

- Termination of Cereal Rye: Before planting soybeans, terminate the cereal rye cover crop using an appropriate herbicide. The timing should be managed to prevent competition with soybeans but to maximize the rye's benefits.
- Herbicide Application: Apply the herbicide 1-2 weeks before planting soybeans to ensure the rye is adequately terminated.

2. No-Till Planting Soybeans:

- Equipment: Use a no-till planter with row cleaners to handle remaining rye residue.
- Seeding Depth: Plant soybean seeds at a depth of 1 to 1.5 inches.
- Row Spacing: Maintain row spacing of 7.5 to 15 inches for optimal canopy closure and weed suppression.

Following Soybeans with No-Till Cereal Rye

1. Harvest and Preparation:

- Soybean Harvest: After soybean harvest in late summer or early fall, leave the crop residue in place to protect the soil.
- Soil Condition: Ensure the soil remains undisturbed to maintain its structure and health.



2. No-Till Planting Cereal Rye:

- Timing: Plant cereal rye immediately after soybean harvest to allow establishment before winter.
- Equipment: Utilize a no-till drill for planting. Adjust the drill settings to ensure proper seed placement and soil contact.
- Seeding Depth: Plant rye at a depth of 0.5 to 1 inch.

Benefits and Considerations

- Soil Health: Continuous no-till farming improves soil structure, increases organic matter, and enhances microbial activity.
- Erosion Control: The presence of standing vegetation and cover crops reduces soil erosion by protecting the soil surface from rain and wind.
- Weed Management: Chemical burndown and cover crops suppress weed growth, reducing the need for herbicides.
- Moisture Retention: No-till practices improve water infiltration and retention, benefiting crop growth during dry periods.

Adhering to these technical guidelines ensures successful crop establishment and soil conservation through sustainable agricultural practices.

- Years 3 and 4 Barley

No-till barley planting involves sowing barley seeds directly into undisturbed soil without prior tillage. This method maintains soil structure, enhances water retention, and reduces erosion. Additionally, incorporating cover crops such as sorghum sudan grass before barley and buckwheat after barley further improves soil health and fertility.

Technical Details

Seedbed Preparation

- Minimal Soil Disturbance: Preserves soil organic matter and microbial activity.
- Previous Crop Residues: Remain on the surface, protecting soil from erosion and moisture loss.
- Cover Crops:
 - Sorghum Sudan Grass: Planted prior to barley to improve soil structure, add organic matter, and suppress weeds.
 - Buckwheat: Planted after barley to provide quick ground cover, suppress weeds, and add organic matter.



Seeding Equipment

- No-Till Drills or Planters: Equipped with coulters, openers, and seed metering systems to slice through residue and place seeds at the correct depth.
- Calibration: Proper calibration of the equipment ensures even seed distribution and optimal planting depth.

Soil Fertility

- Soil Tests: Conducted to determine nutrient requirements.
- Fertilizer Application: Fertilizers can be applied in conjunction with the no-till drill to ensure nutrients are available to emerging seedlings.

Weed Control

- Pre-Plant Herbicide Applications: Manage existing weed pressure.
- Surface Residue: Suppresses weed emergence by blocking sunlight.

Monitoring and Management

- Regular Scouting: For pest and disease pressure.
- Integrated Pest Management (IPM): Strategies employed to maintain crop health.

Incorporation of Tillage and Cover Crops

- Sorghum Sudan Grass Cover Crop:
 - Before Barley: Planted and grown to maturity, then terminated with a herbicide or mowed. If necessary, the field can be lightly disked to manage residue before planting barley.
- Buckwheat Cover Crop:
 - After Barley: Planted immediately following barley harvest. It grows quickly, providing a cover that helps with weed suppression and soil health.
 - Tillage Option: If necessary, the field can be disked after buckwheat to incorporate the cover crop residues and prepare the seedbed for the next crop.

Benefits of the System

- Soil Health: Continuous no-till and cover cropping improve soil structure, increase organic matter, and enhance microbial activity.
- Erosion Control: Cover crops and no-till methods protect the soil surface from erosion.
- Moisture Retention: No-till and cover crops improve water infiltration and retention, benefiting crop growth during dry periods.
- Nutrient Cycling: Cover crops contribute to nutrient cycling, reducing the need for synthetic fertilizers.

By integrating cover crops of sorghum sudan grass before barley and buckwheat after barley, along with occasional disking if necessary, this system enhances soil health and sustainability while maintaining the benefits of no-till farming.



No-Till Pumpkins with a Winter Cover Crop

Overview: No-till pumpkin planting involves sowing pumpkin seeds directly into soil that has not been tilled, following the growth of a cover crop such as hairy vetch during the winter. This practice improves soil health, controls weeds, and enhances moisture retention.

Technical Details:

1. Cover Crop Management:
 - Selection: Hairy vetch is chosen for its nitrogen-fixing properties and biomass production.
 - Establishment: The cover crop is no-till drilled into the field in the fall.
 - Termination: In the spring, the cover crop is terminated using a roller-crimper or herbicide, creating a mulch layer that retains moisture and suppresses weeds.
2. Seedbed Preparation:
 - The mulch layer from the terminated cover crop remains on the surface.
 - No disturbance to the soil structure, maintaining soil organic matter and microbial activity.
3. Seeding Equipment:
 - No-till planters or transplanters are used to plant pumpkin seeds or seedlings through the mulch layer.
 - Equipment is adjusted to ensure proper penetration through the mulch and soil for optimal seed placement.
4. Soil Fertility:
 - Soil tests determine nutrient needs.
 - Fertilizers, if needed, are applied to ensure availability for the pumpkins, taking into account the nutrients contributed by the cover crop.
5. Weed and Pest Management:
 - The mulch layer from the cover crop suppresses weed growth.
 - Pre-plant herbicides may be used if necessary to manage weeds.
 - Regular monitoring for pests and diseases, with IPM strategies in place to address any issues.
6. Irrigation and Water Management:
 - The mulch layer helps retain soil moisture, reducing the need for frequent irrigation.
 - Irrigation systems, if used, are carefully managed to avoid over-watering.

By adopting these no-till practices for both barley and pumpkins, soil health is improved through reduced erosion, enhanced organic matter, and better water retention. The use of a winter cover crop for pumpkins further enriches the soil, providing additional benefits such as nitrogen fixation and weed suppression.



Livestock:

- The operation will expand its livestock operation to include the following:
 - 8- alpacas, 150 lb, 1.2 AU
 - 60- chickens, 4 lb, 0.24 AU
 - Up to 10- pigs, 140 lb, 1.4 AU
 - 6 to 10 background calves, 500 lb, 5 AU
 - Total: 7.8 AU

Animal Concentration Areas (ACA):

- Two livestock pens qualify as animal concentration areas (ACA): 0.07 ac and 0.25 ac.
 - They are located on the farmstead land use.
 - Currently, these areas are used to house two alpacas.
 - In the future, these areas will be used for 8 alpacas.
- Map on (or near) page 16: Buildings and Farm Structures.
- ACA Management
 - 0.07 ac
 - The 0.07 acre ACA is too small and located in an area inconvenient to support a vegetated treatment area. Other recommended practices such as a roof with runoff control or collecting the overland flow are also not feasible. Therefore, the 0.07 ac ACA will be seasonally grazed and kept in 70% vegetation.
 - 0.25 ac
 - The 0.25 acre ACA has experienced sheet and rill erosion over its lifespan. As a result, soil has collected near the downhill corner of the ACA. Additionally, livestock (current and future) will keep the soil surface devoid of vegetation. A vegetated filter strip is required in the downhill corner of the ACA to prevent soil and nutrient loss. Follow the guidance provided in the conservation practice Filter Strip (393) found later in this plan. Additionally, a fence needs to be installed along the edge of the filter strip to protect it from access to livestock.
 - Operation and maintenance:
 - Mow the area and remove the vegetation on a bi-weekly basis during the growing season (after establishment).
 - Or - allow livestock to flash graze the area briefly, leaving 90% cover and 3"+ of forage. This O&M alternative should mimic the mowing option. Livestock should not be allowed to remain in the area overnight or for multiple days at a time.



Resource Inventory (by Land Use)

Developed Land (Field 5)

Field 1 is categorized as 'developed land' for conservation planning purposes. Developed land includes areas occupied by buildings and related facilities used for commercial sites, among other purposes. Resource concerns typically evaluated for developed land include:

- Classic gully erosion
- Bank erosion from streams, shorelines, or water conveyance channels
- Concentration of salts or other chemicals
- Soil organism habitat loss or degradation
- Ponding and flooding
- Seasonal high-water table
- Seeps
- Drifted snow
- Groundwater depletion
- Naturally available moisture use
- Nutrients and sediment transported to surface water and groundwater
- Plant productivity and health
- Plant pest pressure
- Inadequate livestock shelter
- Wind erosion

The planning criteria for the potential resource concerns associated with developed land were either not met or not applicable.

Farmstead (Field 8)

Animal Resource Concerns

Animal resource concerns are the most likely to require attention due to the presence of several heads of various livestock housed in the Farmstead area. Animal resource concerns such as a 'balanced feed and forage program', 'adequate livestock shelter', and 'adequate livestock water quantity, quality, and distribution' have been considered.

- Feed and forage are properly addressed with livestock forage, roughage, and supplemental nutritional requirements being properly addressed, and
- The inventory of livestock forage and feed is in balance for the intended use.
- As a result, there are no 'animal resource concerns' associated with the farmstead.



Plant Resource Concerns

The 'plant resource concerns' that were evaluated for the farmstead included 'plant productivity and health' and 'wildfire hazard from biomass accumulation'. The majority of the farmstead land use is mowed grass. Animals are kept in specific housing quarters. Therefore, there are no 'plant resource concerns' associated with the farmstead.

Soil Erosion Resource Concerns

'Soil erosion resource concerns' were evaluated based on the presence of sheet and rill erosion and gully erosion (ephemeral and classic).

- The animal concentration area (ACA) measuring 0.25 ac has experienced sheet and rill erosion. Additionally, it is planned to be managed in a with very little vegetative productivity. The following conservation practices are recommended:
 - Filter Strip (393), 0.04 ac
 - Mulch (484), 0.21 ac

Compaction

Definition: Management-induced soil compaction at any level throughout the soil profile resulting in reduced plant productivity, biological activity, infiltration and aeration.

Objective: Reduce soil compaction.

Planning observation:

- Compaction is a resource concern in the Area #1 (ACA #1) and Area #2. Soil compaction is an optional resource concern to be addressed under the conservation planning standards. The current land management decision is to take no action to address compaction in the farmstead field at this time.
- Compaction is also likely to occur on Area #3 (Farmstead) when/if the area is used for overflow parking of equipment and/or vehicles. Annual cover crops are a great way to treat for compaction and maintain the area for agricultural potential. If the area will be used for parking periodically throughout the year, manage a cover crop to treat compaction.
 - Cover Crop (340) - Area #3 (Farmstead)

Other

All other resource concerns associated with the Farmstead were evaluated and found to be properly addressed at this time.



Cropland (Fields 1, 6, 9, and 10)

Soil Resource Concerns

Resource concerns associated with cropland involve balancing the production of annual crops with the conservation need to minimize soil loss and maximize soil health. Three types of erosion are typically evaluated in this area, 1) sheet and rill, 2) ephemeral gully, and 3) classic gully erosion. A fourth type of erosion can cause problems but is typically not a concern in this area; wind erosion.

- Sheet and Rill erosion
 - Definition:
 - Detachment and transport of soil particles caused by rainfall, melting snow, or irrigation.
 - Objective:
 - Reduce sheet and rill erosion to tolerable limits. The tools used to evaluate sheet and rill erosion is a combination of the planner's observation and RUSLE2 (the USDA-NRCS soil loss prediction model).
 - Current condition:
 - Sheet and rill erosion is currently negligible; all cropland acres are in a perennial hay crop.
 - Desired crops: corn and soybeans, barley, cereal rye, sorghum sudan, buckwheat, and pumpkins. Soil loss for cultivated crops will need to be less than or equal to 2.9 tons per acre for Reaville silt loam, 3 to 8 percent slopes (RhB), the predominant soil type.
 - Corn/soybean rotation with a cereal rye winter crop, all established with no-till, will have a soil loss of 0.66 tons per acre.
 - Malting barley established with some tillage, preceded by sorghum sudan grass (hayed or grazed) and a buckwheat cover crop established with tillage: soil loss, 2.7 tons/ac/year.
 - Pumpkins with cereal rye cover crop; both no-till: soil loss, 2.0 tons/ac/yr.
 - Note: Specific to Field 9b; commercial vegetables, tomatoes, and hemp on weed barrier. RUSLE2 calculations indicate 0.78 tons per acre soil loss. The soil's T-value is 2 tons per acre. Therefore there is no soil sheet and rill resource concern field 9b.
 - Conservation practices associated with corn/soybeans/rye, barley, and pumpkins are as follows. See the RUSLE2 report in the Appendix.
 - Conservation planning:
 - Cover Crop (340)
 - Residue and Tillage Management, Reduced Tillage (345)



- Ephemeral Gully Erosion
 - Definition:
 - Soil erosion which results in small gullies in the same flow area that can be obscured by tillage or other soil distribution activities.
 - Objective:
 - Control the formation of ephemeral gullies.
 - Current condition:
 - Observations were made on 4/26/2024 to identify ephemeral gully erosion within the crop field; none were found.
 - Conservation Planning:
 - Current crop; perennial hay. Additional conservation practices over and above current agronomic practices are not necessary to treat ephemeral gully erosion at this time.
 - The owner and farmer must recognize that soil retention must be actively managed within the field. While a soil conservation plan serves as a guiding framework, its implementation is paramount for minimizing soil loss. Should ephemeral gullies develop, it is essential to promptly engage with KES LLC and your conservation planner to evaluate and enact measures to mitigate and correct soil loss.
- Classic Gully Erosion
 - Definition:
 - Gullies created by runoff that can enlarge a channel progressively by head cutting and/or lateral widening.
 - Objective:
 - Stabilize an actively eroding gully.
 - Current condition:
 - Observations were made on 4/26/2024 to identify classic gully erosion within the crop field; none were found.
 - Conservation Planning:
 - Additional conservation practices over and above current agronomic practices are not necessary to treat classic gully erosion at this time.

Plant Pest Pressure

As a potential resource concern, plant pest pressure is excessive pest damage to plants including that from undesired plants, diseases, animals, soil borne pathogens, and nematodes. This concern addresses invasive plant, animal, and insect species. The objective is to reduce plant pest pressure. This resource becomes a concern when pest damage to plants is below economic, historical, pest model or environmental thresholds.

- The existing crop in Fields 1, 3, 6, 9, and 10 is perennial hay.



- Observations conducted on 4/26/2024 indicated that there are no resource concerns critical to treating associated plant pest pressure at this time.

Cropland (Field 3)

Soil Resource Concerns

Field 3 is planned to be perennial hops. There is no concern with sheet and rill, ephemeral gully, or classic gully erosion.

- RUSLE2, vineyard, full cover, soil loss: 0.77 tons per acre.

Pasture (Fields 7, 11)

Soil Resource Concerns

Soil resource concerns include evaluations of 'sheet and rill erosion', 'ephemeral gully erosion', and 'gully erosion'.

- Sheet and rill erosion is defined as the detachment and transport of soil particles caused by rainfall, melting snow, or irrigation. The objective when sheet and rill erosion is out of parameters is to reduce sheet and rill erosion to tolerable limits through the conservation planning process. The current condition is a soil erosion rate of less than 1 ton/ac/year. The tolerable loss limit for the predominant soil type is 2 tons/ac/yr. Therefore, there is not a current resource concern associated with sheet and rill erosion at this time.
- Ephemeral gully erosion is soil erosion that results in small gullies in the same flow area that can be obscured by tillage or other soil distribution activities. The conservation planning objective is to control the formation of ephemeral gullies. Observations were made on 4/26/2024 to identify ephemeral gully erosion within the pasture and crop fields; none were found. Additional conservation practices over and above current management practices are not necessary to treat ephemeral gully erosion.



- Classic gully erosion is gullies that are created by runoff that can enlarge a channel progressively by head cutting and/or lateral widening. The conservation planning objective is to stabilize an actively eroding gully. Observations were made on 4/26/2023 to identify classic gully erosion within the pasture and crop fields. Throughout the center of field, classic gully erosion has taken place in the past. Currently, the erosion has “healed” over with perennial grasses. If livestock are reintroduced to the field, care should be taken to keep these areas vegetated.
 - Additional conservation practices over and above current management practices are not necessary to treat classic gully erosion.
 - If livestock are reintroduced:
 - Prescribed Grazing (528)

Plant Structure and Composition

‘Plant structure and composition’ is a resource concern that is required to be considered for pasture. This resource concern considers whether plant communities have sufficient composition and structure to achieve ecological functions and management objectives. The objective of this resource concern is to improve plant structure and composition if it is found to be under the planning criteria threshold.

- The minimum criteria for this resource concern has to do with the percent of desirable plant species and the vigor/recovery of the forage after being grazed:
 - 60-80% of plant community are desirable species, and
 - Recovery after grazing takes 1 to 2 days longer than ‘normal’, there are light green plants among greener urine and dung patches, minor insect/disease damage, no plants are wilting, and yields are near the site potential.
- At the time of the field visit, 4/26/2024, the following species were observed as occupying 60-80%(+) of the plant community: perennial ryegrass, tall fescue, fine fescue, and orchardgrass.
- Livestock have not yet been added to the grazing system, creating conditions that differ from those of a longstanding continuous or rotational grazing system. Therefore, the pasture recovery after grazing is difficult to predict. It will depend largely on the grazing management practices.
- To maintain or improve the pasture condition, Prescribed Grazing (528) will be planned for pasture fields.

