

# AGRICULTURAL BEST MANAGEMENT PRACTICES TECHNICAL BULLETIN

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Agricultural Best Management Practices (BMPs) refer to a set of environmentally sustainable and efficient farming techniques designed to optimize productivity while minimizing negative impacts on the environment. These practices encompass a wide range of methods, from soil conservation and water management to pest control and nutrient application. By implementing BMPs, farmers can enhance the quality of their land and water resources, improve crop yields, and ensure long-term agricultural viability. BMPs are essential for balancing economic goals with environmental stewardship, helping to promote sustainable agriculture and preserve natural ecosystems for future generations.

## Potential Resource Concerns

Potential resource concerns stem from the degradation of the soil, water, air, plant, or animal resources to the extent that the sustainability or intended use of the resource is impaired. Natural Resource Conservation Service (NRCS) quantifies or describes resource concerns as part of a comprehensive conservation planning process, that includes client objectives, human, and energy resources.

## SWAPAE | Soil, Water, Air, Plants, Animals, Energy

### *Soil*

Soil health is crucial for sustaining both agricultural productivity and the overall function of ecosystems. Soil health refers to the condition of the soil in terms of its ability to function effectively as a vital living ecosystem that sustains plant, animal, and human life. Some of the key principles of soil health include minimizing disturbance, maintaining soil cover, promoting biodiversity, and providing adequate nutrients. Practices such as







*Swales are shallow channels with gently sloping sides that are used to manage stormwater runoff. Here they can be seen along either side of the drive.*

crop rotation, cover cropping, reduced tillage, and proper nutrient management all help to enhance soil health. Additional benefits of healthy soils include increased water infiltration, reduced erosion, improved nutrient cycling, and enhanced resilience to climate change. The ultimate goal of improving and maintaining soil health is the continued capacity of the soil to function as a vital living ecosystem that sustains plants, animals, and humans.

**Example Resource Concerns:** Erosion, compaction, organic matter depletion

**Example Best Management Practices:** Heavy Use Area Protection (Sq. Ft.) (561), Cover Crop (Ac.) (340), Residue and Tillage Management, No-Till (Ac.) (329)

## **Water**

Healthy water on an agricultural operation offers numerous benefits, both for farm productivity and environmental sustainability. Clean, abundant

water is essential for irrigating crops, ensuring optimal growth, and improving overall yields. Proper water management also helps prevent soil erosion, supports healthy soil microbes, and enhances nutrient cycling. Additionally, maintaining water quality by preventing contamination from runoff or pollutants improves the health of nearby ecosystems, such as rivers, streams, and wetlands, which all benefit wildlife and support biodiversity. Healthy water resources also reduce the risk of crop diseases and pests, leading to lower input costs and better long-term farm profitability. Ultimately, well-managed water resources contribute to more resilient, sustainable farming systems and a healthier environment, not just for the farm but all those downstream as well.

**Example Resource Concerns:** Flooding, ponding, surface and groundwater depletion, nutrient and sediment transport to ground and surface water

**Example Best Management Practices:** Stream Crossing (No.) (578), Nutrient Management (Ac.) (590), Roof Runoff Structure (No.) (558)

## Air

Agriculture can contribute significantly to air pollution, impacting human health and the environment. Sources include animal waste, synthetic fertilizers, pesticides, and emissions from farm vehicles. These pollutants contribute to climate change, public health issues like heart and lung diseases, as well as water and soil quality. Solutions such as implementing conservation practices can help reduce emissions and mitigate the negative effects of agricultural air pollution.

**Example Resource Concerns:** Greenhouse gas (GHG) emissions, odor emissions

**Example Best Management Practices:** Waste Storage Facility (No.) (313), Waste Transfer (No.) (634), Air Filtration and Scrubbing (No.) (371)



A grass waterway are channels lined with vegetation to convey water runoff without causing soil erosion and protect water quality.

## Plants

Plants are integral to many NRCS conservation practices due to their ability to stabilize soil, protect stream banks and shorelines, filter pollutants, and provide food for livestock and habitat for wildlife. Additionally, they play a vital role in restoring land affected by wildfires, floods, and drought, promoting ecosystem resilience and recovery.

**Example Resource Concerns:** Pests, plant productivity and health

**Example Best Management Practices:** Grassed Waterway (Ac.) (412), Forest Stand Improvement (Ac.) (666), Field Border (Ac.) (386)

## Animals

Both domestic and wild animals are essential to the health of ecosystems and the environment. Domesticated animals, like livestock, provide valuable resources such as food and fiber, while wildlife plays a crucial role in maintaining balanced, thriving ecosystems.

