Agricultural Best Management Practices Definitions

BMP	Sector	BMP Description
Alternative Crops	Agriculture	Carbon Sequestration refers to the conversion of cropland to hay land (warm season grasses). The hay land is managed as a permanent hay land providing a mechanism for sequestering carbon within the soil. (Note: this practice has not been incorporated into the watershed model nor have specifications been developed for its use as an approved BMP)
Animal Waste Management Systems - Livestock/Poultry	Agriculture	Practices designed for proper handling, storage, and utilization of wastes generated from confined animal operations. Reduced storage and handling loss is conserved in the manure available for land application. **NRCS Codes: 313, 359, 425**
Barnyard Runoff Control	Agriculture	These practices include the installation of practices to control runoff from barnyard areas. This includes practices such as roof runoff control, diversion of clean water from entering the barnyard and control of runoff from barnyard areas. Different efficencies exist if controls are installed on an operation with manure storage or if the controls are installed on a loafing lot without a manure storage. The sediment efficiency has not been incorporated into the current watershed model but will be included in the updated model that is under development at this time. **NRCS Codes: 558**
Conservation Plans	Agriculture	Farm conservation plans are a combination of agronomic, management and engineered practices that protect and improve soil productivity and water quality, and to prevent deterioration of natural resources on all or part of a farm. Plans may be prepared by staff working in conservation districts, natural resource conservation field offices or a certified private consultant. In all cases the plan must meet technical standards. **NRCS Codes: 192, 193, 468,380,330, 331, 350, 362, 378, 392, 410, 585, 586, 589, 600, 635, 642**
Conservation Tillage	Agriculture	Conservation tillage involves planting and growing crops with minimal disturbance of the surface soil. Conservation tillage requires two components, (a) a minimum 30% residue coverage at the time of planting and (b) a non-inversion tillage method. No-till farming is a form of conservation tillage in which the crop is seeded directly into vegetative cover or crop residue with little disturbance of the surface soil. Minimum tillage farming involves some disturbance of the soil, but uses tillage equipment that leaves much of the vegetation cover or crop residue on the surface.

Cover Crops	Agriculture	Cereal cover crops reduce erosion and the leaching of nutrients to groundwater by maintaining a vegetative cover on cropland and holding nutrients within the root zone. This practice involves the planting and growing of cereal crops (non-harvested) with minimal disturbance of the surface soil. The crop is seeded directly into vegetative cover or crop residue with little disturbance of the surface soil. These crops capture or "trap" nitrogen in their tissues as they grow. By timing the cover crop burn or plow-down in spring, the trapped nitrogen can be released and used by the following crop. Different species are accepted as well as different times of planting (early, late and standard) and fertilizer application restrictions. Manure application on cover crops is not modeled and acres of cover crops that receive manure are not eligible. There is a sliding scale of efficiencies based on crop type and time of planting. **NRCS Codes: 340**
Cropland Irrigation Management (Interim)	Agriculture	Cropland under irrigation management is used to decrease climatic variability and maximize crop yields. The potential nutrient reduction benefit stems not from the increased average yield (20-25%) of irrigated versus non-irrigated cropland, but from the greater consistency of crop yields over time matched to nutrient applications. This increased consistency in crop yields provides a subsequent increased consistency in plant nutrient uptakes over time matched to applications, resulting in a decrease in potential environmental nutrient losses. The current placeholder effectiveness value for this practice has been proposed at 4% TN, 0%TP and 0%TSS, utilizing the range in average yields from the 2002 and 2007 NASS data for irrigated and non-irrigated grain corn as a reference. The proposed practice is applied on a per acre basis, and can be implemented and reported for cropland on both lo-till and hi-till land uses that receive or do not receive manure.
Decision Agriculture	Agriculture	A management system that is information and technology based, is site specific and uses one or more of the following sources of data: soils, crops, nutrients, pests, moisture, or yield for optimum profitability, sustainability, and protection of the environment.
Enhanced Nutrient Management	Agriculture	Based on research, the nutrient management rates of nitrogen application are set approximately 35% higher than what a crop needs to ensure nitrogen availability under optimal growing conditions. In a yield reserve program using enhanced nutrient management, the farmer would reduce the nitrogen application rate by 15%. An incentive or crop insurance is used to cover the risk of yield loss. This BMP effectiveness estimate is based on a reduction in nitrogen loss resulting from nutrient application to cropland 15% lower than the nutrient management recommendation. The effectiveness estimate is based on conservativeness and data from a program run by American Farmland Trust.