Forest (Field 2, 4, 11)

Forest resource concerns are not addressed in this plan.




Land Use Map

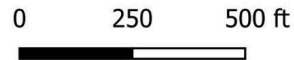
Land Use Map
Assisted by John Kluthe, TSP
5/30/2024
Montgomery County Conservation District

Marty Firely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA



Legend

 Firely Fields Bing aerial

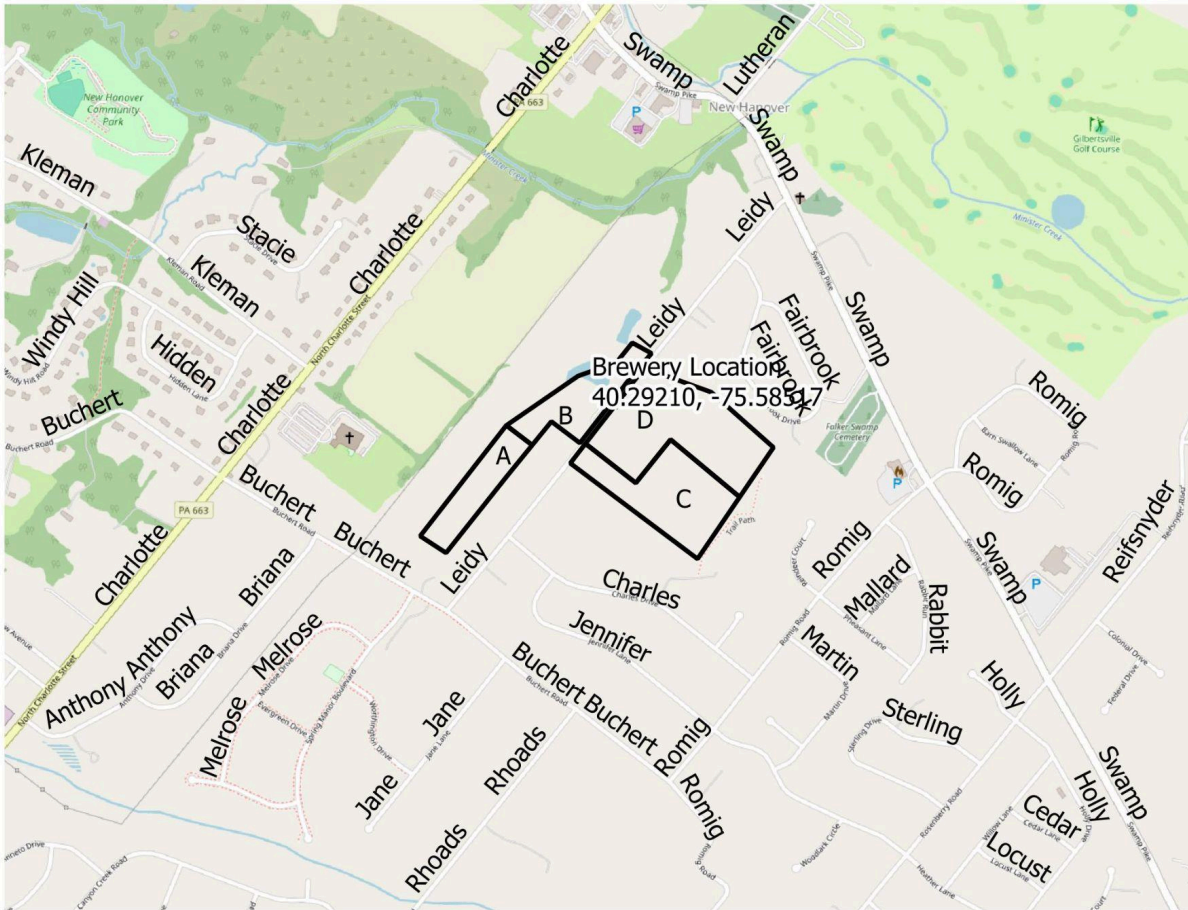




Farm Location Map

Location Map
Assisted by John Kluthe, TSP
5/30/2024

Marty Filrely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA
Montgomery County Conservation District



Legend

- Firely Parcels
- OpenStreetMap

Label	Parcel ID
A	47-00-04324-00-9
B	47-00-04324-00-3
C	47-00-04324-01-2
D	47-00-04324-02-1

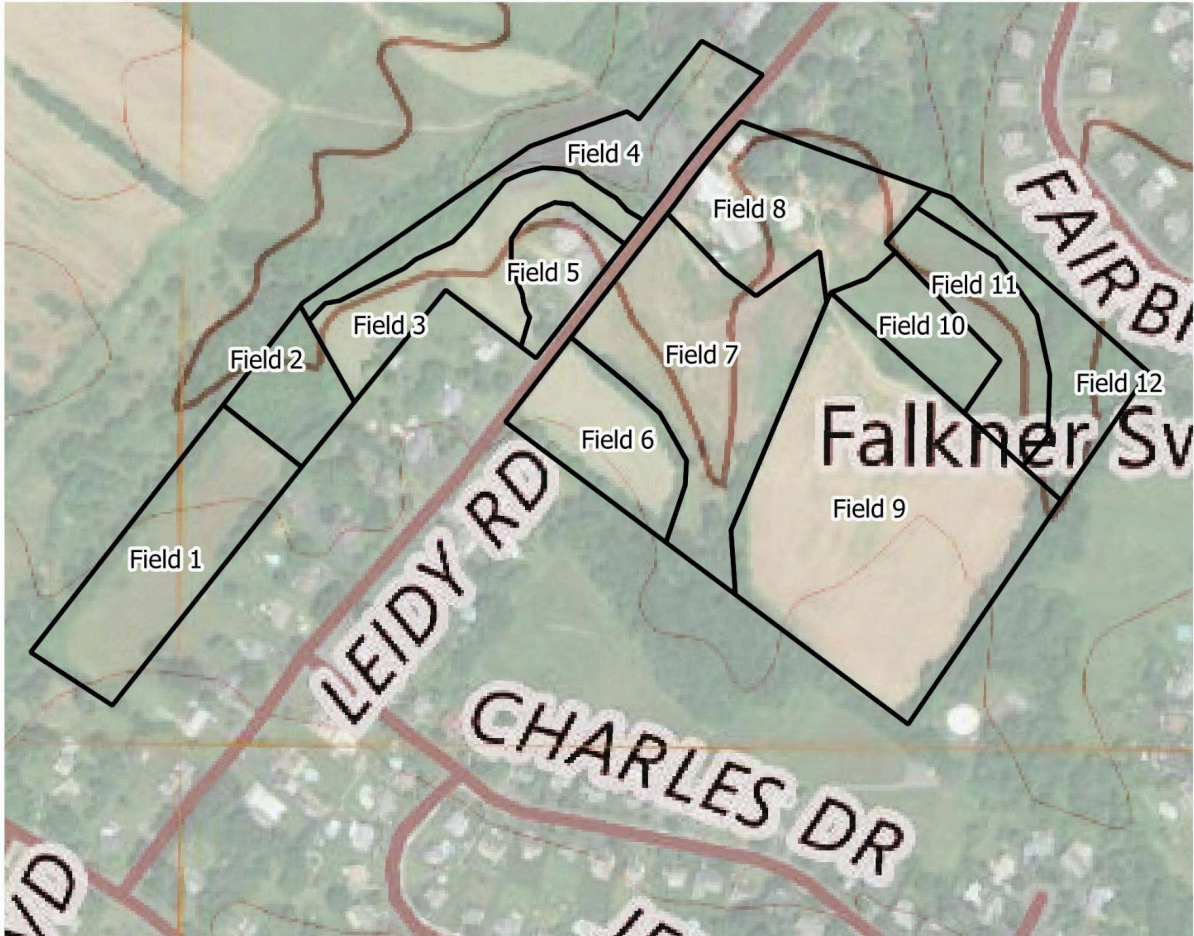




Topography Map

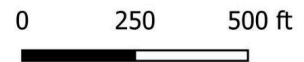
Topography Map
Assisted by John Kluthe, TSP
5/30/2024
Montgomery County Conservation District

Marty Filrely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA



Legend

	Firely Fields	PA_Sassamansville_20230504_TM_geo
	Bing aerial	PA_Sassamansville_20230504_TMorth_geo





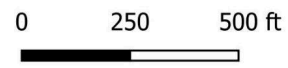
Surface Water Resources Map

Surface Water & Buffer Map
Assisted by John Kluthe, TSP
5/30/2024
Montgomery County Conservation District

Marty Filrely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA



Legend	
Firely Fields	channels & surface water
100ft surface water buffer	Channel
Bing aerial	Surface Water
	Montgomery County Streams



* The Montgomery County Streams layer shows that 'blue line streams' are absent.

** PA_geodatabase_wetlands — PA_Wetlands shows only the freshwater ponds located in/near Field 4. No other wetlands are present.



Buildings and Farm Structures Map

Farmstead Map
Assisted by John Kluthe, TSP
5/30/2024
Montgomery County Conservation District

Marty Filrely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA



Legend

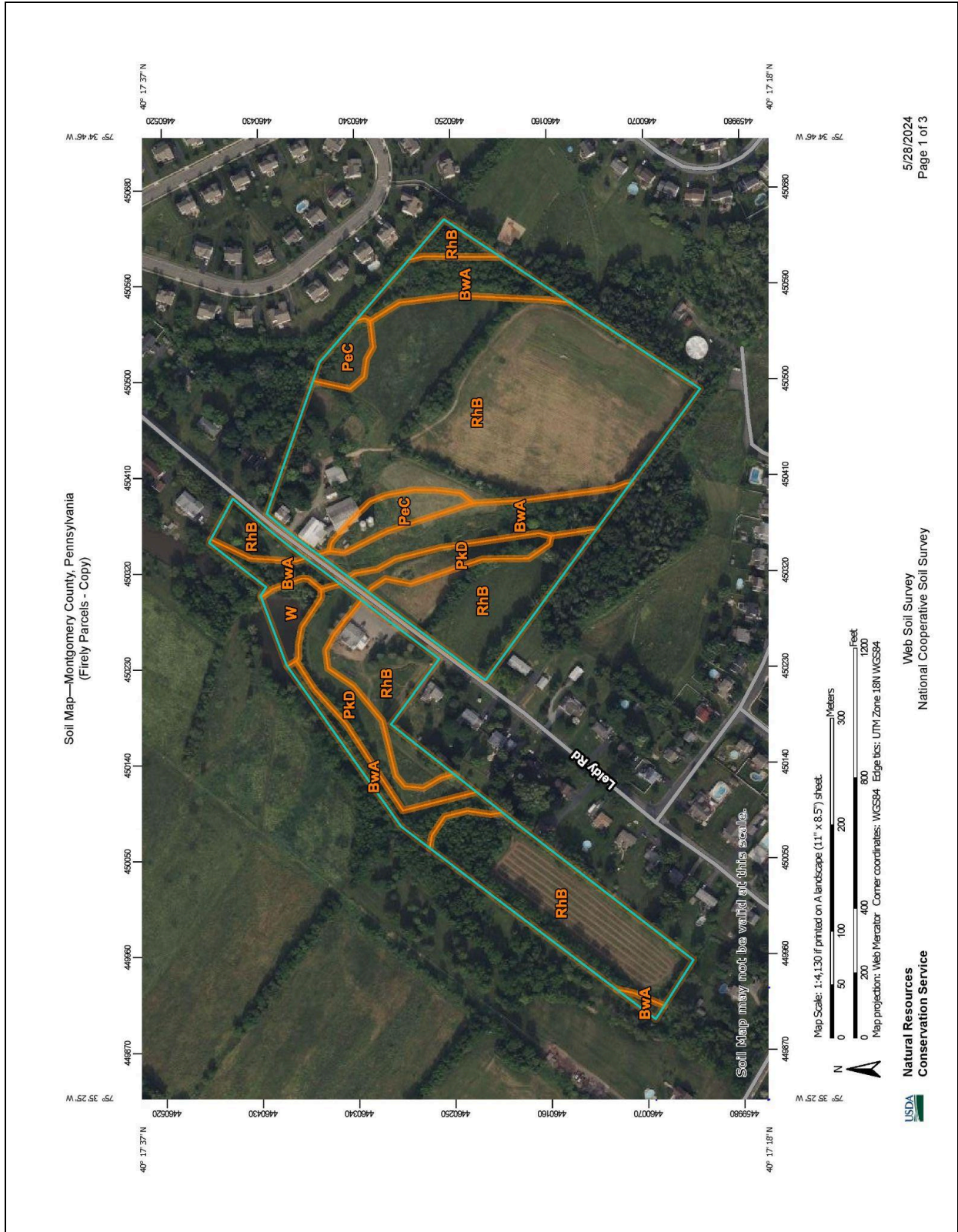
- Firely Fields
- Annotations (Boundary Lines)
- Annotations (Area #3)
- Annotations (Farmstead labels)
- Bing aerial





Soils Map

(see following pages)





Soil Map—Montgomery County, Pennsylvania
(Firely Parcels - Copy)

MAP LEGEND

- Area of Interest (AOI)
- Area of Interest (AOI)
- Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points
- Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features
- Water Features**
- Streams and Canals
- Transportation**
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads
- Background**
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:12,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Montgomery County, Pennsylvania
Survey Area Data: Version 18, Sep 8, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jun 3, 2022—Jul 20, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.



Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
BwA	Buckingham silt loam, 0 to 3 percent slopes	5.0	14.6%
PeC	Penn silt loam, 8 to 15 percent slopes	1.4	4.0%
PkD	Penn-Klinesville channery silt loams, 15 to 25 percent slopes	2.6	7.7%
RhB	Reaville silt loam, 3 to 8 percent slopes	24.7	71.9%
W	Water	0.6	1.8%
Totals for Area of Interest		34.3	100.0%



Conservation Practices for Conservation Plan

Resource concerns related to the farm's land uses have been evaluated against NRCS conservation planning criteria. Conservation practices addressing these identified resource concerns, as supported by NRCS criteria, have been included in this plan.

This evaluation ensures that all significant resource concerns are identified and addressed - according to the landowner's preference. The selected conservation practices are designed to mitigate these concerns, promote sustainable land use, and improve the overall environmental health of the farm. Each practice has been chosen based on its effectiveness and alignment with NRCS standards, ensuring comprehensive and practical solutions for the farm's specific needs.

If the operation transitions to a different form of management, it is essential to reassess this conservation plan to align with the new management activity. Adapting the plan to suit the evolving needs and objectives of the farm ensures that conservation practices remain effective and aligned with the updated management approach.



Conservation Plan Map

All Fields - Management Practices

Conservation Plan Map, Management Practices
 Assisted by John Kluthe, TSP
 5/30/2024
 Montgomery County Conservation District

Marty Firely
 2782 Leidy Rd, Gilbertsville, PA
 New Hanover Twp, Montgomery Co. PA



Legend

Firely Fields

Bing aerial



Crop Fields	Conservation Practice Code
1	340, 345
6	340, 345
9a	340, 345
10	340, 345

Farmstead and Pasture Fields	Conservation Practice Code
7	528, 382, 614
8	528, 340, 393
11	528, 382, 614

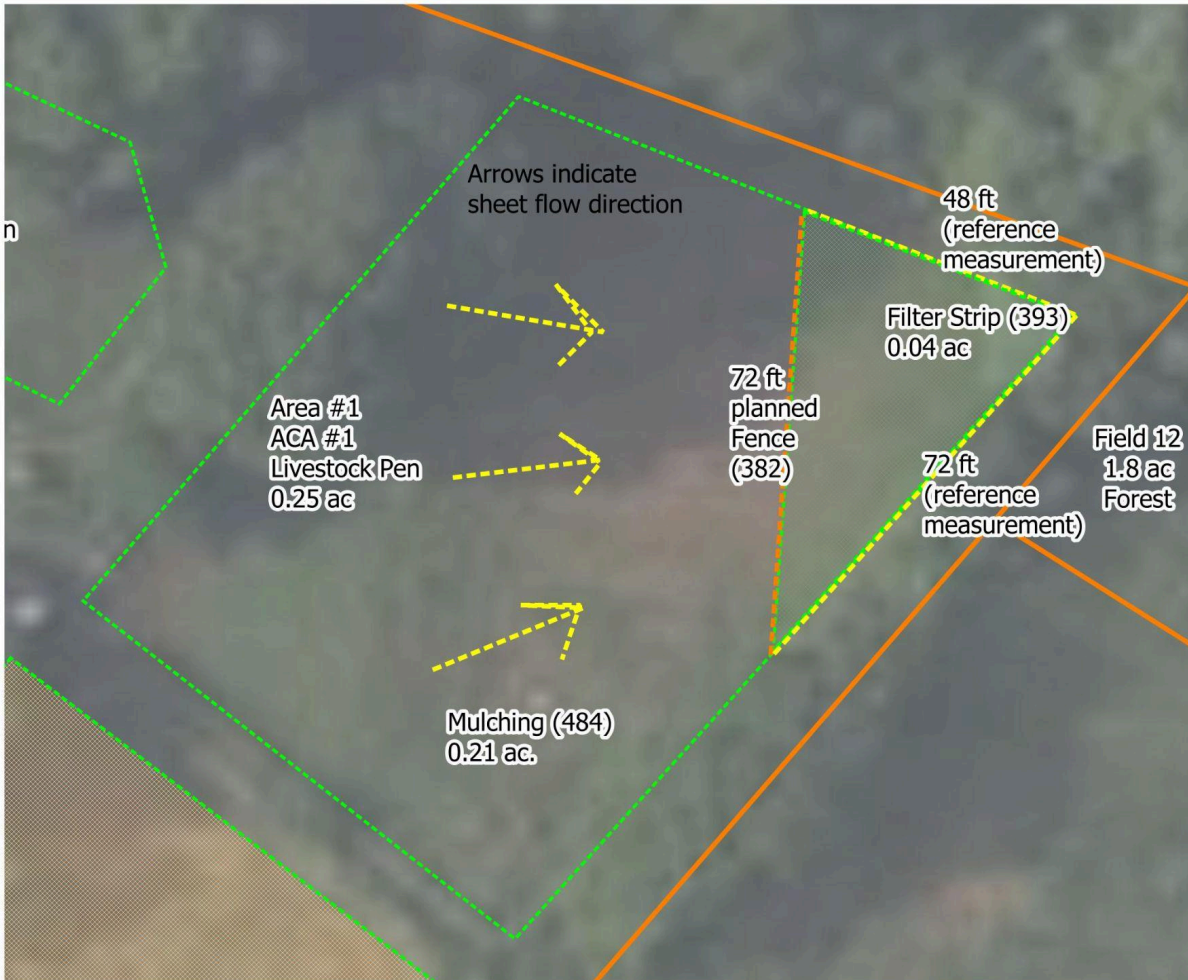




Field 8 - Farmstead Area #1

Area #1 Conservation Practices Map
 Assisted by John Kluthe, TSP
 5/30/2024
 Montgomery County Conservation District