**Example Resource Concerns:** Inadequate livestock shelter and water, deteriorated habitat, elevated water temperatures

**Example Best Management Practices:** Cover Crop (Ac.) (340), Riparian Forest Buffer (Ac.) (391), Forest Stand Improvement (Ac.) (666)

## Energy

Effective energy management is crucial in agriculture to enhance efficiency, lower costs, and promote environmental sustainability. Key priorities in energy use include reducing consumption, embracing renewable energy sources, and minimizing greenhouse gas emissions. Various energy-saving practices, such as optimizing equipment efficiency, incorporating alternative energy technologies like wind and solar power, and upgrading farm infrastructure to be more energy-efficient, can significantly benefit operations.

**Example Resource Concerns:** Energy efficiency of equipment and facilities

**Example Best Management Practices:** Energy Efficient Agricultural Operation (No.) (374), Energy



Efficient Building Envelope (No.) (672), Energy Efficient Lighting System (No.) (670)

## Human

Human considerations encompass social and economic factors that are integral to the planning process. This concept also includes cultural resources and historic properties. These considerations are addressed early in the planning phase, guiding planners in providing clients with the information necessary to make well-informed decisions.

**Example Resource Concerns:** Resource concerns impacting the farm or ranch operation and the environment and pressures from development and land use changes

**Example Best Management Practices:** Conservation Plan, Conservation Easements

## Conservation Plan

Planning is a crucial first step for success in any undertaking, particularly when it comes to conservation efforts on agricultural operations. A conservation plan is a site-specific action plan designed to support farmers in effectively managing their soil, water, air, plants, animal, and human resources.

This document is made in partnership with the farm operator and outlines the best management practices currently in use or planned for the near future. Having a plan in place helps ensure that valuable soil and nutrients remain on the farm, preventing runoff into nearby water sources.

## USDA | NRCS Conservation Practice Codes

The USDA Natural Resources Conservation Service (NRCS) is a federal agency dedicated to providing technical assistance, financial support, and resources to farmers, ranchers, and landowners in the United States to help conserve and manage their natural resources. Established in 1935, the NRCS works closely with communities to implement conservation practices that improve soil health, water quality, and wildlife habitat, while also enhancing agricultural productivity. Through programs such as the Environmental Quality Incentives Program (EQIP), the NRCS offers guidance and funding to adopt best management practices that support sustainable land use and mitigate the effects of climate change. By prioritizing the health of the nation's natural resources, the NRCS plays a vital role in ensuring the long-term sustainability of American agriculture and rural communities.



NRCS Nine-Step Conservation Planning Process. Diagram courtesy of NRCS.



*Above: Construction occurring on a farm.  
Right: A recently installed biochar filter on an agricultural property.*



NRCS provides technical guides which serve as the main scientific references for agriculture BMPs providing detailed information on the conservation of soil, water, air, wildlife (both domestic and wild), and energy resources, while also addressing relevant human factors. These guides are tailored to specific geographic regions, ensuring their relevance to local conditions.

The following practices are those that are recognized and supported by NRCS:

- Access Control (Ac.) (472)
- Access Road (Ft.) (560)
- Agrichemical Handling Facility (No.) (309)
- Air Filtration and Scrubbing (No.) (371)
- Alley Cropping (Ac.) (311)
- Amending Soil Properties with Gypsum Products (Ac.) (333)
- Amendments for Treatment of Agricultural Waste (au) (591)
- Anaerobic Digester (No.) (366)
- Animal Mortality Facility (No.) (316)
- Anionic Polyacrylamide (PAM) Application (Ac.) (450)
- Aquaculture Ponds (Ac.) (397)
- Aquatic Organism Passage (Mi.) (396)
- Bivalve Aquaculture Gear and Biofouling Control (Ac.) (400)
- Brush Management (Ac.) (314)
- Channel Bed Stabilization (Ft.) (584)
- Clearing and Snagging (Ft.) (326)
- Combustion System Improvement (No.) (372)
- Composting Facility (No.) (317)
- Conservation Cover (Ac.) (327)
- Conservation Crop Rotation (Ac.) (328)
- Constructed Wetland (Ac.) (656)
- Contour Buffer Strips (Ac.) (332)
- Contour Farming (Ac.) (330)
- Contour Orchard and Other Perennial Crops (Ac.) (331)
- Controlled Traffic Farming (Ac.) (334)
- Cover Crop (Ac.) (340)
- Critical Area Planting (Ac.) (342)
- Cross Wind Ridges (Ac.) (588)
- Cross Wind Trap Strips (Ac.) (589c)
- Dam (No.) (402)
- Dam, Diversion (No.) (384)
- Deep Tillage (Ac.) (324)
- Denitrifying Bioreactor (No.) (605)
- Dike and Levee (Ft.) (356)
- Diversion (Ft.) (362)
- Drainage Water Management (Ac.) (554)
- Dry Hydrant (No.) (432)
- Dust Control on Unpaved Roads and