Forest Buffers	Agriculture	Agricultural riparian forest buffers are linear wooded areas along rivers, stream and shorelines. Forest buffers help filter nutrients, sediments and other pollutants from runoff as well as remove nutrients from groundwater. The recommended buffer width for riparian forest buffers (agriculture) is 100 feet, with a 35 feet minimum width required. **NRCS Codes: 391, 650**
Grass Buffers	Agriculture	Agricultural riparian grass buffers are linear strips of grass or other non-woody vegetation maintained between the edge of fields and streams, rivers or tidal waters that help filter nutrients, sediment and other pollutant from runoff. The recommended buffer width for riparian forests buffers (agriculture) is 100 feet, with a 35 feet minimum width required. Vegetated open channels are modeled identically to grass buffers. **NRCS Codes: 386, 393, 390**
Heavy Use Area Livestock	Agriculture	The stabilization of areas frequently and intensively used by people, animals or vehicles by establishing vegetative cover, surfacing with suitable materials, and/or installing needed structures. This does not include poultry pad installation. **NRCS Codes: 561**
Horse Pasture Management	Agriculture	Stabilizing overused small pasture containment areas (animal concentration area) adjacent to animal shelters or farmstead. **NRCS Codes: 512**
Land Retirement	Agriculture	Agricultural land retirement takes marginal and highly erosive cropland out of production by planting permanent vegetative cover such as shrubs, grasses, and/or trees. Agricultural agencies have a program to assist farmers in land retirement procedures. **NRCS Codes: 342, 412, 327**
Liquid Manure Incorporation (Interim)	Agriculture	The subsurface application of liquid manure from cattle and swine has been demonstrated in research studies to significantly reduce nutrient losses for both surface runoff and ammonia emissions. Recent studies by Pennsylvania State University (PSU) and USDA-ARS indicate that the effectiveness of the practice is dependent on the technology used for injection, and that some systems are not consistent with the USDA-NRCS management requirements for high residue management systems; e.g. Continuous No-Till. This proposed practice is indicative of low disturbance soil injection systems and is not appropriate for tillage incorporation or other post surface application incorporation methods. The current placeholder effectiveness value for this practice has been proposed at 25% TN, 0%TP and 0%TSS, utilizing a conservative estimate in combined nutrient and sediment loss reductions by current university and ARS research as a reference. The proposed practice is applied on a per acre basis, and can be implemented and reported for cropland on both lo-till and hi-till land uses that receive manure, pasture and hay with manure.
Manure Transport	Agriculture	Manure is transported by truck from the county of origin to another or out of the watershed. Manure transported to another county in the watershed results in increased manure mass in the receiving county. **NRCS Codes: 101, 103**