Marty Filrely
 2782 Leidy Rd, Gilbertsville, PA
 New Hanover Twp, Montgomery Co. PA



Legend

- Firely Fields
- Bing aerial

Location	Area #1
Total Acres	0.25 ac
Filter Strip (393)	0.04 ac
Mulching (484)	0.21 ac





Field 8 - Farmstead Area #3

Area #3 Conservation Practices Map
Assisted by John Kluthe, TSP
5/30/2024
Montgomery County Conservation District

Marty Filrely
2782 Leidy Rd, Gilbertsville, PA
New Hanover Twp, Montgomery Co. PA



Legend

- Firely Fields
- Bing aerial

Location	Area #3
Total Acres	0.26 ac
Cover Crop (340)	0.26 ac

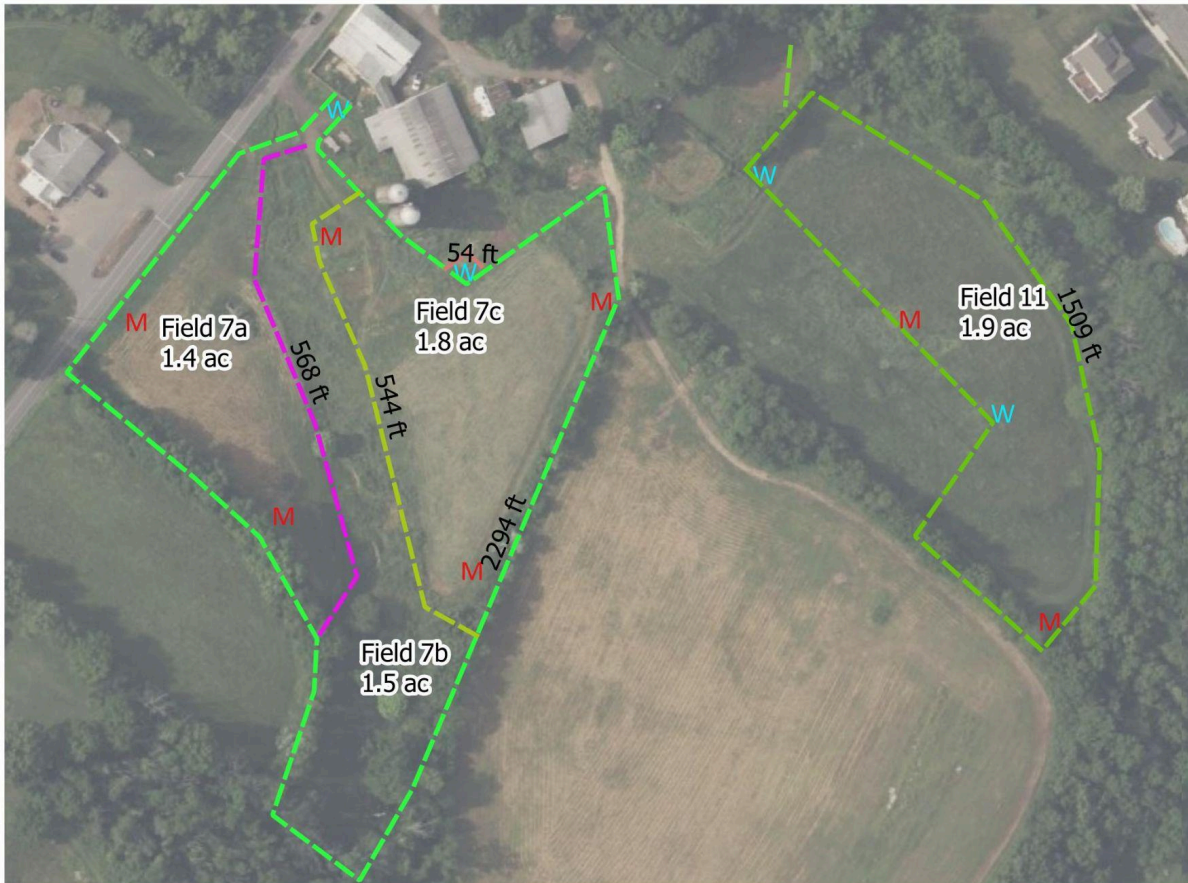




Fields 7 and 11 - Structural Practices Map

Conservation Plan Map, Structural Practices
 Assisted by John Kluthe, TSP
 5/30/2024
 Montgomery County Conservation District

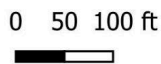
Marty Filrely
 2782 Leidy Rd, Gilbertsville, PA
 New Hanover Twp, Montgomery Co. PA



Legend

Firely Fields

Bing aerial



Field 7	perimeter fence	2294 ft
Field 7a/7b	interior fence	568 ft; a gate system will complete paddock division
Field 7b/7c	interior fence	544 ft
Field 11	perimeter fence	1509 ft
All fields	temporary fence	used for strip grazing as needed
W =	Watering locations	relocate waterers as needed per ACA management
M =	Mineral locations	locate minerals away from waterers, symbols for demo



* Permanent livestock waterers, under the NRCS practice Watering Facility (614), are an optional conservation practice. However, if permanent waterers are installed, Heavy Use Area Protection (561) is also required.



Record of Decisions

Conservation Practice ¹	Fields	Planned Amount	Planned Date ²	Applied Date		
				2025	2026	2027
Filter Strip (393)	8 (Area #1)	0.04 ac.	4/1/2027			
Mulching (484)	8 (Area #1)	0.04 ac.	10/1/2027			
Cover Crop (340)*	1	2.4 ac.	9/1			
Cover Crop (340)*	6	1.5 ac.	9/1			
Cover Crop (340)*	8	0.26 ac	9/1			
Cover Crop (340)*	9a	6.1 ac.	9/1			
Cover Crop (340)*	10	1.2 ac.	9/1			
Residue and Tillage Management (345)*	1	2.4 ac.	5/1			
Residue and Tillage Management (345)*	6	1.5 ac.	5/1			
Residue and Tillage Management (345)*	9a	6.1 ac.	5/1			
Residue and Tillage Management (345)*	10	1.2 ac.	5/1			
Prescribed Grazing (528)*	7	4.8 ac.	5/1			
Prescribed Grazing (528)*	11	1.9 ac.	5/1			
Prescribed Grazing (528)*	8 (Farmstead Area #1)	0.04 ac.	5/1			

¹ All NRCS conservation practices shall be installed, operated and maintained according to NRCS conservation practice standards and associated technical specifications.

² Specific planned dates may vary - reference the implementation requirements for planned dates.



Fence (382)	7	2294 ft.	1/1/2025			
Fence (382)	7a/7b	568 ft.	1/1/2025			
Fence (382)	7b/7c	544 ft.	1/1/2025			
Fence (382)	7c	72 ft.	1/1/2025			
Fence (382)	11	1509 ft.	1/1/2025			
Watering Facility (614)	7	2 each	1/1/2025			
Watering Facility (614)	11	2 each	1/1/2025			
Heavy Use Area Protection (561)	7	2 each	1/1/2025			
Heavy Use Area Protection (561)	11	2 each	1/1/2025			

* Conduct management practices annually during tillage and grazing activities.



Filter Strip (393)

A Filter Strip (393)³ is an area of herbaceous vegetation that removes contaminants from overland flow. Its purpose, in this case, is to reduce suspended solids and associated contaminants in runoff and excessive sediment in surface waters. This practice will be utilized on the downhill slope of Area #1 which is used for as a animal concentration area for alpacas.

The areas highlighted on the Conservation Plan Map and the figure below will be maintained as a Filter Strip (393). The filter strip will be established to permanent herbaceous vegetation. It will be able to withstand partial burial from sediment deposition. It will be suited to current site conditions and the intended use. And it will be able to achieve adequate density and vigor within an appropriate period to stabilize the sufficiently.



Location of filter strip downslope corner of Area #1 in Field 8 (Farmstead).

Management activities on filter strips (mowing, burning, or light disking), should not be done more often than every other year with frequency dependent on geographical location to maintain

³ Natural Resources Conservation Service, Conservation Practice Standard, Filter Strip Code 393, PA NRCS, January 2018



the purpose(s) of the practice. Management activities should be completed outside of the primary nesting season and should not be completed between April 1st and July 15th.

Filter Strip located in:

Field 8, Area #1, 0.04 ac; 48' x 72' x 72' (triangular)

Total, 0.04 ac

Implementation Requirements:

Area may require light tillage to prepare the seedbed. All areas to be seeded are to have a minimum 4-inch depth of topsoil. Apply and incorporate lime and fertilizer evenly at the rate shown or based on soil test results. Apply seed uniformly by hand, cyclone seeded, drill or cultipacker-seeder.

Mulch (straw) or turf reinforcement mat shall be applied or installed immediately after seeding. Mulch (straw) shall be applied at a rate that completely covers the soil surface and may be anchored by thoroughly wetting the entire surface. Irrigate as needed to establish a full stand.

Quantities

Hard Fescue 20 lbs/ac; 5 lbs pure live seed (PLS)

Perennial Ryegrass 10 lbs/ac; 2.5 lbs PLS

Red Clover 4 lbs/ac; 1 lb PLS

Limestone, ground 2 tons/ac; TBD according to soil test

Fertilizer, 10-10-10 500 lbs/ac; TBD according to soil test

Mulch, clean straw 2 tons/ac; 1000 lbs

Seeding Dates: Mar 1 to Apr 30

or Aug 1 to Oct 15

Only viable, high quality, and regionally adapted can be used for all species selected for planting.

Filter Strip Life Span Design for Sediment

The following tables identify that Filter Strip (393) meets the 10 year life span required for this conservation practice. Further, the filter strip should expect to be rebuilt after 13 years.

Nevertheless, the Filter Strips (393) should be checked periodically to ensure they remain functional. See Operation and Maintenance for specific instructions.



Customer Name:		Marty Firely			Tract Number:			
		ACA #2; 0.25 ac						
Planner Name:		John Kluthe			Field Number:		8	
Design Date:		May 30, 2024			Filter Strip Number:		1	
Step 1	Step 2	Step 3	Step 4	Calculated	Calculated	Calculated	Calculated	Calculated
Sed. Delivery to VFS (t/ac/yr)	Contributing Area (ac)	VFS (ac)	Sed. Leaving VFS (t/ac/yr)	Trapping Efficiency %	Sed. In VFS (Ft3/Yr)	Sed. Depth (in.) Accum/yr in VFS	Years to Accum 0.5 Ft.	Passes 10 yr Life
15	0.21	0.04	0.39	97%	1,668	0.459	13.1	YES
<i>RUSLE2 Profile Screen Capture:</i>								



Profile: default*

Location: USA\Pennsylvania\Montgomery County

Buttons: Add break, Erase break

Soil Topo

0 20 40 60 80 100 120 140 160 ft

0 5 10

Contouring: a. rows up-and-down hill

Man. strip builder: Man. strip builder

Strips/barriers: (none)

Diversion/terrace, sediment basin: (none)

Subsurface drainage: (none)

Adjust yields: Yields, Base yield

General yield level: Yields, Base yield

Adjust ext. res. additions: Residue inputs

Soil loss for cons. plan, t/ac/yr: 6.5

Sediment delivery, t/ac/yr: 0.39

Actual row grade, %: 6.0

Crit. slope length, ft: []

T value, t/ac/yr: 2.0

Fuel type for entire run: (none)

Equiv. diesel use for entire simulation, gal/ac: 0.0010

Fuel cost for entire simulation, US\$/ac: 0

Energy use for entire simulation, BTU/ac: 0.0014

Soil conditioning index: Soil conditioning index

Nitrogen leaching index: open

Soil | Topography | **Management** | Diversion and Terrace Location | Information | ADDITIONAL_OUTPUT | TRACK_RESIDUE_BIOMASS_AND_CANOPY_ |

Slope Management								
Segment	Management	Seg length (along slope), ft	Is this a rotation?	Duration, yr	Yrs offset from start year, yr	Soil loss, t/ac/yr	Sed. delivery, t/ac/yr	
1	FORAGES\Central Northeast FP2\Tall Fescue\Tall Fescue, severe continuous overgrazing*	110	Yes	1	0	15	15	
2	Strip/Barrier Managements\Cool season grass, not harvested	45	Yes	1	0	-34	0.39	

Operations | Info

Management Operations							
Date, m/d/y	Operation	Vegetation	Yield (harv. units), #/ac	Type of cover material	Cover from addition, %	Cover matl add/remove, lb/ac	Fuel used this operation
1/1/0	Begin growth	New Forages\Central Northeast\Tall Fescue, Central Northeast	1000				default
3/15/0	Grazing, continuous, high traffic, set season, rate						default
12/1/0	g. continuous, severe hoof traffic, set season, rate						default

Area #1 - Filter Strip Life Span Design for Sediment.

Operation And Maintenance

Control undesired weed species, especially State-listed noxious weeds.



Inspect the filter strip after storm events and repair any gullies that have formed, remove unevenly deposited sediment accumulation that will disrupt sheet flow, reseed disturbed areas and take other measures to prevent concentrated flow through the filter strip.

Apply supplemental nutrients as needed to maintain the desired species composition and stand density.

Periodically regrade and reestablish the filter strip area when sediment deposition at the filter strip-field interface jeopardizes its function. Reestablish the filter strip vegetation in regraded areas, if needed.



Mulching (484)

Mulching (484)⁴ is the act of applying plant residues or other suitable materials to the land surface. This practice is applied in this case to reduce the sheet and rill erosion of the ACA (Area #1). Use plant-based mulching materials, such as wood chips, of suitable quantity and quality to cover the soil surface and reduce the impact of rainfall and hoof traffic impacts. An evaluation of the system using the current approved soil conditioning index (SCI) procedure results in zero or higher; SCI = 0.58 with mulch added.

Use criteria for mulch:

- Apply 3000 yards per acre: 70 cubic yards per 1000 square feet.
- Do not incorporate.
- Must be distributed evenly across the area.
- Inspect the area annually, if mulch remains on the soil surface, it is not necessary to add additional material.

Evaluate the effects of mulching on evaporation, infiltration, and runoff. Mulch material may affect microbial activity in the soil surface, increase infiltration, and decrease runoff, erosion, and evaporation. The temperature of the surface runoff may also be lowered.

Mulch materials with low permeability may adversely affect the water needs of plants.

Consider mulching materials only if the selected mulching materials, and rates of application do not contribute to pest problems.

Mulching Operation And Maintenance

Manure in Animal Concentration Areas (ACAs) is required to be scraped and removed annually. Periodically inspect the mulched areas and reinstall mulch or repair as needed to accomplish the intended purpose.

Periodically inspect the boarder between the mulched area and the filter strip. Redistribute mulch that has gathered along the boarder of the Filter Strip (393).

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

Remove or incorporate mulch materials to be consistent with the intended purpose and site conditions.

Do not operate equipment near the mulched site that would compromise the intended purpose of the mulch.

Prevent or repair any fire damage to the mulch material.

⁴ Natural Resources Conservation Service, Conservation Practice Standard, Mulching Code 484, PA NRCS, June 2018



Properly collect and dispose of synthetic mulch material after intended use.
Monitor and control undesirable weeds in mulched areas.

Mulching (484) Implementation Requirements

(see following pages)



PA484- Mulching Implementation Requirements

Producer: Marty Firely
Location: 2782 Leidy Road, Gilbertville, PA 19525
Farm Name:

Project or Contract: conservation planning
County: Montgomery
Tract Number:

DEFINITION

Applying plant residues or other suitable materials to the land surface.

PURPOSE (check all that apply)

This practice is applied to achieve the following purpose(s):

- Improve the efficiency of moisture management
Reduce irrigation energy used in farming/ranching practices and field operations
Improve the efficient use of irrigation water
Prevent excessive bank erosion from water conveyance channels
Reduce concentrated flow erosion
Reduce sheet, rill, & wind erosion
Improve plant productivity and health
Maintain or increase organic matter content
Reduce emissions of particulate matter

PLANS AND SPECIFICATIONS

Practice Location Map see conservation plan maps

Field Number(s) Field 8, Area #1

Table with 3 columns: Extent (acres), Planned, Applied. Rows include: 1. Mulch material/type (wood chips), 2. Amount of mulch (70 cu. yds per 1000 sq. ft.), 3. Method of applying mulch (skid-steer loader), 4. Type of anchoring (none), 5. Anchor application rate (n/a).

