CONSERVATION PRACTICE PHYSICAL EFFECTS WORKSHEET

STATE	Pennsylvania	FIELD OFFICE	Any	DATE	
PRACTICE: Surface Drainage, Field Ditch 607		Baseline Setting:			
		Appropriate Land Use(s): Crop, Hay, Pasture			

RESOURCES, CONSIDERATIONS AND CONCERNS	**PHYSICAL EFFECTS**	**RATIONALE**
SOIL - EROSION		
Sheet and Rill	Not Applicable	Not applicable.
Wind	Slight Worsening	Improving drainage may increase surface soil drying.
Ephemeral Gully	Slight to Moderate Improvement	Reducing soil profile saturation increases infiltration by improving drainage and therefore decreases water runoff.
Classic Gully	Slight Worsening	Because of higher concentration and velocities from water collection.
Streambank	Not Applicable	Not applicable.
Shoreline	Not Applicable	Not applicable.
Irrigation Induced	Not Applicable	Not applicable.
Mass Movement	Not Applicable	Not applicable.
Road, Roadsides, and Construction Sites	Not Applicable	Not applicable.
SOIL – CONDITION		
Organic Matter Depletion	Slight to Moderate Worsening	Drainage increases organic matter oxidation.
Rangeland Site Stability	Not Applicable	Not applicable.
Compaction	Slight Improvement	Soils have less risk of compaction when they are dryer.
Subsidence	Slight Worsening	Drainage increases organic matter oxidation.
Contaminants:		
• Salts and other Chemicals	Slight to Moderate Improvement	Soluble pollutants will decrease because of increased water removal.
• Animal Waste and other Organics - N	Slight Improvement	Drainage removes N with water and aerated soils increased N uptake by most plants.
• Animal Waste and other Organics - P	Slight Improvement	Drainage removes P with water and aerated soils increased P uptake by most plants.
• Animal Waste and other Organics - K	Slight Improvement	Drainage removes K with water and aerated soils increased K uptake by most plants.
• Commercial Fertilizer - N	Slight Improvement	Drainage removes N with water and aerated soils increased N uptake by most plants.
• Commercial Fertilizer – P	Slight Improvement	Drainage removes P with water and aerated soils increased P uptake by most plants.
• Commercial Fertilizer – K	Slight Improvement	Drainage removes K with water and aerated soils increased K

		uptake by most plants.
• Residual Pesticides	Slight Improvement	Increased infiltration and aerobic conditions may lead to increased pesticide degradation in the root zone.
Damage from Sediment Deposition	Not Applicable	Not applicable.
WATER – QUANTITY		
Rangeland Hydrologic Cycle	Not Applicable	Not applicable.
Excessive Seepage	Not Applicable	Not applicable.
Excessive Runoff, Flooding, or Ponding	Slight to Substantial Improvement	Because of improved drainage.
Excessive Subsurface Water	Slight to Substantial Improvement	Control of water table - subsurface water is collected and conveyed to a proper outlet.
Drifted Snow	Not Applicable	Not applicable.
Inadequate Outlets	Slight to Substantial Worsening	Water from drains increase pressure on outlets.
Inefficient Water use on Irrigated Land	Slight to Substantial Improvement	Drains can collect water for beneficial use or reuse and improved soil, water air relationship.
Inefficient Water use on Non-Irrigated Land	Slight to Substantial Improvement	Drains can collect water for beneficial use or reuse and improved soil, water air relationship.
Reduced Capacity of Conveyances by Sediment Deposition	Slight to Moderate Worsening	Earthen ditches transport sediment that normally deposits to some degree.
Reduced Storage of Water Bodies by Sediment Accumulation	Slight to Moderate Worsening	Because of sediment transport in the drainage system.
Aquifer Overdraft	Slight Worsening	Drains intercept water that may recharge aquifers.
Insufficient Flows in Water Courses	Slight to Moderate Improvement	Water collected by drains can enhance flows in water courses.
WATER – QUALITY		
In Groundwater:		
• Harmful Levels of Pesticides	Slight Improvement	The action decreases deep percolation and promotes aerobic degradation of pesticide residues.
• Excessive Nutrients and Organics	Slight Improvement	The action facilitates the removal of surface runoff, thus reducing percolation of water and nutrients.
• Excessive Salinity	Slight Improvement	The action removes surface flows before infiltration and intercepts subsurface flows.
• Harmful Levels of Heavy Metals	Slight Improvement	The action removes surface flows before infiltration and intercepts subsurface flows.
• Harmful Levels of Pathogens	Slight Improvement	The action removes surface flows before infiltration and intercepts subsurface flows.
• Harmful Levels of Petroleum	Not Applicable	Not applicable.