- Surfaces (Sq. Ft.) (373)
- Dust Management for Pen Surfaces (Ac.) (375)
- Early Successional Habitat Development/Management (Ac.) (647)
- Emergency Animal Mortality Management (No.) (368)
- Energy Efficient Agricultural Operation (No.) (374)
- Energy Efficient Building Envelope (No.) (672)
- Energy Efficient Lighting System (No.) (670)
- Feed Management (Au.) (592)
- Fence (Ft.) (382)
- Field Border (Ac.) (386)
- Field Operations Emissions Reduction (Ac.) (376)
- Filter Strip (Ac.) (393)
- Firebreak (Ft.) (394)
- Fish Raceway or Tank (Ft. and Ft3) (398)
- Fishpond Management (Ac.) (399)
- Forage Harvest Management (Ac.) (511)
- Forest Farming (Ac.) (379)
- Forest Stand Improvement (Ac.) (666)
- Forest Trails and Landings (Ac.) (655)
- Fuel Break (Ac.) (383)
- Grade Stabilization Structure (No.) (410)
- Grassed Waterway (Ac.) (412)
- Grazing Land Mechanical Treatment (Ac.) (548)
- Groundwater Testing (No.) (355)
- Heavy Use Area Protection (Sq. Ft.) (561)
- Hedgerow Planting (Ft.) (422)
- Herbaceous Weed Treatment (Ac.) (315)
- Herbaceous Wind Barriers (Ft.) (603)
- High Tunnel System (Sq.Ft.) (325)
- Hillside Ditch (Ft.) (423)
- Irrigation Canal or Lateral (Ft.) (320)
- Irrigation Ditch Lining (Ft.) (428)
- Irrigation and Drainage Tailwater Recovery (No.) (447)
- Irrigation Field Ditch (Ft.) (388)
- Irrigation Land Leveling (Ac.) (464)
- Irrigation Pipeline (Ft.) (430)
- Irrigation Reservoir (Ac-Ft) (436)
- Irrigation System, Microirrigation (Ac.) (441)
- Irrigation System, Surface and Subsurface (Ac.) (443)
- Irrigation Water Management (Ac.) (449)
- Land Clearing (Ac.) (460)
- Land Reclamation, Abandoned Mined Land (Ac.) (543)
- Land Reclamation, Landslide Treatment (No. and Ac) (453)
- Lined Waterway or Outlet (Ft.) (468)
- Livestock Pipeline (Ft.) (516)
- Livestock Shelter Structure (No.) (576)
- Mine Shaft and Adit Closing (No.) (457)
- Monitoring Well (No.) (353)
- Mulching (Ac.) (484)
- Nutrient Management (Ac.) (590)
- Obstruction Removal (Ac.) (500)
- On-Farm Secondary Containment Facility (No.) (319)
- Open Channel (Ft.) (582)
- Pasture and Hay Planting (Ac.) (512)
- Pest Management Conservation System (Ac.) (595)
- Pond (No.) (378)
- Pond Sealing or Lining-Compacted Soil (Ft2) (520)
- Pond Sealing or Lining-Concrete (Ft2) (522)
- Pond Sealing or Lining-Geomembrane or Geosynthetic Clay Liner (No.) (521)
- Precision Land Forming and Smoothing (Ac.) (462)
- Prescribed Burning (Ac.) (338)
- Prescribed Grazing (Ac.) (528)
- Pumping Plant (No.) (533)
- Range Planting (Ac.) (550)
- Recreation Land Improvement and Protection (Ac.) (566)
- Residue and Tillage Management, No-Till (Ac.) (329)
- Residue and Tillage Management, Reduced Till (Ac.) (345)
- Restoration of Rare or Declining Natural Communities (Ac.) (643)
- Riparian Forest Buffer (Ac.) (391)
- Riparian Herbaceous Cover (Ac.) (390)
- Road/Trail/Landing Closure and Treatment (Ft.) (654)
- Rock Wall Terrace (Ft.) (555)
- Roof Runoff Structure (No.) (558)
- Roofs and Covers (No.) (367)
- Row Arrangement (Ac.) (557)
- Saline and Sodic Soil Management (Ac.) (610)
- Saturated Buffer (Ft.) (604)
- Sediment Basin (No.) (350)