Site preparation: Remove existing manure piles prior to applying mulch.
Application timing: Apply mulch during dry periods in the fall of the year - typically October.

Sketches and drawings attached as needed



PA484 – Mulching Implementation Requirements

OPERATION AND MAINTENANCE:

- Inspect areas periodically and reinstall mulch or repair as needed to accomplish the intended purpose .
- Evaluate the effectiveness of mulch application and adjust management when needed.
- Removal or incorporation of mulch materials will be consistent with the intended purposes and conditions.
- Avoid operation of equipment that compromises the intended purpose of the practice.
- Prevent or repair any fire damaged mulch material.
- Properly collect and dispose of artificial mulch material after intended use.
- Monitor and control undesirable weeds in the mulched areas.

NRCS Review Only

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

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.

Planner/Technical Service Provider & Date



Residue and Tillage Management, Reduced Tillage (345)

Residue and Tillage Management, Reduced Tillage (345)⁵ is managing the amount, orientation, and distribution of crop and other plant residues on the soil surface during the crop rotation while limiting soil-disturbing activities used to grow and harvest crops in systems where the field surface is tilled prior to planting. This practice is used to reduce sheet, rill, and wind erosion and excessive sediment in surface waters. Additional benefits include improving soil health, maintaining or increasing organic matter content, reducing tillage-induced particulate emissions, and reducing energy use.

This practice includes tillage methods commonly referred to as mulch tillage or conservation tillage where the entire soil surface may be disturbed by tillage operations such as chisel plowing, field cultivating, tandem disking, or vertical tillage. do not meet the soil tillage intensity rating (STIR) criteria for conservation practice Residue and Tillage Management, No Till (Code 329). Uniformly distribute residues over the entire field. Removing residue from the row area prior to or as part of the planting operation is acceptable. Do not burn residues, except for a light-to-moderate burn of sugarcane residue after harvest (as described in the wind and water erosion operations database). The STIR value shall include all soil disturbance field operations that are performed during the crop interval (i.e., from the time immediately following harvest or termination of one crop through harvest or termination of the next crop in the rotation, including fallow periods). The crop interval STIR value rating shall be no greater than 80, and no primary inversion tillage implements (e.g., moldboard plow) shall be used.

Carbon loss is directly related to the volume of soil disturbed, intensity of the disturbance and soil moisture content, and soil temperature at the time the disturbance occurs. The following guidelines can make this practice more effective:

- When deep soil disturbance is performed, such as by subsoiling or fertilizer injection, make sure the vertical slot created by these implements is closed at the surface.
- Planting with a single disk opener no-till drill will release less CO₂ and oxidize less organic matter than planting with a wide-point hoe/chisel opener seeder drill.
- Soil disturbance that occurs when soil temperatures are below 50° F will oxidize less organic matter and release less CO₂ than operations done when the soil is warmer.
- Maximizing year-round coverage of the soil with living vegetation and/or crop residues builds organic matter and reduces soil temperature, thereby slowing organic matter oxidation.
- Use a diverse crop rotation by incorporating multiple crop types (cool-season grass, cool-season legume/forb, warm-season grass, warm-season legume/forb) into the crop rotation.

⁵ Natural Resources Conservation Service, Conservation Practice Standard, Residue And Tillage Management, Reduced Till, Code 345, NRCS PA, June 2017



- Plant a cover crop after every cash crop in the rotation. Multispecies cover crop mixes provide greater benefits than single-specie cover crops.
- Using undercutting tools rather than burying tools will enhance the accumulation of organic material in the surface layer.

Conducting any soil-disturbing field operation when soil moisture is optimal, neither excessive nor too dry, will help maintain soil tilth, and reduce the need for additional tillage in the future.

Description of Work

Full-width tillage and operations will be performed using implements such as chisel plowing, field cultivating, tandem disking, vertical tillage, or ridge-till. The amount, orientation, and distribution of the crop residues on the soil surface will be managed to limit soil-disturbing activities used to grow and harvest crops. Specific tillage implements approved for this system can be found in the attached RUSLE2 reports.

To meet the NRCS conservation planning criteria for the practices the soil condition index (SCI) must be positive and the (STIR) value must be below 80.

Criteria

See the RUSLE2 report for general information regarding the amount of residue produced by each crop, residue orientation, surface disturbance and the field operations and amount of residue (pounds/acre or percent surface cover) required to accomplish the purpose, and the time of year it must be present.

Location	Crop Description ⁶	Planned erosion rate (tons/ac/yr)	Planned SCI value	Planned STIR value
Fields 1, 6, 9b, 10	Years 1 and 2, No-till corn and no-till soybeans, both followed by no-till cereal rye winter crop.	0.66	0.87	5.63
Fields 1, 6, 9b, 10	Years 3 and 4, Barley, preceded by sorghum sudan	2.7	0.35	36.6

⁶ Note: the cropping description is available for any/all crop fields to provide flexibility. Years 1 and 2 can be repeated indefinitely. Years 3 and 4 can be conducted independently of Years 1 and 2, and can be repeated indefinitely. All crop fields can remain in hay production indefinitely. Pumpkins can be grown in whole or partial fields and rotated as management decisions dictate.



	cover crop, followed by a buckwheat cover crop			
Fields 1, 6, 9b, 10	Pumpkins (no-till) w/ cereal rye winter crop, both established with no-till - conducted annually	2.0	0.54	5.78

Operation And Maintenance

- Evaluate/measure the crop residue cover and orientation for each crop to ensure the planned amounts and orientation are being achieved.
- Adjust management as needed to either plan a new residue amount or orientation; or adjust the planting, tillage, or harvesting equipment.
- If there are areas of heavy residue accumulation (because of movement by water or wind) in the field, spread the residue before planting so it does not interfere with the planter's operation.



Cover Crop (340)

A cover crop is grasses, legumes, and/or forbs planted for seasonal vegetative cover. Cover Crop (340)⁷ is applied primarily to reduce soil erosion from water and minimize soil compaction. Cover Crop (340) is necessary for this plan to meet conservation planning criteria.

- Fields (see Implementation Requirements)

PURPOSES OF COVER CROPS (Magdoff and Van Es pg. 139) The term “cover crop” generally refers to plants that are grown but not harvested. While this term is used generally, different types of plants are grown as cover crops to achieve a number of primary purposes:

Catching and cycling nutrients: typically grasses such as cereal rye and oats. Especially useful in high-nutrient environments.

Fixing nitrogen via a symbiotic relationship with Rhizobium bacteria (green manures): typically legumes (e.g., hairy vetch and red clover). Especially useful on organic farms or by others who want to “grow” their own nitrogen.

Smothering weeds: typically competitive, fast-growing species (e.g., buckwheat, sorghum-sudangrass, cereals) - especially useful when weed control is a challenge.

Biofumigating pests with glucosinolates and isothiocyanates: typically brassicas (e.g., mustards and radishes) - especially useful when growing disease-susceptible crops with limited chemical control.

Loosening compacted soil: typically strong-rooted crops (e.g., cereal rye, radishes, hairy vetch, alfalfa) - especially useful to improve a degraded soil.

Growing biomass and organic matter: typically fast-growing crops (e.g., sorghum-sudangrass, cereal rye, sunn hemp) - especially useful when soils are low in organic matter or when you aim to capture carbon.

Providing cover for the soil surface: typically crops that establish quickly during the off season to protect the soil, like rye or oats in cool climates.

Cereal rye plus Austrian winter pea or a single species cereal rye was used for planning purposes.

From Building Soils for Better Crops (Magdoff and Van Es pg. 145) “Cereal rye, also called winter rye, is very winter hardy and easy to establish. Its ability to germinate quickly, together with its winter hardiness, means that it can be planted later in the fall than most other species, even in cold climates. Decomposing residue of cereal rye has shown to have an allelopathic effect, which means that it can chemically suppress germination of small broadleaf weed seeds. It grows quickly in the fall and also grows readily in the spring. It is often the cover crop of choice as a catch crop and also works well with a roll-crimp

⁷ Natural Resources Conservation Service, Conservation Practice Standard Cover Crop, Code 340, NRCS NJ, May 2022



mulch system, in which the cover crop is terminated by rolling and crimping while the cash crop (for example, soybeans) is no-till planted or transplanted into the resulting mulch.”

Crop nutrient needs should also be considered: “If you’re growing a crop for which a reliable in-season adaptive method is available, like the PSNT, a sensor or a computer model, you can hold off applying most of the fertilizer until the crop indicates a need. At that point, apply N as a side-dress or topdress. However, if the soil is likely very nitrogen deficient (for example, a sandy soil low in organic matter), it may be necessary to band-apply higher-than-normal levels of starter nitrogen at planting or broadcast nitrogen before planting. This ensures sufficient nitrogen nutrition until a soil test can determine if additional nitrogen is needed, which can then be applied as a side-dress or topdress. About 15–20 pounds of starter N per acre (in a band at planting) is highly recommended for crops in colder climates. Even more starter N is needed when some cover crops like cereal rye or triticale are allowed to grow near maturity. The large amount of biomass, with its high C:N ratio, will tie up mineral sources of soil N for some weeks following cover crop termination (Magdoff and Van Es pg. 299).”

Multi-species cover crops may be a better choice. Here is an excerpt from Building Soils for Better Crops (Magdoff and Van Es) that includes discussion of oats, peas, and radish. From page 146, “Oats are another popular cover crop. Many farmers like to use spring oats for fall cover crop planting because they will not overwinter and thus don’t need spring termination. Summer or fall seedings, usually planted about a month before the last seeding date for cereal rye, will winterkill under most cold-climate conditions. This provides a naturally killed mulch the following spring and may help with weed suppression. As a mixture with one of the clovers, oats provide some quick cover in the fall. Oat stems help trap snow and conserve moisture, even after the plants have been killed by frost.”

From page 142, “Austrian winter peas (bred for winter hardiness) and Canadian field peas (bred for good spring growth) tend to establish quickly and grow rapidly in cool moist climates, producing a significant amount of residue: 2 1/2 tons or more of dry matter. They fix plentiful amounts of nitrogen, from 100– 150 or more pounds per acre. Austrian winter peas will perform best as a winter cover crop if seeded in early fall.”

From page 147, “Brassicas used as cover crops include mustard, rapeseed, oilseed radish, forage turnips and other species. They are increasingly used as winter or rotational cover crops in vegetable and specialty crop production, such as potatoes and tree fruits.”

And from page 147 - 148, “Oilseed (forage) radish has gained a lot of interest because of its fast growth in late summer and fall, which allows significant uptake of nutrients. It develops a large taproot, 1–2 inches in diameter and a foot or more deep, that can break through compacted layers, allowing deeper rooting by the next crop (Figure 10.6). Oilseed radish will winterkill and decompose by spring, but it leaves the soil in friable condition with remnant root holes that improve rainfall infiltration and storage. It also eases root penetration and development by the following crop. All of the brassicas get much better growth as fall cover crops if planted in late summer or early fall.”



Read Chapter 10: Cover Crops in Building Soils for Better Crops for important information about choosing and managing cover crops.

<https://www.sare.org/wp-content/uploads/Building-Soils-for-Better-Crops.pdf>

Operation and Maintenance

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.



Cover Crop (340) Implementation Requirements

(see following pages)



PA340 – Cover Crop
Implementation Requirements

Producer: Marty Firely **Project or Contract:** Conservation Planning
Location: 2782 Leidy Rd, Gilbertsville, PA **County:** Montgomery Co
Farm Name: _____ **Farm/Tract Number:** _____

COVER CROP Grasses, legumes, and forbs planted for seasonal vegetative cover.

PURPOSE(s): (Check at least one and all that apply)

- | | |
|---|---|
| <input checked="" type="checkbox"/> Reduce erosion from wind and water. | <input type="checkbox"/> Suppress excessive weed pressures and break pest cycles. |
| <input type="checkbox"/> Maintain or increase soil health and organic matter content. | <input type="checkbox"/> Improve soil moisture use efficiency. |
| <input type="checkbox"/> Minimize soil compaction | <input type="checkbox"/> Reduce water quality degradation by utilizing excessive soil nutrients. (scavenging) |

Brief description of planned cover crop management.

- Pumpkins followed by cereal rye cover crop.
- Burndown and/or roller crimp cereal rye.
- No-till drill pumpkins into mulch created by cereal rye cover crop.

- Corn/Soybeans, both notill, both followed by a cereal rye winter crop
- Barley, preceded by a sorghum sudan cover crop and followed by buckwheat a cover crop.

PLANS AND SPECIFICATIONS: *Cover Crop Management* The following table provides cover crop information for each field. Mixtures are described one individual species per line. Add species to total the 100% mix rate.

Field #	Acres	Species	Seeding Rate (lbs/ac)	Seeding Date Range (Table 3) ¹	Seeding Method	Termination Date or Stage	Termination Method
1, 6, 9, 10	11.2	sorghum sudan	35-40	May 15 - June 15	drill	prior to planting barley	disk
1, 6, 9, 10	11.2	buckwheat	50-60	June 15 – August 15	drill	10 days post-flower barley	disk
1, 6, 9, 10	11.2	cereal rye	126	Sept 15 - Oct 31	drill	Prior to planting pumpkins	spray & roller crimp



1. Seeding date ranges are listed in Table 3 of the Cover Crop 340 Practice Guide. Use FALL SEEDING DATE for Erosion Reduction Purpose

Field #	Acres	Species	Seeding Rate (lbs/ac)	Seeding Date Range (Table 3) ¹	Seeding Method	Termination Date or Stage	Termination Method

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.

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.

Planner / Technical Service Provider: X _____

Date: _____

NRCS Use Only	
Designed By: _____	Date _____
Approved By: _____	Date _____



Prescribed Grazing (528)

Location: Fields 7, 11, and 8 (area #2)

Prescribed Grazing⁸ is the livestock management conservation practice that manages the harvest of vegetation with grazing and/or browsing animals with the intent to achieve specific ecological, economic, and management objectives. Its purpose in this plan is to:

- Improve or maintain desired species composition, structure and/or vigor of plant communities
- Improve or maintain quantity and/or quality of forage for grazing and browsing animals' health
- Improve or maintain surface and subsurface water quality and quantity
- Reduce soil erosion, and maintain or improve soil health.

Benchmark forage/livestock system

The Firely Farm does not currently have cattle, but they plan to acquire cows in the near future. Presently, there is one field designated for pasture use: Field 7, which is 4.0 acres. Fencing and water infrastructure will need to be installed in this field to support the new livestock.

Existing resource concerns

- Field 8, Farmstead Area #1 must be flash grazed to meet manure management rules associated with Pennsylvania regulation. It should be kept in 70% vegetation.
- Area 7b
 - Area 7b previously experienced gully erosion, but the gullies have since stabilized and are now covered with grass and vegetation. To prevent the gullies from head-cutting again, Area 7b will need to be managed with flash grazing.
- Areas 7a, 7c, and Field 11: Opportunities to enhance resource condition.
 - Improve pasture/browse management: Implement rotational grazing practices that involve dividing the grazing area into smaller paddocks and regularly rotating the cattle. This allows for better utilization of pasture/browse resources, prevents overgrazing, and promotes healthier vegetation growth.
 - Extend grazing rotations: Increase the duration of rest periods between livestock rotations in each paddock. This allows the vegetation to recover and promotes more robust regrowth, leading to improved forage quality and quantity.
 - Utilize multiple grazing cells: Divide the grazing area into multiple cells or paddocks and rotate the cattle through them in a planned sequence. This

⁸ Natural Resources Conservation Service, Conservation Practice Standard, Prescribed Grazing, Code 528, NRCS, PA, January 2018



enables longer rest periods for each cell, providing ample time for vegetative rejuvenation.

- i. Strip grazing:
 - Implement strip grazing within all paddocks - except Field 7b; where flash grazing will be used.
 - Divide pastures into narrower strips: Instead of rotating cattle through entire paddocks, use temporary fencing to create narrower strips within each paddock. This restricts cattle access to a smaller area at a time, ensuring more efficient forage utilization.
 - Increase rest periods: With strip grazing, cattle are moved to a new strip once they have grazed the available forage in the current strip. This allows for longer rest periods in ungrazed sections, allowing the vegetation to recover and promoting better regrowth.
- Monitor forage availability: Regularly assess the forage availability and adjust the rotation schedule accordingly. This ensures that the cattle have an adequate supply of nutritious forage during their grazing periods while allowing for sufficient rest periods for regrowth.
- Implement a flexible grazing plan: Adapt the rotation frequency based on the growth rate of the forage and the nutritional needs of the cattle. Adjust the rotation schedule to maintain an optimal balance between forage utilization and rest periods.
- Monitor cattle condition: Regularly evaluate the body condition of the cattle to determine if adjustments to the rotation frequency are necessary. If the cattle are not achieving desired weight gains or if the pasture shows signs of overgrazing, consider modifying the rotation intervals.
- Plan for seasonal variations: Account for seasonal changes in forage growth rates and adjust the rotation frequency accordingly. During periods of slower growth, it may be necessary to extend the rest periods to ensure sustainable pasture/browse management.

Alternatives for resource enhancement

Should the gullies start head-cutting again after cattle are introduced, further conservation measures may be necessary. These measures could include Streambank and Shoreline Protection, NRCS practice code 580. The primary purposes being to prevent the loss of land or damage to land uses or facilities adjacent to the banks of streams or constructed channels - and to - reduce the offsite or downstream effects of sediment resulting from bank erosion.

Producers goals

1. Expand livestock operations by acquiring cattle.
2. Implement sustainable agricultural practices.



3. Maintain and improve soil health and prevent erosion.
4. Ensure efficient use of water resources.
5. Enhance farm productivity and resilience.
6. Establish infrastructure for livestock, including fencing and water systems.
7. Promote animal welfare and environmental sustainability.
8. Engage with the community through educational opportunities.
9. Integrate crop and livestock systems for better resource efficiency.
10. Monitor and address any erosion issues, particularly in Area 7b, with appropriate conservation measures if needed.