In Surface Water:		
• Harmful Levels of Pesticides	Neutral	If the drain is designed to collect surface runoff, pesticides in surface water may be increased. If the purpose is to collect subsurface water, surface runoff will be decreased and aerobic degradation of pesticide residues will increase.
• Excessive Nutrients and Organics	Slight to Moderate Worsening	Increasing the rate of runoff from a field can increase the amount of soluble pollutants delivered to surface water.
• Excessive Suspended Sediment and Turbidity	Slight to Moderate Worsening	Increased drainage and runoff will carry sediments.
• Excessive Salinity	Slight to Moderate Worsening	The action removes both surface and subsurface flows and soluble contaminates from site.
• Harmful Levels of Heavy Metals	Slight to Moderate Worsening	Heavy metals are carried with sediment to surface waters.
• Harmful Temperatures	Neutral	Surface water is conveyed relatively quickly, reducing the risk of warming.
• Harmful Levels of Pathogens	Slight to Moderate Worsening	Where pathogens are transported by sediments
• Harmful Levels of Petroleum	Slight to Moderate Worsening	Because of increased surface water runoff carrying petroleum
AIR – QUALITY		
Particulate Matter less than 10 Micrometers in Diameter (PM 10)	Not Applicable	Not applicable.
Particulate Matter less than 2.5 Micrometers in Diameter (PM 2.5)	Not Applicable	Not applicable.
Excessive Ozone	Not Applicable	Not applicable.
Excessive Greenhouse Gas:		
• CO_2 (Carbon Dioxide)	Not Applicable	Not applicable.
• N_20 (Nitrous Oxide)	Not Applicable	Not applicable.
• CH_4 (Methane)	Not Applicable	Not applicable.
Ammonia (NH_3)	Not Applicable	Not applicable.
Chemical Drift	Not Applicable	Not applicable.
Objectionable Odors	Neutral	Planning and management must preclude transport of animal by-products in outflow.
Reduced Visibility	Not Applicable	Not applicable.
Undesirable Air Movement	Not Applicable	Not applicable.
Adverse Air Temperature	Not Applicable	Not applicable.
PLANTS – SUITABLIITY		
Plants not Adapted or Suited	Not Applicable	Not applicable.
PLANTS - CONDITION		
Productivity, Health, and Vigor	Slight to Moderate Improvement	Improved drainage enhances growing environment for non-hydrophytes. If hydrophytes are desired, drainage will increase the problem.

Threatened or Endangered Plant Species:		
• Plant Species Listed or Proposed for Listing Under the Endangered Species Act	Not Applicable	Not applicable.
• Declining Species, Species of Concern	Not Applicable	Not applicable.
Noxious and Invasive Plants	Not Applicable	Not applicable.
Forage Quality and Palatability	Slight to Substantial Improvement	Drainage improves forage quality and palatability.
Wildfire Hazard	Not Applicable	Not applicable.
ANIMALS - FISH AND WILDLIFE		
Inadequate Food	Neutral	Increase or decrease in food supply depends on plant species on the site and degree of drainage.
Inadequate Cover/Shelter	Neutral	Increase or decrease in cover/shelter depends on plant species on the site due to soil moisture/plant relationships.
Inadequate Water	Neutral	The action will increase available wet habitat for some species and decrease it for others.
Inadequate Space	Not Applicable	Not applicable.
Habitat Fragmentation	Not Applicable	Not applicable.
Imbalance Among and Within Populations	Not Applicable	Not applicable.
Threatened and Endangered Fish and Wildlife Species:		
• Fish and Wildlife Species Listed or Proposed for Listing Under the Endangered Species Act	Neutral	Activities are designed, installed, and mitigated to an extent to maintain or enhance species of concern.
• Declining Species, Species of Concern	Neutral	Activities are designed, installed, and mitigated to an extent to maintain or enhance species of concern.
ANIMALS – DOMESTIC		
Inadequate Quantities and Quality of Feed and Forage	Moderate to Substantial Improvement	Quantity and quality of forage species will be improved if drainage is installed to enhance their production.
Inadequate Shelter	Not Applicable	Not applicable.
Inadequate Stock Water	Not Applicable	Not applicable.
Stress and Mortality	Not Applicable	Not applicable.
HUMAN – ECONOMICS		
Land - Change in Land Use	Substantial	Substantial if land use changes.
Land – Land in Production	Substantial increase	Substantial increase, if land brought into production.
Capital – Change in Equipment	Moderate increase.	
Capital - Total Investment Cost	Moderate.	Moderate.
Capital – Annual Cost	Slight increase.	