Mortality Composters	Agriculture	A physical structure and process for disposing of dead livestock. Composted material is combined with poultry litter and land applied using nutrient management plan recommendations. **NRCS Codes: 316, 318**
Non-Urban Stream Restoration	Agriculture	A collection of site specific engineering techniques used to stabilize an eroding streambank and channel. These are areas not associated with animal entry.
Nursery and Greenhouse Runoff Capture and Reuse(Interim)	Agriculture	This practice involves the collection of runoff water from container nursery operations where runoff of irrigation water and leachate from plant containers grown on plastic or in greenhouses is routed to lined return ditches or piped to lined holding ponds. Ponds would be designed to retaining all excess irrigation water runoff or leachate and capturing the first one-half to one-inch of stormwater runoff. Water would be recirculated for irrigation in nursery and greenhouse operations or irrigated at the proper times of year on other vegetation capable of trapping nutrients at agronomic rates, such as cool season grasses. Proposed BMP efficiency would be the same as for an animal waste storage system: 75% N reduction, 75% P reduction. This BMP is requested by Virginia DCR.
Nutrient Management	Agriculture	Nutrient management plan (NMP) implementation (crop) is a comprehensive plan that describes the optimum use of nutrients to minimize nutrient loss while maintaining yield. A NMP details the type, rate, timing, and placement of nutrients for each crop. Soil, plant tissue, manure and/or sludge tests are used to assure optimal application rates. Plans should be revised every 2 to 3 years. **NRCS Codes: 590**
Off Stream Watering Without Fencing	Agriculture	Alternative watering facilities typically involves the use of permanent or portable livestock water troughs placed away from the stream corridor. The source of water supplied to the facilities can be from any source including pipelines, spring developments, water wells, and ponds. In-stream watering facilities such as stream crossings or access points are not considered in this definition. The modeled benefits of alternative watering facilities can be applied to pasture acres in association with or without improved pasture management systems such as prescribed grazing or PIRG. They can also be applied in conjunction with or without stream access control. **NRCS Codes: 382, 574, 614, 728**

Phosphorus-sorbing Materials in Ag Ditches (PSMs) (Interim)	Agriculture	The University of Maryland and the USDA Agricultural Research Service (ARS) have demonstrated through an existing research project at the University of Maryland-Eastern Shore the application of “Phosphorus-sorbing” materials to absorb available dissolved phosphorus in cropland drainage systems for removal and reuse as an agricultural fertilizer. These in-channel engineered systems can capture significant amounts of dissolved phosphorus in agricultural drainage water by passing them through phosphorus-sorbing materials, such as gypsum, drinking water treatment residuals, or acid mine drainage residuals. The current placeholder effectiveness value for this practice has been proposed at 0% TN, 40%TP and 0%TSS, utilizing a conservative estimate in phosphorus removal measured by the UMD/ARS research project as a reference. The proposed practice is applied on a per acre basis, and can be implemented and reported for cropland on both lo-till and hi-till land uses that receive or do not receive manure. Based upon the documentation, the proposed practice is currently limited to Coastal Plain soils with shallow groundwater levels requiring drainage ditches for agricultural production.
Poultry Litter Treatment	Agriculture	Litter amendments like alum suppress the formation of ammonia from ammonium in litter. Biofilters attached to animal enclosure ventilation systems detoxify ammonia. Lagoon covers prevent volatilization from loss due to wind. Reduced NH3 emission is conserved in the manure available for land application.
Poultry Manure Incorporation (Interim)	Agriculture	The subsurface injection of poultry manure has been demonstrated in university and USDA-ARS research studies to significantly reduce nutrient losses for both surface runoff and ammonia emissions. Recent studies by universities and USDA-ARS indicate that dry manure injection is feasible and effective by utilizing current research technology. These systems are also consistent with the USDA-NRCS management requirements for high residue management systems; e.g. Continuous No-Till. This proposed practice is indicative of low disturbance soil injection systems and is not appropriate for tillage incorporation or other post surface application incorporation methods. The current placeholder effectiveness value for this practice has been proposed at 25% TN, 0%TP and 0%TSS, utilizing a conservative estimate in combined nutrient and sediment loss reductions by current university and ARS research as a reference. The proposed practice is applied on a per acre basis, and can be implemented and reported for cropland on both lo-till and hi-till land uses that receive manure, pasture and hay with manure.