Completed PCS worksheet



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Pasture Condition Score Sheet

Operator: MARTY FREELY	Date: 5/30/2024
Evaluator: JOHN KLUTHE	Pasture ID:
Soils (ESD(s) and/or PSP(s))	Livestock type: N/A
Current Season's Precipitation (check one): <input type="checkbox"/> Above Normal <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Below Normal	
Seasonal Temperature Tends (check one): <input type="checkbox"/> Above Normal <input checked="" type="checkbox"/> Normal <input type="checkbox"/> Below Normal	

Evaluate the site and rate each indicator based upon your observations. Scores for each indicator may range from 1 to 5. Sum the indicator scores to determine overall pasture condition score.

Indicator	1 Point	2 Points	3 Points	4 Points	5 Points	Score
Percent Desirable Plants* (Dry Weight, for Livestock Type)	Desirable species <20% of stand.	Desirable species 20-40% of stand.	Desirable species 41-60% of stand.	Desirable species 61-80% of stand.	Desirable species exceed 80% of stand.	4
Percent Legume by Dry Weight	<5% OR >50% bloating legumes	5-10% legumes OR >40% bloating legume.	11-20% legumes.	21-30% legumes.	31-40% legumes. No grass loss; grass may be increasing.	1
Live (includes dormant) Plant Cover	Less than 40% is live leaf canopy. Remaining is either dead standing material, or bare ground.	40-65% is live leaf canopy. Remaining is either dead standing material, or bare ground.	66-80% live leaf canopy. Remaining is either dead standing material, or bare ground.	81-95% live leaf canopy. Remaining is either dead standing material, or bare ground.	More than 95% live (non-dormant) leaf canopy. Remaining is either dead standing material, or bare ground.	3
Plant Diversity by Dry Weight (*See footnote at bottom of page)	Diversity: Very low	Diversity: Low	Diversity: Moderate	Diversity: High	Diversity: Very high	3
	<50% desirable species	2 dominant desirable species in 1 functional group	3 dominant desirable species in 1 functional group	4 dominant desirable species in 2 functional groups	4 dominant desirable species in 3 functional groups	
	OR 1 dominant desirable species in 1 functional group OR No dominant desirable species and all minor species in each functional group totaling <15%	OR 2 functional groups each represented by minor species totaling ≥15%	OR 2-3 dominant desirable species in 2 functional groups OR 3 functional groups each represented by minor species totaling ≥15%	OR 3 dominant desirable species in 3 functional groups OR 3 dominant desirable species in 2 functional groups AND 1 additional functional group represented by minor species totaling ≥15%	OR 4 dominant desirable species in 2 functional groups AND 1 additional functional group represented by minor species totaling ≥15%	
Plant Residue and Litter as Soil Cover (Full back canopy)	Bare soil is very easily seen. There is <20% cover on the soil surface or it is excessive, and slow to break down.	Openings of bare soil can be seen fairly easily. Soil cover is 21-40%	Small openings of bare soil can be seen, but minimal. Soil cover is 41-60%	No bare soil is easily seen. Soil cover is 61-80%	No bare soil is seen. Soil cover is >80% with good biological activity and decomposition of older residue.	4
Grazing Utilization and Severity	Pasture is overgrazed throughout.	Pasture consists primarily of overgrazed and/or refused areas (former dung areas, older plants, undesired plants)	Pastures show uneven grazing throughout with heavier grazing near water or feeding areas, or distinct zone grazing.	Pasture grazed evenly throughout with minimal overgrazing with some undergrazed small areas and heavier use near water sources.	Pasture grazed evenly throughout with no overgrazing.	N/A

*Use NRCS plant list for livestock species. Functional groups are as appropriate for your state (cool-season grasses, legumes, warm-season grasses, non-leguminous forbs). Any time there are more undesirables than desirables, it will be 1 point. Desirable species must total more than 50% of the total biomass. Dominant species are ≥15%. Functional groups must be ≥15% of stand to be counted.



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Natural Resources Conservation Service

Indicator	1 Point	2 Points	3 Points	4 Points	5 Points	Points
Livestock Concentration Areas (If field <1 acre, see ** footnote)	Livestock concentration areas are within 100 feet of, or are a direct conveyance to surface water, and cover more than 0.1 acre, including trails.	Livestock concentration areas are within 100 feet of, or are a direct conveyance to surface water, and cover less than 0.1 acre, including trails.	Livestock concentration areas are farther than 100 feet from and are not a direct conveyance to surface water, and cover more than 0.1 acre, including trails.	Livestock concentration areas are farther than 100 feet and are not a direct conveyance to surface water, and cover less than 0.1 acre, including trails.	Livestock concentration areas including trails, not present.	N/A
Soil Compaction and Soil Regenerative Features (** See footnote at bottom of page)	Compaction: Dense or thick platy layer very distinct.	Compaction: Dense or moderate platy layer noticeable.	Compaction: Thin dense or platy layer still present.	Compaction: Minor dense or platy layer, good aggregates common (crumbly soil).	Compaction: No dense or platy layers, crumbly soil throughout.	4
	Roots: Dominantly horizontal; most shallow/sparse.	Roots: Numerous horizontal; moderate amount shallow/sparse.	Roots: Some horizontal with increasing downward.	Roots: Few horizontal, more downward through the soil profile.	Roots: Abundant growth primarily downward through the soil profile.	
	Color: Surface horizon same as subsoil.		Color: Surface horizon moderately darker than subsoil.		Color: Surface horizon dramatically darker than subsoil.	
	Soil Life: Few or no signs.	Soil Life: Signs scattered in surface layer.	Soil Life: Signs scattered throughout.	Soil Life: Signs numerous throughout.	Soil Life: Signs abundant throughout.	
Plant Vigor	No plant recovery after grazing/harvest. Pale, yellow or brown, or severe stunting of desirable forage.	Some recovery. Yellowish green forage, or moderately or slight stunting of desirable forage.	Adequate recovery of desirable forage. Yellowish and dark green areas due to manure and urine patches.	Good recovery of desirable forage. Light green and dark green forage present.	Rapid recovery of desirable forage. All healthy green forage.	3
Erosion (Circle all that apply, the overall indicator score will be the lowest rating indicated)	Sheet and Rill: Plant density is insufficient to stop runoff, with poor infiltration. Erosion easily visible throughout pasture.	Sheet and Rill: Plant density slows runoff. Erosion present and easily seen on steeper terrain.	Sheet and Rill: Plant density good and runoff moderate. If present, erosion concentrated on heavily used areas.	Sheet and Rill: Plant density high, runoff low/good infiltration. May have evidence of past erosion if present.	Sheet and Rill: Plant density high, no runoff, good infiltration. No evidence of present or past erosion.	3
	Wind: Severe scoured areas and deposition throughout.	Wind: Scoured areas common, deposition affecting plants.	Wind: Occasional scoured areas, litter windrowed.	Wind: Minimal soil exposed, some detached vegetation windrowed, minor plant damage.	Wind: No exposed soil.	
	Streambank and/or Shoreline: Banks bare, major sloughing, no bank vegetation.	Streambank and/or Shoreline: More than half the bank vegetation trampled, sloughing.	Streambank and/or Shoreline: Less than half the bank vegetation trampled, eroding at crossing/entrances.	Streambank and/or Shoreline: Eroding at crossings/entrances, all the bank vegetation is intact and banks are stable.	Streambank and/or Shoreline: Vegetation intact and stable, hardened crossings and alternative water sources used.	
	Gully: Very large mass movement, caving sides.	Gully: Advancing upslope, increasing fingering extensions.	Gully: Not all active but extensions present.	Gully: Stable with vegetative cover.	Gully: None, drainage ways vegetative.	

** If field size is less than 1 ac. Use 10% of field size in place of 0.1 acre. *** Use a shovel. Root and Compaction subindicators are primary and should be considered first. Soil color and soil life are secondary subindicators which can be considered where applicable.

Overall Pasture Condition Score	Individual Indicator Score	Management Change Suggested
45 to 50	5	No changes in management needed at this time.
35 to 45	4	Minor changes would enhance, do most beneficial first.
25 to 35	3	Improvements would benefit productivity and/or environment.
15 to 25	2	Needs immediate management changes, high return likely.
10 to 15	1	Major effort required in time, management and expense.

Overall Pasture Condition Score = 3

Comments/Notes:



U.S. Department of Agriculture
Natural Resources Conservation Service

Pasture Condition Score Sheet

Operator:					Date:	
Evaluator:					Pasture ID:	
Soil(s), ESD(s) and or FSG(s):			Livestock type:			
Current Season's Precipitation (check one)		Above Normal	Normal	Below Normal		
Seasonal Temperature Trend (check one)		Above Normal	Normal	Below Normal		
Evaluate the site and rate each indicator based upon your observations. Scores for each indicator may range from 1 to 5. Sum the indicator scores to determine overall pasture condition score.						
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Percent Legume by Dry Weight	<5% OR >50% bloating legumes.	5-10% legumes OR >40% bloating legume.	11-20% legumes.	21-30% legumes.	31-40% legumes. No grass loss; grass may be increasing.	
Live (includes dormant) Plant Cover	Less than 40% is live leaf canopy. Remaining is either dead standing material, or bare ground.	40-65% is live leaf canopy. Remaining is either dead standing material, or bare ground.	66-80% live leaf canopy. Remaining is either dead standing material, or bare ground.	81-95% live leaf canopy. Remaining is either dead standing material, or bare ground.	More than 95% live (non-dormant) leaf canopy. Remaining is either dead standing material, or bare ground.	
Plant Diversity by Dry Weight (*See footnote at bottom of page)	Diversity: Very low <50% desirable species OR 1 dominant desirable species in 1 functional group OR No dominant desirable species and all minor species in each functional group totaling <15%	Diversity: Low 2 dominant desirable species in 1 functional group OR 2 functional groups each represented by minor species totaling ≥15%	Diversity: Moderate 3 dominant desirable species in 1 functional group OR 2-3 dominant desirable species in 2 functional groups OR 3 functional groups each represented by minor species totaling ≥15%	Diversity: High 4 dominant desirable species in 2 functional groups OR 3 dominant desirable species in 3 functional groups OR 3 dominant desirable species in 2 functional groups AND 1 additional functional group represented by minor species totaling ≥15%	Diversity: Very high 4 dominant desirable species in 3 functional groups OR 4 dominant desirable species in 2 functional groups AND 1 additional functional group represented by minor species totaling ≥15%	
	Plant Residue and Litter as Soil Cover (Pull back canopy)	Bare soil is very easily seen; OR There is <20% cover on the soil surface or it is excessive, and slow to break down.	Openings of bare soil can be seen fairly easily; OR Soil cover is 21-40%.	Small openings of bare soil can be seen, but minimal; OR Soil cover is 41-60%.	No bare soil is easily seen; OR Soil cover is 61-80%.	No bare soil is seen; OR Soil cover is >80% with good biological activity and decomposition of older residue.
Grazing Utilization and Severity	Pasture is overgrazed throughout.	Pasture consists primarily of overgrazed and/or refused areas (former dung areas, older plants, undesired plants).	Pastures show uneven grazing throughout with heavier grazing near water or feeding areas, or distinct zone grazing.	Pasture grazed evenly throughout with minimal overgrazing with some under grazed small areas and heavier use near water sources.	Pasture grazed evenly throughout with no overgrazing.	

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	Soil Life: Few or no signs.	Soil Life: Signs scattered in surface layer.	Soil Life: Signs scattered throughout.	Soil Life: Signs numerous throughout.	Soil Life: Signs abundant throughout.	
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	Wind: Severe scoured areas and deposition throughout;	Wind: Scoured areas common, deposition effecting plants;	Wind: Occasional scoured areas, litter windrolled;	Wind: Minimal soil exposed, some detached vegetation windrolled, minor plant damage;	Wind: No exposed soil;	
	Streambank and/or Shoreline: Banks bare, major sloughing, no bank vegetation;	Streambank and/or Shoreline: More than half the bank vegetation trampled; sloughing.	Streambank and/or Shoreline: Less than half the bank vegetation trampled; eroding at crossing/entrances.	Streambank and/or Shoreline: Eroding at crossings, entrances; all the bank vegetation is intact and banks are stable.	Streambank and/or Shoreline: Vegetation intact and stable, hardened crossings and alternative water sources used;	
	Gully: Very large mass movement, caving sides.	Gully: Advancing upslope, increasing fingering extensions.	Gully: Not all active but extensions present.	Gully: Stable with vegetative cover.	Gully: None, drainage ways vegetative.	

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Overall Pasture Condition Score	Individual Indicator Score	Management Change Suggested
45 to 50	5	No changes in management needed at this time.
35 to 45	4	Minor changes would enhance, do most beneficial first.
25 to 35	3	Improvements would benefit productivity and/or environment.
15 to 25	2	Needs immediate management changes, high return likely.
10 to 15	1	Major effort required in time, management and expense.

Overall Pasture Condition Score =

Comments/Notes:



Grazing Guidelines outlined in grazing plan (includes minimum grazing heights and rest periods based on forage species).

- Opportunities to enhance resource conditions.
 - Improve pasture/browse management: Implement rotational grazing practices that involve dividing the grazing area into smaller paddocks and regularly rotating the cattle. This allows for better utilization of pasture/browse resources, prevents overgrazing, and promotes healthier vegetation growth.
 - Extend grazing rotations: Increase the duration of rest periods between livestock rotations in each paddock. This allows the vegetation to recover and promotes more robust regrowth, leading to improved forage quality and quantity.
 - Utilize multiple grazing cells: Divide the grazing area into multiple cells or paddocks and rotate the cattle through them in a planned sequence. This enables longer rest periods for each cell, providing ample time for vegetative rejuvenation.
 - i. Strip grazing:
 - Divide pastures into narrower strips: Instead of rotating cattle through entire paddocks, use temporary fencing to create narrower strips within each paddock. This restricts cattle access to a smaller area at a time, ensuring more efficient forage utilization.
 - Increase rest periods: With strip grazing, cattle are moved to a new strip once they have grazed the available forage in the current strip. This allows for longer rest periods in ungrazed sections, allowing the vegetation to recover and promoting better regrowth.
 - Monitor forage availability: Regularly assess the forage availability and adjust the rotation schedule accordingly. This ensures that the cattle have an adequate supply of nutritious forage during their grazing periods while allowing for sufficient rest periods for regrowth.
 - Implement a flexible grazing plan: Adapt the rotation frequency based on the growth rate of the forage and the nutritional needs of the cattle. Adjust the rotation schedule to maintain an optimal balance between forage utilization and rest periods.
 - Monitor cattle condition: Regularly evaluate the body condition of the cattle to determine if adjustments to the rotation frequency are necessary. If the cattle are not achieving desired weight gains or if the pasture shows signs of overgrazing, consider modifying the rotation intervals.
 - Plan for seasonal variations: Account for seasonal changes in forage growth rates and adjust the rotation frequency accordingly. During periods of slower



growth, it may be necessary to extend the rest periods to ensure sustainable pasture/browse management.

- Location and condition of structural improvements such as fences, water developments, etc., including seasonal availability and quality of watering sites.
 - Planned perimeter fences around Field 7 would benefit from being reinforced with energized wire.
 - Water that is supplied from a well.
 - i. Water, a crucial nutrient, is often underestimated in its importance. On average, yearlings require 7 gallons of water per day, depending on factors such as diet, intake, and weather conditions. Insufficient water intake can significantly impact animal performance, making it more critical than any other nutrient deficiency. Therefore, ensuring adequate water supply is paramount for maintaining the health and vitality of any cattle operation.
 - See conservation plan maps.
- Forage inventory of the expected forage quality, quantity, and species in each management unit(s).
 - Fields 7 and 11
 - i. Forage Quality
 - At least three forage species from one functional group.
 - ii. Forage Quantity
 - Canopy: 60-80%, Basal area 35-50+%, spot grazing which results in some loss of photosynthetic potential.
 - iii. Species
 - Perennial Ryegrass (*Lolium perenne*)
 - Tall Fescue (*Festuca arundinacea*)
 - Fine Fescue (*Festuca* spp.)
 - Orchardgrass (*Dactylis glomerata*)
 - **Minimum grazing height is 3". The end of the grazing period is when the forage still has enough leaf area to grow from photosynthesis rather than relying on root reserves.**
- Forage-animal balance is developed for the grazing plan that ensures forage produced or available meets the forage demand of livestock and/or wildlife.
 - On a per acre basis, a rotational grazing system should handle 1000 lb. Therefore, 6.7 acres should handle twelve to fourteen 500 lb (average) backgrounding calves. Area 7b should be used for flash grazing only.
 - With good grazing management, the farm may be able to increase the animal numbers, depending on factors such as forage availability, weather conditions, and supplemental feed/forage.