Capital – Credit and Farm Program Eligibility	Situational.	
Labor - Labor	Slight to moderate decrease	Slight to moderate decrease due to reduced soil wetness, better traction and reduced drag.
Labor – Change in Management Level	Negligible	
Risk - Yield	Slight Decrease	Slight decrease due to improved drainage.
Risk - Flexibility	Slight Decrease	Slight decrease due to more conductive growing conditions.
Risk - Timing	Substantial Increase	Substantial increase - practice must be installed before drainage benefits can be realized.
Risk – Cash Flow	Slight to Moderate Increase	Slight to moderate increase because of installation costs.
Profitability – Change in Profitability	Situational	Slight decrease to moderate increase.
HUMAN - CULTURAL		
Cultural Resources and/or Historic Properties Present or Suspected to be PRESENT	Slight to Substantial Increase	Construction impacts (mechanical).
HUMAN – ENERGY		
Depletion of Fossil Fuel Resources	Slight Increase	This practice requires regular maintenance and cleanout
Underutilization of Non-Fossil Energy Resources	Not Applicable	Not Applicable

Human Considerations Explanation

Considerations	Physical effects indicate:
Land - Change in Land Use	The degree to which implementing the conservation practice is expected to cause a change from one land use to another.
Land - Land in Production	The degree to which implementing the conservation practice is expected to cause an increase or decrease in the amount of land in production.
Capital - Change in Equipment	The degree to which implementing the conservation practice is expected to cause an increase or decrease in the amount of capital equipment required for farm or ranch operations.
Capital - Total Investment Cost	A qualitative measure of the increase in total investment dollars required in order to implement the conservation practice.
Capital - Annual Cost	A qualitative measure of the expected change in annual capital costs required in order to operate and maintain the conservation practice.
Capital - Credit & Farm Program Eligibility	Included to make conservation planners aware of the potential availability of funding for implementing conservation practices.
Labor – Labor	The degree to which implementing the conservation practice is likely to cause an increase or decrease in the total amount of overall farm or ranch labor required for operations.
Labor - Change in Management Level	The degree to which implementing the conservation practice is likely to cause an increase or decrease in the total amount of required active management on a farm or ranch.
Risk – Yield	The degree to which risk, as related to crop or livestock yields, is expected to increase or decrease as a result of implementing the conservation practice.
Risk – Flexibility	The degree to which risk, as related to the flexibility of farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice. For example, converting from flood irrigation to a sprinkler system gives a farmer an increase in flexibility of irrigation, which results in a decrease in the level of risk associated with inflexibility of operations.
Risk – Timing	The degree to which risk, as related to the timing of farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice.
Risk - Cash Flow	The degree to which risk, as related to cash flow in farm or ranch operations, is expected to increase or decrease as a result of implementing the conservation practice.
Profitability - Change in Profitability	The degree to which farm or ranch profitability is expected to increase or decrease as a result of implementing the conservation practice.
Cultural Resources and/or Historic Properties Present or Suspected to be Present	The degree to which implementation of the conservation practice is expected to increase or decrease the risk of cultural resource disturbance, degradation, or loss.
Depletion of Fossil Fuel Resources	Inefficient use of fossil-originated energy sources (diesel, gasoline, propane, natural gas, coal), lubricants, and other materials.
Underutilization of Non-Fossil Energy Sources	Available and cost-effective alternative energy sources (solar, wind, biofuel, hydroelectric, geothermal) are not being used or are being used inefficiently.