Poultry Phytase	Agriculture	Phytase is an enzyme added to poultry-feed that helps poultry absorb phosphorus. The addition of phytase to poultry feed allows more efficient nutrient uptake by poultry, which in turn allows decreased phosphorus levels in feed and less overall phosphorus in poultry waste. The use of phytase is a best management practice (BMP). In Scenario Builder, no poultry automatically have the phytase feed additive. The values of implementation are reported by the Chesapeake Bay jurisdictions each year as part of their annual progress reports.
Precision Intensive Rotational Grazing	Agriculture	This practice utilizes more intensive forms pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and reduce the impact of animal travel lanes, animal concentration areas or other degraded areas of the upland pastures. PIRG can be applied to pastures intersected by streams or upland pastures outside of the degraded stream corridor (35 feet width from top of bank). The modeled benefits of the PIRG practice can be applied to pasture acres in association with or without alternative watering facilities. They can also be applied in conjunction with or without stream access control. This practice requires intensive management of livestock rotation, also known as Managed Intensive Grazing systems (MIG), that have very short rotation schedules. Pastures are defined as having a vegetative cover of 60% or greater.
Prescribed Grazing	Agriculture	This practice utilizes a range of pasture management and grazing techniques to improve the quality and quantity of the forages grown on pastures and reduce the impact of animal travel lanes, animal concentration areas or other degraded areas. PG can be applied to pastures intersected by streams or upland pastures outside of the degraded stream corridor (35 feet width from top of bank). The modeled benefits of prescribed grazing practices can be applied to pasture acres in association with or without alternative watering facilities. They can also be applied in conjunction with or without stream access control. Pastures under the PG systems are defined as having a vegetative cover of 60% or greater. **NRCS Codes: 528**

Stream Access Control with Fencing	Agriculture	Stream access control with fencing involves excluding a strip of land with fencing along the stream corridor to provide protection from livestock. The fenced areas may be planted with trees or grass, or left to natural plant succession, and can be of various widths. To provide the modeled benefits of a functional riparian buffer, the width must be a minimum of 35 feet from top-of-bank to fence line. If an entity is installing a riparian buffer practice in conjunction with stream protection fencing, and can track and report these installations, additional upland benefits of those riparian buffers can be applied in the model. The implementation of stream fencing provides stream access control for livestock but does not necessarily exclude animals from entering the stream by incorporating limited and stabilized in-stream crossing or watering facilities. The modeled benefits of stream access control can be applied to degraded stream corridors in association with or without alternative watering facilities. They can also be applied in conjunction with or without pasture management systems such as prescribed grazing or PIRG. **NRCS Codes: 382, 574, 614, 728**

Vegetative Environmental Buffers (VEB) (Interim)	Agriculture	A vegetative environmental buffer, or VEB, is the strategic dense planting of combinations of trees and shrubs around poultry houses to address environmental, production, and public relations issues. Research conducted by the University of Delaware have indicated that mature tree plantings can offer filtration benefits for poultry operations by entrapping dust, odor, feathers, and noise emitted by air exhaust from ventilation systems. Documentation on the effectiveness of VEB's in reducing nitrogen losses to the environment through ammonia emission reductions is currently non-conclusive. The current placeholder effectiveness value for this practice will be described as a land use change for the area directly planted to trees and shrubs. The proposed practice is applied on a per acre basis, and results in a conversion to forest land from cropland, on both lo-till and hi-till land uses that receive manure or do not receive manure, pasture or hay land with or without nutrients. It's important to note that a recent scientific analysis report from the University of Maryland/Mid-Atlantic Water Program, funded by EPA, indicated that the practice has not undergone a science-
Water Control Structures	Agriculture	Installing and managing boarded gate systems in agricultural land that contains surface drainage ditches. **NRCS Codes: 587**
Wetland Restoration	Agriculture	Agricultural wetland restoration activities re-establish the natural hydraulic condition in a field that existed prior to the installation of subsurface or surface drainage. Projects may include restoration, creation and enhancement acreage. Restored wetlands may be any wetland classification including forested, scrub-shrub or emergent marsh. **NRCS Codes: 657, 658**

Adapted from:

USEPA (U.S. Environmental Protection Agency). 2010d. Estimates of County Level Nitrogen and Phosphorus Data for Use in Modeling Pollutant Reductions. December 2010. U.S. Environmental Protection Agency, Region 3 Chesapeake Bay Program Office, Annapolis, MD.