- A grazing plan has been developed for livestock, detailing periods of grazing, rest, and other treatments for each management unit. This plan allows for flexibility and adaptive management, as supported by the contingency and monitoring plans, to meet the farm's goals and objectives. The contingency plan outlines potential problems (such as drought, flooding, and insects) and guides adjustments in grazing practices to mitigate resource and economic impacts.
 - 210 days grazing
 - i. Overwintering; not applicable
 - ii. Grazing season, April through October 210 days rotated between areas in Field 7.
 - Contingency Plan
 - i. Move the calves into the livestock area of the Blue Barn when grazing conditions place the soil or plant resources at risk.
- A monitoring plan has been created with protocols and records to assess if the grazing strategy is meeting our goals and objectives. Both short-term and long-term monitoring will help determine outcomes and support timely adaptive management. Key areas, plants, and other indicators will be evaluated to guide grazing management decisions.
 - A grazing monitoring plan involves establishing criteria to assess the health and productivity of the grazing system. Here are some criteria to consider:
 - i. Forage Utilization: Check how much forage is used by observing the leftover stubble after grazing. Set targets for the desired amount of forage used based on the plants and ecosystem goals. Monitoring helps avoid overgrazing or underuse, promoting forage regrowth and long-term productivity. Keeping grasses and legumes from seeding and leaving enough leaf area after grazing improves regrowth, forage quality, grazing seasons, weed control, erosion prevention, and biodiversity, supporting pasture health.
 - ii. Animal Performance: Monitor the well-being of grazing animals by observing weight gain, body condition, and reproduction rates. These factors indicate whether the animals are receiving adequate nutrition. Animal performance reflects the availability of forage and the effectiveness of the grazing plan.
 - iii. Plant Health and Diversity: Keep an eye on plant health and variety. Look for signs of stress like bare spots or weeds taking over. Check if there are enough good plants and how they change over time. Having a mix of plants helps the land bounce back and provides food for animals.
 - iv. Soil Health: Check soil health indicators like organic matter, moisture, compaction, and nutrients. Healthy soil helps plants grow and keeps



nutrients available, which is important for grazing. Regular soil tests can show what the soil needs.

- v. **Water Quality and Availability:** Make sure water in the grazing area is clean and enough for animals and wildlife. Watch out for pollution or erosion that could harm the water. Water is crucial for animal health and eating grass.

Contingency statement

Contingency Statement for Grazing:

If grass availability is reduced due to weather, soil conditions, or other factors, relocate the cattle to the current dairy freestall barn (Blue Barn). Do not graze pastures that do not have enough forage available.

Prescribed Grazing Operation and Maintenance

Operation:

- Prescribed grazing will be applied on a continuing basis throughout the livestock occupation period of all planned grazing units.
- Adaptive management decisions will be made as needed and documented within the plan to ensure that the goals and objectives of the prescribed grazing strategy are met.

Maintenance:

- Monitoring data and grazing records will be used on a regular basis within the prescribed grazing plan to ensure that objectives are being met, or to make necessary changes in the prescribed grazing plan to meet objectives.
- All facilitating and accelerating conservation practices: e.g., Fence (382), that are needed to effect adequate grazing and/or browsing distribution as planned by this practice standard will be maintained in good working order and operated as intended.



Prescribed Grazing Technical Reference
(see following pages)



New Jersey Prescribed Grazing Technical Reference

Contents

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The information in this technical reference is based on typical estimations. These charts can be used as a baseline to prepare prescribed grazing plans. The management of each operation will greatly impact the actual production, utilization, and intake of the fields and livestock. The monitoring and management of fields and livestock condition will be the most important aspect of the grazing plan. Producer understanding and knowledge of the management and monitoring is essential to the success of the grazing operation.

Actual values should be used, if reliable. If values are used that differ from producer knowledge and typical values in this reference explain in the plan where the values were derived.

Definitions

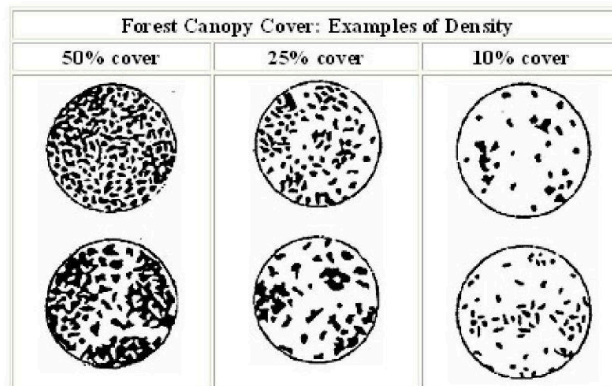
Forage-based Plan – The nutrients deposited on the site by the animals, in accordance to the prescribed grazing plan will not have an impact on the environmental conditions of the site. The animals will be limited to grazing periods based on the forage balance.

Nutrient-based Plan – The grazing animals have a potential to impact environmental conditions due to the site conditions and the amount of manure the animals will deposit in the pastures. This plan will limit grazing periods based on the nutrient balance of each field.

Pasture – Land composed of introduced or domesticated native forage species that is used primarily to produce livestock by providing in-field forages. Pastures receive *periodic* renovation and cultural treatments, such as tillage, fertilization, mowing, weed control, and may be irrigated. Pastures are not in rotation with crops and have less than 25% tree/shrub canopy.

Silvopasture – Land that is intensely managed for growing perennial grasses or grass mixes in a forest stand for livestock pastures. Silvopastures will have between 25% and 50% tree/shrub canopy, depending on the shade tolerance of existing and/or planned forages. Canopy cover can be determined by using the most current GIS imagery (leaf-on photography) or by in-field estimations.

This is a visual example of canopy cover at 10, 25, and 50%. For cases where the canopy cover percentage cannot be determined, request assistance from your Biologist.





Daily Water Requirements by Animal Type

When planning a pasture system, utilize water sources, if possible, to distribute animals evenly in the pastures/paddocks. Water should be located to minimize travel distances to 900 feet or less from any one point in the pasture the water source is servicing. Refer to Table 1 for approximate water requirements. Water requirements may fluctuate during the year based on animal diet and weather conditions.

TABLE 1: DAILY WATER REQUIREMENTS BY ANIMAL TYPE	
SPECIES	GALLONS/HEAD/DAY
Lactating Dairy (based on production)	25-35
Cow/calf pair	12
Yearling steers/heifers	12
Horses	12
Yearling horses	12
Sheep/goats/llamas	2
Swine	4

Dry Matter Intake Requirements as a Percentage of Body Weight/Day

Use Table 2 to determine the typical dry matter intake requirements/animal/day. High performance animals such as show stock and high-quality breeding stock may require a higher intake than represented in the chart.

TABLE 2: DRY MATTER INTAKE REQUIREMENTS AS PERCENTAGE OF BODY WEIGHT PER DAY		
Species	Condition	Daily Requirement (%)
Beef Animals	Maintenance	2.5
	Cows with calves, growing heifers	3.0 – 4.0
	Feeders and Finishers	3.0 – 3.5
Sheep	Weaned Lambs	4.0
	Maintenance	1.8 – 2.0
	Lactating	2.5 – 4.0
Horses	Maintenance	2.0
Goats	Maintenance	1.8 – 2.0
	Lactating	5.0
Dairy Cows	Maintenance	2.4
	Lactating - TMR	4.0
	Lactating – Pasture Only	3.0



Heights and Yields for Common Species Used in Grazing Systems

Refer to Table 3 when writing Prescribed Grazing Plans for guidance on when to allow animals to enter a paddock for grazing and when to rotate the animals out of the paddock. Estimated yields can be referenced in the absence of actual yield data.

PASTURE TYPE	HEIGHT IN INCHES		QUALITY (lbs. DM/ac.)*		
	Turn In Height	Residual Height	Good	Poor	Overgrazed
Kentucky Bluegrass	4-6	3	4500	2000	1000
Smooth Bromegrass	6-8	3-4	6500	3000	1500
Orchardgrass	8-12	3-6	8000	3000	1500
Ryegrass	6-12	3-4	7500	4000	2000
Tall Fescue	6-8	4	8000	3000	1750
Timothy	8	4	7000	2000	1500
Alfalfa/Grass	6-8	3-4	10000	4500	2250
Orchardgrass/Clover	6-8	3-4	6500	3000	1500
Birdsfoot Trefoil/Grass	6	3-4	8500	3500	1750
Ryegrass/Clover	6	3	6000	2750	1375
Tall Fescue/Clover	6-8	3-4	6000	3000	1500
Red Clover/Grass	4-7	3-4	9000	6000	3000
Alfalfa	6	3-4	8000	4000	2000
White Clover (Ladino)	6-8	2-3	2500	1000	500
Switchgrass	18-12	8-12	8500	7000	
Sorghum-Sudangrass	20-24	8-12	9000	7000	
Small Grains	8-12	4	3500	1500	
Corn	18-30	10	10000	5000	
Brassicas (spring seeding)	30 days after planting		10000	5000	
Brassicas (summer seeding)	30 days after planting		9000	4000	
Pearl Millet	20-24	8-12	10000	4000	
Corn Stover**			6000	3000	
Soybean Residue**			2000	1000	

*Soil types and grazing management will affect the yield potential of each pasture. Soils with inherently low productivity should use the "poor" values.
 **Accurate crop residue amounts based on actual yield can be found in RUSLE2.



Estimated Forage Yield Per Acre/Inch for Non-Irrigated Lands

Use Table 4 to determine the amount of forage available per rotation based on the turn-in and turn-out heights of each pasture. Turn-in and turn-out heights are based on information from Table 3.

TABLE 4: ESTIMATED FORAGE YIELD PER ACRE/INCH FOR NON-IRRIGATED LANDS*		
Tons DM /acre/year	lbs. DM/acre/year	Forage yield/acre-inch
4.5	9000	300
4	8000	270
3.5	7000	230
3	6000	200
2.5	5000	170
2	4000	130
1.5	3000	100

*Estimations are based on 5 rotations/year, harvesting an average of 6 inches each rotation.

Utilization Rate Based on Length of Occupation

Use Table 5 to determine the typical utilization rate according to the days allowed in each pasture per rotation. In cases where multi-species are grazing, a 5 – 10% increase in utilization may be observed. Increased utilization rates are based on the type of forage in the pasture and the type of animals that will be grazed together.

TABLE 5: UTILIZATION RATE BASED ON LENGTH OF OCCUPATION	
Length of Occupation (days)	Utilization Rate (%)
1 or less	80
2 – 3	75
4	70
5	65
6	60
7	50
14	40
Continuous – low stocking density	35
Continuous – high stocking density (overgrazed)	90



Rest Periods for Cool Season Pastures

Table 6 can be used for determining approximate rotations for each pasture based on typical weather conditions. Site monitoring must be used to make field by field decisions of when to rotate animals in and out of pastures based on forage heights. This table can provide the producer guidance in determining periods where excess forage may occur and determining confinement periods during the grazing season. To be conservative, use the higher end of the ranges during planning.

TABLE 6: REST PERIODS FOR COOL SEASON PASTURES			
SEASON	WEATHER CONDITIONS	GROWTH RATE	REST PERIOD
Spring	Cool, moist	Fast	10-14 days
Spring	Warm, dry	Medium	14-20 days
Summer	Hot, moist	Slow	30-35 days
Summer	Hot, dry	Very slow	40-60 days
Fall	Cool	Medium	14-20 days

How to Determine if a Grazing Plan is Forage-based or Nutrient-based

1. Determine if the ac/AU is 1 to 1.
2. If the ac/AU is less than 1:1, run the Pasture Nutrient Balance Calculator (found in the eFOTG > Section IV > Conservation Practices > Prescribed Grazing > Pasture Nutrient Balance Calculator) to determine if the system will be forage based or nutrient based.
3. Nutrient deposition during grazing periods on non-pastureland acres (i.e. woodland) is not allowed to be accounted for when determining if the system is nutrient or forage limited.
4. If no current soil tests are available, assume the system will be phosphorus based when running the Pasture Nutrient Balance Calculator. If a current soil test (from the past 3 years) is available, the Pasture Nutrient Balance Calculator will be run based on results of the P-Index.
5. The information in the Prescribed Grazing calculations must be consistent with the values in the Pasture Nutrient Balance Calculator.
6. If the nitrogen balance or P removal balance (depending on if the system is nitrogen based or phosphorus based) is negative, the grazing system will be nutrient based.
7. Adjust the animal numbers, duration of grazing, or acres until there is no excess nutrients being applied. The prescribed grazing plan will be based on the management that was entered in the Pasture Nutrient Balance Calculator.



Typical Growth Patterns of Forages

Table 7 can be used when planning forage rotations to stretch the amount of time animals are able to graze. Typically, rotations with only cool season grass pastures can be enhanced by adding pastures seeded to warm season species or by stockpiling forage to be used for winter grazing.

TABLE 7: TYPICAL GROWTH PATTERNS OF FORAGES									
Species	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<u>Orchardgrass</u>									
Timothy									
Smooth Brome									
Tall Fescue									
Bluegrass									
Reed Canary									
Sorghum/Sudan									
Switchgrass									
Big Bluestem									
Alfalfa									
<u>Birdsfoot</u> Trefoil									
Red Clover									
Sweet Clover									
Alsike									
Ladino									
Winter Rye									
Oats									



Criteria for Management of Intensive Grazing

A grazing system can be perceived to be intensively rotated when all of the following criteria are met:

1. Livestock are rotated at a minimum of every 3 days, and a lactating dairy herd is rotated at least every 24 hours.
 2. Pastures must receive adequate rest periods based on predominant forage species. Refer to Table 6: Rest Periods for Cool Season Grasses/Clover Pastures
 3. Rations of mature animals must consist of a minimum of 80% forage, either pasture or dry hay.
 4. Supplemental forages must be made available to extend the grazing system into the winter and/or provide alternative grass sources during the intense summer months. Planning year-long plant productivity can be done using any or all of the following:
 - Supplemental annuals (summer or winter) – Refer to Table 7: Typical Growth Patterns of Forages
 - Fall stockpiling
 - Grazing row crop residue
 - Bale-grazing during winter Pasture and dry forage testing are required
 5. Pasture and dry forage testing are completed within the first 12 months to assist with balancing the feed ration.
 6. Record keeping requirements include the following:
 - For each pasture rotation, records of the days on each pasture, the amount of animals turned in, and turn in and turn out heights of forage
 - Calculating AUM (animal unit month) and AUD (animal unit day),
 - Annual pasture inventory and evaluations,
 - Animal body condition score and
 - Forage test results for fiber, protein and energy
- * For intensive grazing, it is recommended that paddock systems be broken down into a series of smaller management units or cells, allowing strip grazing with the use of temporary, movable fencing, moved every time the animals are moved. Back fencing should also be incorporated to prevent animals from continually grazing on already grazed pasture.



References

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Heckman et al. Purdue University. 2007. Management-intensive grazing in Indiana (AY328).

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Undersander, D., L.H. Smith, A.R. Kaminski, K.A. Kelling, J.D. Doll. Sorghum-Forage. In: Alternative Field Crops Manual. University of Wisconsin – Extension, Cooperative Extension. <https://hort.purdue.edu/newcrop/afcm/index.html>

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Fence (382)

The purpose of a fence is to:

- Control the movement of livestock.
- Protect sensitive areas such as streams, wetlands, and riparian zones.
- Manage grazing areas to improve pasture utilization and protect resources.

Specifications:

Fences should be designed and installed according to NRCS standards and specifications, ensuring they are appropriate for the intended use and site conditions. This includes selecting the right type of fence (e.g., barbed wire, woven wire, electric) and considering factors like terrain, soil type, and livestock species.

- Install approximately 1800 feet of perimeter fence: woven wire.
- Install approximately 1400 feet of interior energized (electric) fence.

(Implementation requirements follow this description.)

Components:

- Posts: Properly spaced and installed to support the chosen fencing material.
- Fencing Material: Durable and suitable for the intended livestock, ensuring containment and protection.
- Gates: Strategically placed for ease of access and movement of livestock and equipment.
- Braces and Anchors: Installed at corners and ends to provide stability and longevity.

Maintenance:

Regular inspection and maintenance are required to ensure the fence remains functional and effective. Repairs should be made promptly to prevent livestock escape or damage to protected areas.

Environmental Considerations:

Fencing should be placed to minimize environmental impact, including avoiding sensitive habitats and ensuring wildlife movement is not unduly restricted.

Benefits:

- Improved livestock management and pasture utilization.
- Protection of natural resources and sensitive areas.
- Enhanced operational efficiency and safety on the farm.

Follow the Implementation Requirements of Fence (Code 382) on the following pages. Note: The following woven wire fence implementation requirements can also be used for Area #3.



FENCE – Woven Wire
CODE 382

Pennsylvania Conservation Practice Implementation Requirements and Certification

Cooperator Name Marty Firely	County Montgomery	Planner John Kluthe	Date 5/30/2024
Farm/Tract/Field(s) 7 and 11 (exterior)	Program/Contract No. (if applicable)		Amount Planned 3803 FT

Note: This document is not required when fence detail drawings are included on engineering designs for an associated practice (e.g., Heavy Use Area Protection [561], Waste Storage Facility [313], Waste Transfer [634]).

Purpose: Control the movement of animals, people, and vehicles to accomplish specific conservation objectives.

Intended Use(s)

Restrict or control access by domestic animals or people into hazardous or environmentally sensitive areas. Implement a prescribed grazing plan or provide better distribution of grazing animals.

Other: Confine livestock on an area.

Associated Practices (must be implemented in combination with this practice)

Access Control (472) Riparian Herbaceous Cover (390) Other practices (specify):

Heavy Use Area Protection (561) Riparian Forest Buffer (391)

Prescribed Grazing (528) Roofs and Covers (367)

Pasture and Hay Planting (512) Waste Storage Facility (313)

Pond (378) Watering Facility (614)

Fencing is needed to control movement of (check all that apply)

Livestock: Beef Dairy Cattle Goats Sheep Equine

Other:

Wildlife:

People Vehicles and/or equipment

Wire

All wires shall be at least class 3 galvanized. Horizontal wires shall have a minimum thickness of 12½ gauge. Vertical wires shall have a minimum thickness of 14 gauge.

Height of woven wire: 48 inches

If used, min. dimensions of wooden top board: 1 inch x 6 inches x _____ feet

If used, number of additional wires at top of woven wire: barbed _____ electric _____

Minimum overall fence height, including additional top wires: _____ inches

If used, number of additional wires at bottom of woven wire: electric _____

If electric wire is used, 12½ gauge overhead or insulated underground transmission line will be used to carry electricity across all gate openings (including electrified gates) to charge the remainder of the fence.