- Seasonal Water Management for Wildlife (Ac.) (646)
- Short Term Storage of Animal Waste and Byproducts (Cubic Yards) (318)
- Silvopasture (Ac.) (381)
- Sinkhole Treatment (No.) (527)
- Spoil Disposal (Ac.) (572)
- Soil Carbon Amendment (Ac.) (336)
- Spring Development (No.) (574)
- Sprinkler System (Ac.) (442)
- Stormwater Runoff Control (Ac.) (570)
- Stream Crossing (No.) (578)
- Stream Habitat Improvement and Management (Ac.) (395)
- Streambank and Shoreline Protection (Ft.) (580)
- Stripcropping (Ac.) (585)
- Structure for Water Control (No.) (587)
- Structures for Wildlife (No.) (649)
- Subsurface Drain (Ft.) (606)
- Surface Drain, Field Ditch (Ft.) (607)
- Surface Drain, Main or Lateral (Ft.) (608)
- Surface Roughening (Ac.) (609)
- Terrace (Ft.) (600)
- Trails and Walkways (Ft.) (575)
- Tree/Shrub Establishment (Ac.) (612)

- Tree/Shrub Pruning (Ac.) (660)
- Tree/Shrub Site Preparation (Ac.) (490)
- Underground Outlet (Ft.) (620)
- Upland Wildlife Habitat Management (Ac.) (645)
- Vegetated Treatment Area (Ac.) (635)
- Vegetative Barrier (Ft.) (601)
- Vertical Drain (No.) (630)
- Waste Facility Closure (No.) (360)
- Waste Recycling (No.) (633)
- Waste Separation Facility (No.) (632)
- Waste Storage Facility (No.) (313)
- Waste Transfer (No.) (634)
- Waste Treatment (No.) (629)
- Waste Treatment Lagoon (No.) (359)
- Wastewater Treatment, Milk House (No.) (627)
- Water and Sediment Control Basin (No.) (638)
- Water Harvesting Catchment (No.) (636)
- Water Well (No.) (642)
- Watering Facility (No.) (614)
- Waterspreading (Ac.) (640)
- Well Decommissioning (No.) (351)
- Wetland Creation (Ac.) (658)
- Wetland Enhancement (Ac.) (659)
- Wetland Restoration (Ac.) (657)
- Wetland Wildlife Habitat Management (Ac.) (644)
- Wildlife Habitat Planting (Ac.) (420)
- Windbreak/Shelterbelt Establishment and Renovation (Ft.) (380)
- Woody Residue Treatment (Ac.) (384)

## Agriculture and Environment Laws and Regulations

- **Federal Clean Water Act**

The Federal Water Pollution Control Act was enacted in 1948, but the Act was significantly reorganized and expanded in 1972. This Act establishes the basic structure for regulating discharges of pollutants into the waters of the United States and regulating quality standards for surface waters. The EPA's National Pollutant Discharge Elimination System (NPDES) permit program controls discharges.



- **Pennsylvania PA Clean Streams Law**

Enacted in 1937, this law regulates any discharge which may cause or contribute to pollution of waters of the Commonwealth of Pennsylvania. This law establishes the basic authority to protect streams from pollution - for the benefit of Pennsylvania's citizens and the environment.

- Chapter 102 – Erosion & Sedimentation - Agricultural
- Chapter 105 – Water Obstructions and Encroachments
- Chapter 275 – Biosolids
- Chapter 91 – Manure Management
- Chapter 92 – Concentrated Animal Feeding Operations

- **Pennsylvania PA Act 38 of 2005**

PA Act 38's objective is to preserve water quality in Pennsylvania and to create nutrient management planning standards for certain agricultural operations. It requires development of a nutrient management plan (NMP) or nutrient balance sheet (NBS) which is administered by the State Conservation Commission.

- Nutrient Management Program
- Facility Odor Management Program
- **Pennsylvania Invasive Species**
- **Local Municipal Ordinances**
- **Pennsylvania Right to Farm Law**
- **Pennsylvania Right to Know Law**



*Tree plantings.*



## Additional Conservation Affiliates

### Natural Resource Conservation Service (NRCS)

- Provide technical assistance for plan development & implementation
- Guides the producer to other 'partners' or organizations

### County Conservation District

- Assist producers to meet their regulatory and program obligations and requirements
- Refer producers to the appropriate technical provider
- Assist in the application process for permits and financial assistance

## Pennsylvania Department of Environmental Protection (DEP)

- Program development, guidance, permit review and enforcement

## Additional Resources

- NRCS Conservation Practices: <https://www.nrcs.usda.gov/resources/guides-and-instructions/conservation-practice-standards>
- Chester County Conservation District: <https://www.chesco.org/205/Conservation-District>
- Penn State Extension: <https://extension.psu.edu/>



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