Line Posts

Wood: Minimum total length: _____ feet Minimum dimensions: 4-inch diam. round, or 4-inch square

Galvanized steel: Min. total length: 5 feet Min. weight: 1.25 lb/foot (excluding anchor plate)



	<input type="checkbox"/> Other: Minimum total length: _____ feet Approved material: _____ Maximum spacing between line posts: _____ feet Minimum height above ground: _____ feet Minimum depth set in the ground: <u>1½ feet (steel); 2½ feet (wood)</u> If both wood and steel/other posts are used, indicate the maximum number of steel/other posts (_____) to be installed in between each wood post.
Corner, End, & Gate Posts	Min. total length: <u>8</u> feet Min. dimensions: <u>6-inch diam. round or 6-inch square</u> Min. depth set in the ground: <u>3.5 feet</u>
Brace Posts	Min. total length: <u>8</u> feet Min. dimensions: <u>5-inch diam. round or 5-inch square</u> Min. depth set in the ground: <u>3.5 feet</u> (corner, end, gate braces); <u>2.5 feet</u> (line braces)
Brace Rails	Min. dimensions: <u>2-inch diam. (steel); or 4-inch diam. round or 4-inch square (wood)</u> Min. length: <u>7 feet</u>
Brace Assemblies	<input type="checkbox"/> Max. distance between single span assemblies (if needed): _____ feet <input type="checkbox"/> Max. distance between double span assemblies (if needed): _____ feet

Additional Requirements

- All wood posts shall be pressure-treated pine or other wood of suitable strength and rot-resistance (black locust, redcedar of at least 50% heartwood). Note that lumber dimensions are specified in nominal (common) sizes for commercial wood products; actual sizes are usually ¼ to ½ inch less than the nominal sizes for thickness and width.
- Install the fence in the location(s) shown on the attached map or drawing. Refer to the attached Standard Detail drawings and/or specifications for construction requirements.
- For optimum strength of fencing, attach the wire to the side of the fence that will receive the greatest pressure from animals. Place wire on the outside of posts on curves and corners.
- Fence materials shall be new, and fence shall have minimum expected life of at least 20 years with minimal maintenance.
- Comply with current provisions of the PA One-Call utility check and any amendments before performing any work. Contact PA One-Call prior to fence installation by visiting www.pa1call.org or dialing 8-1-1.
- Fences and gates shall be adequate to achieve practice objectives and facilitate management needs.
- If applicable, electric fence charger shall be low-impedance; be UL approved or equivalent; have lightning arrestors, grounding rods, and manufacturer-required safety features installed to meet the recommendations of the charger's manufacturer. Insulators shall be porcelain or UV-stabilized plastic of sufficient strength, strain-resistance, and longevity.



OPERATION AND MAINTENANCE

Regularly inspect fences (at least annually) and associated safety and control features (e.g., fladry or signage) as part of an on-going maintenance program. Fences located near trees should be inspected after severe weather. In areas that flood, inspect fences after each storm event. Perform maintenance in a timely manner (e.g., maintaining proper tension on wires) and promptly repair worn or otherwise damaged components.

Control the encroachment of weeds, brush, and trees along fences by mechanical or chemical methods to prevent them from damaging or otherwise impacting the life and function of the fence. As needed, repair erosion that impacts the life or function of the fence.

For **electric top wire** (if used):

- Inspect insulators, energizers (chargers), and other components frequently (and especially after lightning storms) for proper function. Replace worn, damaged, or otherwise nonfunctional components.
- Post warning signs in areas with public access. Warn children that electric fencing is being used and let neighbors know where and how to shut off the current.

If a **wooden board** is used at the top of the woven wire without an electric wire, plan to replace the board periodically if damaged by livestock, especially horses.

CERTIFICATION (FOR AGENCY USE ONLY)	
Supporting Documentation (for file)	
<input type="checkbox"/> Plan view or map showing practice location, layout (including gates and cattle guards), and length of each run of fence <input type="checkbox"/> Plan view or map showing streams and other water bodies, existing and planned fences, barns, exercise lots, paddocks, and pastures <input type="checkbox"/> Attach appropriate exhibit(s) from the Practice Specification PA-382, along with any applicable standard detail drawings	
Design Certification This practice was designed according to NRCS standards and specifications. Job Class: _____ _____ Signature by individual with appropriate JAA Date	Implementation Certification This practice was implemented according to NRCS standards and specifications. Amount: _____ FT Install Date: _____ _____ Signature by individual with appropriate JAA Date
Reporting Checklist	
<input type="checkbox"/> CPA-06 Notes <input type="checkbox"/> File copy of completed Implementation Requirements <input type="checkbox"/> Post-installation photos	
<input type="checkbox"/> Report in Conservation Desktop <input type="checkbox"/> Other reporting tools (optional)	
Installation/As-Built Comments: Note below any modifications made during installation (e.g., unable to set posts to required depth – concrete used). Red-line acceptable changes on these Implementation Requirements and on the drawings. <div style="border: 1px solid black; height: 100px; width: 100%;"></div>	



FENCE - High Tensile Smooth Wire (Electric)

CODE 382

Pennsylvania Conservation Practice Implementation Requirements and Certification

Cooperator Name Marty Firely	County Montgomery	Planner John Kluthe	Date 5/30/2024
Farm/Tract/Field(s)	Program/Contract No. (if applicable)		Amount Planned 1400 FT

Note: This document is not required when fence detail drawings are included on engineering designs for an associated practice (e.g., Heavy Use Area Protection [561], Waste Storage Facility [313], Waste Transfer [634]).

Purpose: Control the movement of animals, people, and vehicles to accomplish specific conservation objectives.

Intended Use(s)

Restrict or control access by domestic animals or people into hazardous or environmentally sensitive areas. Implement a prescribed grazing plan or provide better distribution of grazing animals.

Confine livestock on an area. Other:

Associated Practices (must be implemented in combination with this practice)

Access Control (472) Riparian Herbaceous Cover (390) Other practices (specify):

Heavy Use Area Protection (561) Riparian Forest Buffer (391)

Prescribed Grazing (528) Roofs and Covers (367)

Pasture and Hay Planting (512) Waste Storage Facility (313)

Pond (378) Watering Facility (614)

Fencing is needed to control movement of: (check all that apply)

Livestock: Beef Dairy Cattle Goats Sheep Equine

Other: **Beef – Steers, Cows and Calves**

Wildlife:

People Vehicles and/or equipment

Wire

High-tensile, smooth wire that has a minimum thickness of 12½ gauge, is class 3 galvanized, and has a breaking strength of at least 200,000 psi or 1540 lb per wire

High-tensile vinyl coated or polymer encased wire that has a minimum thickness of 12½ gauge, is coated with UV resistant polymer, and has a breaking strength of at least 1,300 lb per wire or 4,000 lb per rail

Total number of strands: 3 Number of electric strands: 3 Minimum voltage: 5 kilovolts

Strand spacing at: 18", 30", and 42" inches from ground

Wire stays (battens) used? Yes No Max. spacing interval between wire stays at: _____ feet

If used, min. dimensions of wooden top board: 1 inch x 6 inches x _____ feet

12½ gauge overhead or insulated underground transmission line will be used to carry electricity across all gate openings (including electrified gates) to charge the remainder of the fence.

Line Posts

Wood: Minimum total length: _____ feet Minimum dimensions: **4-inch diam. round, or 4-inch square**



	<input checked="" type="checkbox"/> Galvanized steel: Min. total length: <u>5.0</u> feet Min. weight: <u>1.25 lb/foot (excluding anchor plate)</u> <input type="checkbox"/> Other: Minimum total length: _____ feet Approved material: _____ Maximum spacing between line posts: <u>60</u> feet Minimum height above ground: _____ feet Minimum depth set in the ground: <u>1½ feet (steel); 2½ feet (wood)</u> If both wood and steel/other posts are used, indicate the maximum number of steel/other posts (_____) to be installed in between each wood post.
Corner, End, & Gate Posts	Minimum total length: <u>8</u> feet Minimum dimensions: <u>6-inch diam. round or 6-inch square</u> Minimum depth set in the ground: <u>3.5 feet</u>
Brace Posts	Minimum total length: _____ feet Minimum dimensions: <u>5-inch diam. round or 5-inch square</u> Minimum depth set in the ground: <u>3.5 feet (corner, end, gate braces); 2.5 feet (line braces)</u>
Brace Rails	Minimum dimensions: <u>2-inch diam. (steel); or 4-inch diam. round or 4-inch square (wood)</u> Minimum length: <u>7 feet</u>
Brace Assemblies	<input type="checkbox"/> Maximum distance between single span assemblies (if needed): _____ feet <input type="checkbox"/> Maximum distance between double span assemblies (if needed): _____ feet

Additional Requirements

- All wood posts shall be pressure-treated pine or other wood of suitable strength and rot-resistance (black locust, redcedar of at least 50% heartwood). Note that lumber dimensions are specified in nominal (common) sizes for commercial wood products; actual sizes are usually ¼ to ½ inch less than the nominal sizes for thickness and width.
- Install the fence in the location(s) shown on the attached map or drawing. Refer to the attached Standard Detail drawings and/or specifications for construction requirements.
- For optimum strength of fencing, attach the wire to the side of the fence that will receive the greatest pressure from animals. Place wire on the outside of posts on curves and corners.
- Fence materials shall be new, and fence shall have minimum expected life of at least 20 years with minimal maintenance.
- Comply with current provisions of the PA One-Call utility check and any amendments before performing any work. Contact PA One-Call prior to fence installation by visiting www.pa1call.org or dialing 8-1-1.
- Fences and gates shall be adequate to achieve practice objectives and facilitate management needs.
- Electric fence charger shall be low-impedance; be UL approved or equivalent; have lightning arrestors, grounding rods, and manufacturer-required safety features installed to meet the recommendations of the charger's manufacturer. Insulators shall be porcelain or UV-stabilized plastic of sufficient strength, strain-resistance, and longevity.



Watering Facility (614)

Note: this is an optional conservation practice to be used if farm management wants to establish permanent livestock watering locations. If temporary watering locations are used, move the tank when the area becomes degraded.

A Watering Facility (614)⁹ stores or provides drinking water to livestock or wildlife. This practice is used to supply daily water requirements, improve animal distribution, and provide a water source that is an alternative to a sensitive resource.

Daily water requirements per head for livestock can be estimated at 7-9 gallons per day for backgrounding calves.

A watering facility is a vital component of any agricultural or livestock operation, providing clean and reliable water access for animals. Its capacity, location, foundation, tank, stabilization, appurtenances, and escape features are crucial considerations. The facility's capacity must meet the water needs of the animals, while its location should be strategically positioned for accessibility and environmental considerations. A stable foundation ensures durability, while the tank stores water efficiently. Stabilization features prevent displacement, and appurtenances enhance functionality and safety. Escape features are essential to prevent animal entrapment. Together, these components ensure efficient, durable, and safe water provision for livestock.

Watering Facility Operation and Maintenance

- Regularly checking for damage to the facility. Check for leaks, site erosion, and damage to fences, heavy-use areas, and appurtenances associated with the watering facility. Repair or replace damaged components as needed.
- Check the performance of the automatic water level device, if present.
- Ensure that the outlet pipe, if present, is freely operating and is not causing erosion.
- Clean the facility as needed.
- Monitor and maintain the facility to ensure that there is adequate inflow and outflow.
- Prepare the facility for winter as dictated by the climate. This may include draining supply pipes, emptying tanks, or ensuring that float valves will not be damaged by ice.
- For a portable facility, the plan for moving the facility and for monitoring/repair of the areas around the facility.

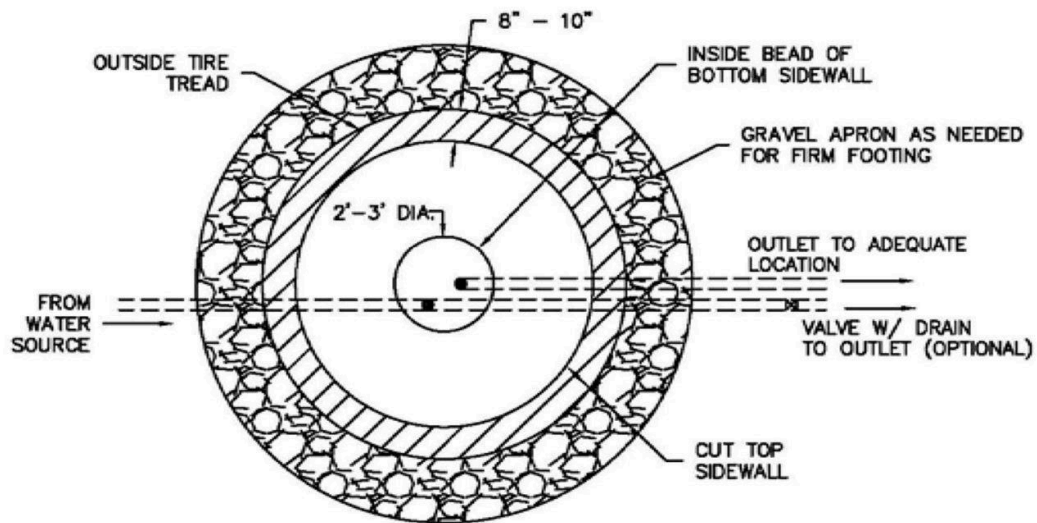
Heavy Use Area Protection (561) is a necessary support practice for Watering Facility (614).

⁹ Natural Resources Conservation Service, Conservation Practice Standard, Watering Facility, Code 614, NRCS PA, October 2022

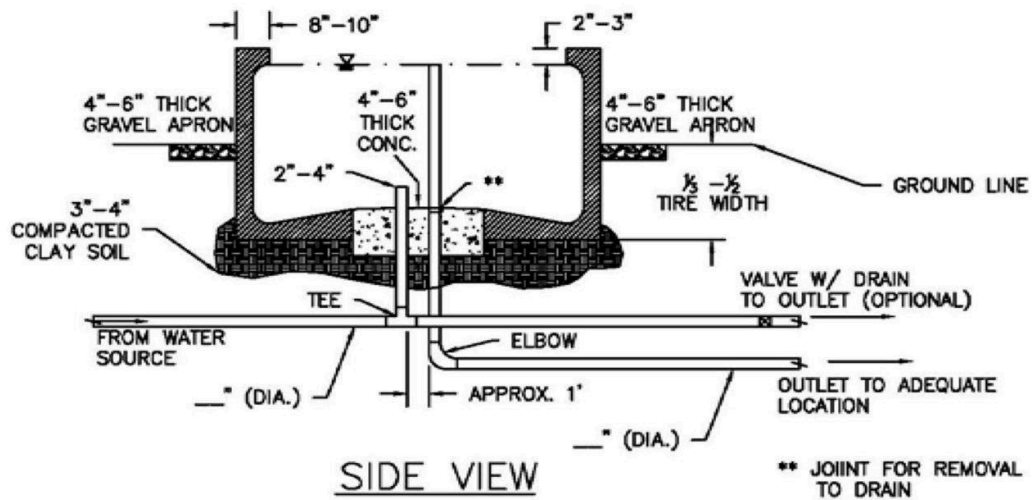


Construction Specifications

<u>CONSTRUCTION SPECIFICATION</u> <u>USED HEAVY EQUIPMENT TIRE</u>																																									
<p>THE TROUGH SHALL BE INSTALLED AT THE LOCATION SHOWN ON THE DRAWINGS.</p> <p>THE FOUNDATION AREA SHALL BE CLEARED OF ALL MATERIAL NOT SUITABLE FOR THE SUBGRADE.</p> <p>THE FOUNDATION AREA AND THE IMMEDIATELY SURROUNDING AREA SHALL BE SMOOTHED AND GRADED TO PERMIT FREE DRAINAGE OF SURFACE WATER. THE TIRE SHALL BE PLACED SUCH THAT APPROXIMATELY 1/3 TO 1/2 OF THE TIRE IS BELOW GRADE AND THE TIRE IS RESTING ON COMPACTED CLAY SOIL. A 3" TO 4" LAYER OF COMPACTED CLAY WILL BE PLACED AS A FOUNDATION AND SEAL BEFORE INSTALLING THE TIRE. TROUGH OR TANK AREAS THAT WILL BE TRAMPLED BY LIVESTOCK SHALL BE GRAVELED, PAVED, OR OTHERWISE TREATED TO PROVIDE FIRM FOOTING.</p> <p>ALL MATERIALS, PLACEMENT, ANCHORING, PROPORTIONING, AND PROTECTION SHALL BE AS SHOWN ON THE DRAWINGS.</p> <p>TRENCHES FOR PLASTIC OR COPPER PIPELINES SHALL BE COMPACTED TO THE DEGREE REQUIRED TO PREVENT CAVING SUBSEQUENT TO CONSTRUCTION. FOR PLASTIC OR COPPER PIPE, THE INITIAL BACKFILL SHALL BE OF SELECTED MATERIAL THAT IS FREE OF ROCKS OR OTHER SHARP-EDGED MATERIAL THAT CAN DAMAGE THE PIPE. DEFORMATION OR DISPLACEMENT OF THE PIPE MUST NOT OCCUR DURING BACKFILLING.</p> <p>CONCRETE USED IN CONSTRUCTION OF TROUGHS SHALL BE READY-MIXED CONCRETE (3000 PSI- 6 BAGS/CY MIX), PRE-BAGGED COMMERCIALY AVAILABLE CONCRETE MIX, OR HAND-MIXED ON-SITE. CEMENT WILL BE TYPE 1 WITH AIR ENTRAINMENT OR TYPE 1A MEETING REQUIREMENTS OF ASTM C150 AND AGGREGATES WILL MEET THE REQUIREMENTS OF ASTM C33. COARSE AGGREGATE WILL BE SIZE NO. 57 OR NO. 67 FOR READY-MIX AND HAND-MIXED CONCRETE. HAND-MIXED CONCRETE SHALL BE MIXED AT A RATIO OF 1 PART CEMENT, 2 PARTS SAND, AND 3 PARTS COARSE AGGREGATE. PRE-BAGGED CONCRETE MIX WILL BE MIXED ACCORDING TO THE MANUFACTURER'S RECOMMENDATION. MIXING WATER WILL BE CLEAN AND FREE OF SUBSTANCES THAT WOULD EFFECT THE STRENGTH OR DURABILITY OF THE CONCRETE. CONCRETE WILL BE MIXED TO A CONSISTENCY THAT WILL ALLOW PROPER CONSOLIDATION, BUT NOT SO WET THAT AGGREGATES WILL SEPARATE FROM THE MORTAR (APPROXIMATELY 3" - 6" SLUMP).</p> <p>ALL MATERIALS USED WILL BE IN GOOD CONDITION AND MEET REQUIREMENTS OF THE APPLICABLE ASTM SPECIFICATIONS OR COMMERCIAL STANDARDS AS SHOWN.</p> <p>UPON COMPLETION OF CONSTRUCTION, ALL DISTURBED AREAS WILL BE GRADED SMOOTH AND BLEND WITH THE SURROUNDING GROUND. VEGETATION WILL BE ESTABLISHED BY APPLYING SEEDING AND MULCHING MATERIALS AS DESCRIBED ON THE DRAWINGS.</p> <p>CONSTRUCTION OPERATIONS WILL BE CARRIED OUT IN SUCH A MANNER THAT EROSION, AIR, AND WATER POLLUTION WILL BE MINIMIZED AND HELD WITHIN LEGAL LIMITS.</p>	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> </table> </div> <div style="margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> </table> </div> </div>																																								
<p>PIPE AND FITTINGS SHALL COMFORM TO THE FOLLOWING:</p> <table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"><u>TYPE OF PIPE</u></th> <th><u>APPLICABLE SPECIFICATION</u></th> </tr> </thead> <tbody> <tr> <td colspan="2" style="text-align: center;">THROUGH CONCRETE AND INSIDE TROUGH:</td> </tr> <tr> <td>PVC:</td> <td>ASTM D-1785, ASTM D-2241 (SDR 26 OR LESS), ASTM D-2665</td> </tr> <tr> <td colspan="2" style="text-align: center;">OUTSIDE OF TROUGH: (ANY OF THE ABOVE OR)</td> </tr> <tr> <td>PVC:</td> <td>ASTM D-2740, ASTM D-2672, ASTM D-2241 (SDR 35 OR LESS)</td> </tr> <tr> <td>PE:</td> <td>ASTM D-2104, ASTM D-2239, ASTM D-3035, ASTM D-2447, ASTM D-2737</td> </tr> <tr> <td colspan="2" style="text-align: center;">PRESSURE PIPE FITTINGS:</td> </tr> <tr> <td>PVC:</td> <td>ASTM D-2466, ASTM D-2467, ASTM D-2464, ASTM D-3036</td> </tr> <tr> <td>PE:</td> <td>ASTM D-2611, ASTM D-2610, ASTM D-2609, ASTM D-3261, ASTM D-2683</td> </tr> <tr> <td>ABS:</td> <td>ASTM D-2468, ASTM D-2469, ASTM D-2465</td> </tr> </tbody> </table> <p>NOTE: OTHER PIPE AND FITTINGS CONFORMING TO PENNSYLVANIA TECHNICAL GUIDE STANDARDS MAY BE USED.</p>	<u>TYPE OF PIPE</u>	<u>APPLICABLE SPECIFICATION</u>	THROUGH CONCRETE AND INSIDE TROUGH:		PVC:	ASTM D-1785, ASTM D-2241 (SDR 26 OR LESS), ASTM D-2665	OUTSIDE OF TROUGH: (ANY OF THE ABOVE OR)		PVC:	ASTM D-2740, ASTM D-2672, ASTM D-2241 (SDR 35 OR LESS)	PE:	ASTM D-2104, ASTM D-2239, ASTM D-3035, ASTM D-2447, ASTM D-2737	PRESSURE PIPE FITTINGS:		PVC:	ASTM D-2466, ASTM D-2467, ASTM D-2464, ASTM D-3036	PE:	ASTM D-2611, ASTM D-2610, ASTM D-2609, ASTM D-3261, ASTM D-2683	ABS:	ASTM D-2468, ASTM D-2469, ASTM D-2465	<div style="display: flex; flex-direction: column; align-items: center;"> <div style="margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> </table> </div> <div style="margin-bottom: 10px;"> <table border="1" style="border-collapse: collapse;"> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> <tr><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td><td style="width: 20px;"> </td></tr> </table> </div> </div>																				
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	<p>File No. PI-008.dwg</p> <p>Drawing No. PI-008</p> <p>Sheet _____ of _____</p>																																								



PLAN VIEW



SIDE VIEW

CAUTION:

HEAVY EQUIPMENT TIRES ARE NORMALLY FILLED WITH LIQUID DURING USE FOR WEIGHT AND BALLAST, RESIDUES FROM THESE LIQUIDS COULD BE TOXIC TO LIVESTOCK. THE NATURAL RESOURCES CONSERVATION SERVICE MAKES NO REPRESENTATION TO THE EXISTENCE OR NONEXISTENCE OF TOXIC RESIDUES IN THE USED TIRES. IT IS THE RESPONSIBILITY OF THE LANDOWNER TO ENSURE THEMSELVES THAT NO HAZARD EXISTS.



Heavy Use Area Protection (561)

Heavy Use Area Protection: Definition and Purpose

Definition:

Heavy Use Area Protection (NRCS Code 561) refers to the practice of stabilizing areas that experience high traffic from livestock, vehicles, or equipment. This is typically achieved through the use of durable materials such as gravel, concrete, or geotextile fabrics, which are applied to the surface to prevent soil erosion and compaction.

Purpose:

The primary purpose of Heavy Use Area Protection is to create a stable, non-erodible surface in areas where livestock congregate, such as around watering facilities, feeding areas, and barn entrances. This practice serves several key functions:

1. Erosion Control: Prevents soil erosion caused by the frequent movement and trampling of livestock.
2. Water Quality Protection: Reduces sediment and nutrient runoff into nearby water bodies, thereby protecting water quality.
3. Animal Health: Provides a clean, dry surface that reduces the risk of livestock injuries and diseases associated with muddy or unstable ground.

Aggregate:

Design aggregate surfaces for expected wear and intended use. In lieu of a site-specific design for areas that will be subject to light nonvehicular use, install a minimum combined thickness for aggregate surfacing and a base course of 6 inches for animals and 4 inches for other applications.

Technical Requirements:

The aggregate pad should extend six feet in all directions from the Watering Facility (614).

In conjunction with a livestock watering facility, Heavy Use Area Protection ensures that the area around the water source remains stable and clean, thereby enhancing the overall sustainability and efficiency of the livestock operation.



Appendix

RUSLE2 Reports

(see following pages)



RUSLE2 Plan Erosion Calculation Record

Computing Average Soil Loss for a Field or Watershed

File: plans\default

Access Group: R2_NRCS_Fld_Office

Inputs:

Tract #:

Owner name: Firely

Info: Year 1 corn with cereal rye winter crop,

Year 2 soybeans with cereal rye winter crop,

Year 3 summer cover crop (sorghum sudan), barley (planted in September)

Year 4 harvest barley (approximately May), buckwheat or sorghum sudan cover crop (June – September)

Location: USA\Pennsylvania\Montgomery County

Soil: SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%

Weighted Results:

<i>Weighted soil loss erod. portion, t/ac/yr</i>	<i>Weighted detachment, t/ac/yr</i>	<i>Weighted cons. plan. soil loss, t/ac/yr</i>	<i>Weighted delivery, t/ac/yr</i>
1.7	1.7	1.7	1.7

Individual Profile Results:

<i>Hillslope</i>	<i>Management</i>	<i>Soil loss erod. portion, t/ac/yr</i>	<i>Soil detachment, t/ac/yr</i>	<i>Cons. plan. soil loss, t/ac/yr</i>	<i>Sediment delivery, t/ac/yr</i>	<i>Relative area</i>
default*	CMZ 65\c.Other Local Mgt Records\corn sb w cover typical noill scenario	0.66	0.66	0.66	0.66	50
default#2*	CMZ 65\c.Other Local Mgt Records\Barley,w summer cover crop before cashcrop	2.7	2.7	2.7	2.7	50



RUSLE2 Profile Erosion Calculation Record

Info: Firely – no-till corn/soybeans – rotation years 1 and 2

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\Pennsylvania\Montgomery County	SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%	150	6.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 65\c.Other Local Mgt Records\corn sb w cover typical notill scenario	vegetations\Corn, grain	bushels	190
managements\CMZ 65\c.Other Local Mgt Records\corn sb w cover typical notill scenario	vegetations\Rye, cereal	bushels	40
managements\CMZ 65\c.Other Local Mgt Records\corn sb w cover typical notill scenario	vegetations\Soybean, group II, III and IV 30 in rows	bu	60
managements\CMZ 65\c.Other Local Mgt Records\corn sb w cover typical notill scenario	vegetations\Rye, cereal	bushels	40

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, %
2.0	0.66	0.66	0.66	0.66	0.016	0.38	150	

Date	Operation	Vegetation	Surf. res. cov. after op, %
5/5/0	Harvest, killing crop 10pct standing stubble		91
5/10/0	Sprayer, kill crop		90
5/15/0	Planter, double disk opnr w/fluted coulter	Corn, grain	88
6/15/0	Sprayer, post emergence		83
6/20/0	Fert applic. side-dress, liquid		81
10/10/0	Harvest, killing crop 30pct standing stubble		97
10/10/0	Planter, double disk opnr	Rye, cereal	97
5/15/1	Harvest, killing crop 10pct standing stubble		98
5/20/1	Fert applic. surface broadcast		98
5/20/1	No operation		98
5/20/1	Drill or air seeder single disk openers 7-10 in spac.	Soybean, group II, III and IV 30 in rows	98
6/17/1	Sprayer, post emergence		96
7/1/1	Sprayer, fungicide and insecticide tank mix		94
10/10/1	Harvest, killing crop 20pct standing stubble		97
10/28/1	Planter, double disk opnr	Rye, cereal	95

SCI and STIR Output

Soil conditioning index (SCI)	SCI OM subfactor	SCI FO subfactor	SCI ER subfactor	Avg. annual slope STIR	Wind & irrigation-induced erosion for SCI, t/ac/yr
0.87	0.87	0.94	0.74	5.63	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system. The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.



RUSLE2 Profile Erosion Calculation Record

Info: Firely - Barley

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\Pennsylvania\Montgomery County	SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%	150	6.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 65\c.Other Local Mgt Records\Barley,w summer cover crop before cashcrop	vegetations\Sorghum, sudangrass, 7in rows, seeding to 1st cut	tons	15
managements\CMZ 65\c.Other Local Mgt Records\Barley,w summer cover crop before cashcrop	vegetations\Sorghum, forage regrowth	tons	10
managements\CMZ 65\c.Other Local Mgt Records\Barley,w summer cover crop before cashcrop	vegetations\Barley, winter	bushels	90
managements\CMZ 65\c.Other Local Mgt Records\Barley,w summer cover crop before cashcrop	vegetations\update2020\Buckwheat	bu.	25

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, %
2.0	2.7	2.7	2.7	2.7	0.056	0.38	150	

Date	Operation	Vegetation	Surf. res. cov. after op, %
5/1/0	Sprayer, kill crop		50
5/8/0	Planter, double disk opnr	Sorghum, sudangrass, 7in rows, seeding to 1st cut	62
6/19/0	Harvest, hay, grass	Sorghum, forage regrowth	82
9/11/0	Harvest, hay, no regrowth		69
9/20/0	Fert applic. surface broadcast		35
9/20/0	Disk, tandem secondary op.		35
9/20/0	Drill or air seeder single disk openers 7-10 in spac.	Barley, winter	35
6/30/1	Harvest, killing crop 20pct standing stubble		96
7/7/1	Disk, tandem secondary op.		75
7/7/1	Drill or air seeder single disk openers 7-10 in spac.	update2020\Buckwheat	75
9/8/1	Mow pasture		62

SCI and STIR Output

Soil conditioning index (SCI)	SCI OM subfactor	SCI FO subfactor	SCI ER subfactor	Avg. annual slope STIR	Wind & irrigation-induced erosion for SCI, t/ac/yr
0.35	0.27	0.64	-0.072	36.6	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system. The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.



RUSLE2 Profile Erosion Calculation Record

Info: Firely – Field 3 (hops)

File: profiles\default

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\Pennsylvania\Montgomery County	SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%	150	6.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 65\a. Single Year/ Single Crop Templates\vineyard\Vineyard, full cover, established, z65	vegetations\Vineyard, full cover	cwt	800

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, %
2.0	0.77	0.77	0.77	0.77	0.015	0.38	150	17

Date	Operation	Vegetation	Surf. res. cov. after op, %
4/1/0	Begin growth	Vineyard, full cover	17
4/25/0	Fert applic. surface broadcast		15
4/25/0	Sprayer, fungicide and insecticide tank mix		15
5/15/0	Sprayer, fungicide and insecticide tank mix		13
6/15/0	Sprayer, fungicide and insecticide tank mix		9.8
7/15/0	Sprayer, fungicide and insecticide tank mix		7.0
8/1/0	Sprayer, fungicide and insecticide tank mix		5.9

SCI and STIR Output

Soil conditioning index (SCI)	SCI OM subfactor	SCI FO subfactor	SCI ER subfactor	Avg. annual slope STIR	Wind & irrigation-induced erosion for SCI, t/ac/yr
0.85	0.77	0.99	0.70	0.900	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.



RUSLE2 Profile Erosion Calculation Record

Info: Firely – Field 9a – garden vegetables, tomatoes, hemp, etc.

File: profiles\default

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\Pennsylvania\Montgomery County	SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%	150	3.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 65\c.Other Local Mgt Records\Plasticultureveg z65 w cc	vegetations\update2020\Tomato, fresh mkt staked	cwt	1000

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, %
2.0	0.78	0.78	0.78	0.78	0.030	0.38	150	0

Date	Operation	Vegetation	Surf. res. cov. after op, %
5/1/0	Plastic mulch applicator 50 percent cover		0
5/1/0	Planter, transplanter, vegetable	update2020\Tomato, fresh mkt staked	0
6/15/0	Sprayer, fungicide		0
6/15/0	Fert applic. side-dress, liquid		0
7/8/0	Harvest, hand pick multiple times		0
8/5/0	Harvest, hand pick multiple times		0
9/9/0	Harvest, hand pick multiple times		0
10/7/0	Harvest, hand pick multiple times		0

SCI and STIR Output

Soil conditioning index (SCI)	SCI OM subfactor	SCI FO subfactor	SCI ER subfactor	Avg. annual slope STIR	Wind & irrigation-induced erosion for SCI, t/ac/yr
0.15	-0.91	0.94	0.69	5.58	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.



RUSLE2 Profile Erosion Calculation Record

Info: Pumpkins (May – Oct) with cereal rye cover crop (Oct - April)
Fields 1, 6, 9, 10

Access Group: R2_NRCS_Fld_Office

Inputs:

Location	Soil	Slope length (horiz)	Avg. slope steepness, %
USA\Pennsylvania\Montgomery County	SSURGO\Montgomery County, Pennsylvania\RhB Reaville silt loam, 3 to 8 percent slopes\Reaville Silt loam 85%	150	6.0

Management	Vegetation	Yield units	# yield units, #/ac
managements\CMZ 65\c.Other Local Mgt Records\pumpkin, w cover crop z65	vegetations\Rye, cereal	bushels	40
managements\CMZ 65\c.Other Local Mgt Records\pumpkin, w cover crop z65	vegetations\Pumpkin	lbs	32000

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, %
2.0	2.0	2.0	2.0	2.0	0.045	0.38	150	

Date	Operation	Vegetation	Surf. res. cov. after op, %
10/15/0	Drill or air seeder single disk openers 7-10 in spac.	Rye, cereal	87
5/27/1	Spray, glyphosate on resistant growing crop		60
6/1/1	Fert applic. surface broadcast		72
6/1/1	Planter, double disk opnr	Pumpkin	72
6/1/1	Sprayer, pre-emergence		72
6/15/1	Sprayer, insecticide post emergence		68
7/1/1	Sprayer, fungicide		65
10/1/1	Harvest, hand pick vegetables		71

SCI and STIR Output

Soil conditioning index (SCI)	SCI OM subfactor	SCI FO subfactor	SCI ER subfactor	Avg. annual slope STIR	Wind & irrigation-induced erosion for SCI, t/ac/yr
0.54	0.29	0.94	0.21	5.78	0

The **SCI** is the **Soil Conditioning Index** rating. If the calculated index is a negative value, soil organic matter levels are predicted to decline under that production system. If the index is a positive value, soil organic matter levels are predicted to increase under that system.

The **STIR** value is the **Soil Tillage Intensity Rating**. It utilizes the speed, depth, surface disturbance percent and tillage type parameters to calculate a tillage intensity rating for the system used in growing a crop or a rotation. STIR ratings tend to show the differences in the degree of soil disturbance between systems. The kind, severity and number of ground disturbing passes are evaluated for the entire cropping rotation as shown in the management description.

