# 6 Section 6: BMPs

## 6.1 Introduction

The primary purpose of the Phase 6 Watershed Model within the Chesapeake Bay Program Partnership is the prediction of change in load due to management actions. Best Management Practice (BMP) efficiency factors are one of the main ways to represent the effect of management actions. Figure 6-1 at right shows the overall structure of the Phase 6 Watershed Model. The majority of BMP types are conceptualized as shown in Figure 6-1 by reducing the load a given percentage as it moves from the field scale to the watershed scale.

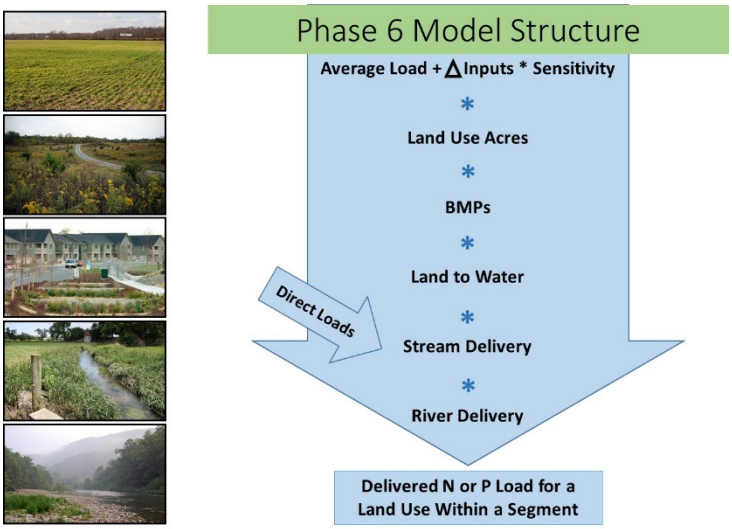


*Figure 6-1: Phase 6 Model Structure*

The Phase 6 Model represents the effects of BMPs that do not fit into the conceptual model of Figure 6-1 through other means. Some types of BMPs reduce loads by a given mass rather than a percentage. Other BMPs may change load source acreages. BMPs that change input loads are discussed both in this Section and Section 3.

## 6.2 Protocol for adding or modifying BMPs

The BMPs that are available for credit in the Phase 6 Watershed Model have been approved by the Partnership according to the Chesapeake Bay Program's BMP protocol (Chesapeake Bay Program 2015a), also attached as Appendix 6A. BMP expert panels consisting of recognized authorities on the implementation and effects of individual BMPs are convened to develop the BMP efficiency estimates, load reduction estimates, or other specifications necessary for the simulation of BMP effects. The Water Quality Goal Implementation Team (WQGIT) and its workgroups are responsible for reviewing the reports of the BMP expert panels. The WQGIT must approve the panel reports prior to the BMPs being used in the Phase 6 Watershed Model. Since the definitions and values used for both loading and efficiency estimates have important implications for the Chesapeake Bay Program and the various partners, it is critical that they be developed in a process that is consistent, transparent, and scientifically defensible.

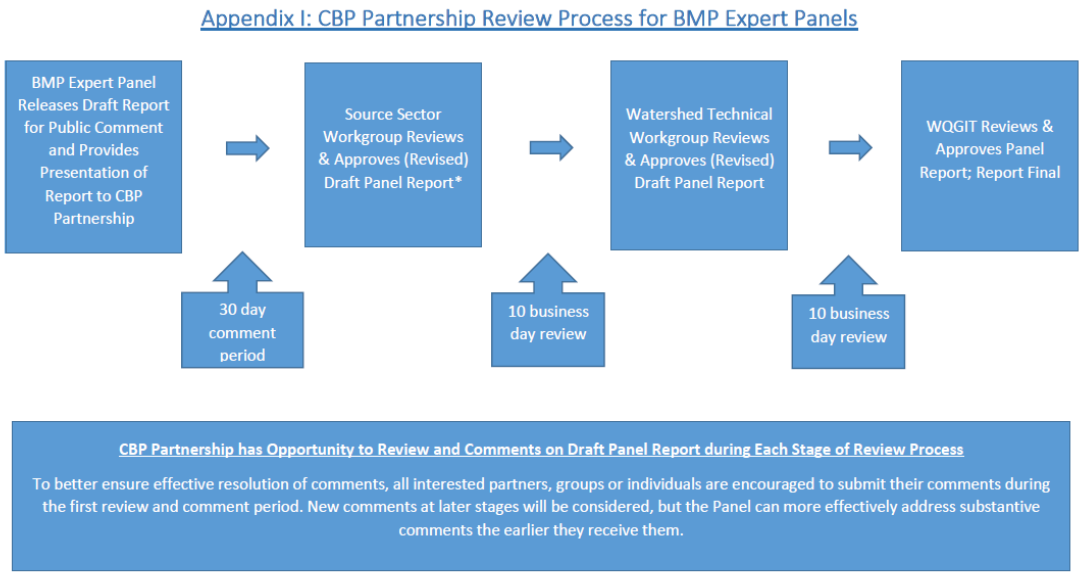


*Figure 6-2: BMP review process*

Figure 6-2 shows the partnership review process for BMP Expert Panels. The panel report approval process includes public comment and reviews from the relevant source sector workgroup or workgroups, the Watershed Technical Workgroup, and the Water Quality Goal Implementation Team.

As of this writing, BMP panel information is kept up to date at the following web site: http://www.chesapeakebay.net/groups/group/bmp_expert_panels. BMP data are kept current on the CAST home page in the spreadsheet under 'source data,' and are updated to reflect Phase 6 changes. http://cast.chesapeakebay.net/. This section covers the primary methods of BMP simulation. For brevity, some of the details that apply to individual BMPs are omitted. Each expert panel report contains a technical appendix that discusses the exact method of implementation in the Phase 6 Watershed Model. Readers interested in the simulation of a particular BMP should consult the appropriate technical appendix.

## 6.3 Types of BMPs

BMPs may be classified into types based on how they are calculated. Six common types are described. Exceptions are addressed in Section 6.6.

### 6.3.1 Load Source Change Practices

Load source change practices simply exchange acreage of one load source acre for a different load source. For example, Tree Planting can alter an acre of pasture to an acre of forest. By changing from a higher-loading load source to a lower-loading one, nutrients are automatically reduced on that acre of land. Each additional acre of load source change typically results in a lower load for a given geographic area, such as a county, but too much land conversion could result in higher loads since a given amount of manure and fertilizer in a county would be applied at higher rates to a smaller number of acres.

Load source change BMPs are not applied to historical land uses since those land use changes would already be present in the data used to generate the historical land use. For example, Tree Planting in the past would be detected as forest by a satellite image and not reported as pasture in an Agricultural Census. The acreage of a Load Source Change BMP applied is a scenario is calculated as the difference between the amount submitted in a scenario and the amount in the scenario used to project the land use for that scenario year. The term typically used to describe this calculation is "backout". The backout calculation avoids double-crediting acres of a land use submitted as a BMP that already are present in the data used to create the initial land use for that year. The amount backed-out is the amount submitted in the immediately preceding year until 2012. After 2012, the amount backed-out is the amount submitted in 2012. There is no backout in the Everyone-Everywhere-Everything (E3) scenario.

### 6.3.2 Efficiency values

An efficiency value is a percentage of a pollutant that is removed when the BMP is applied. For example, Dry Extended Detention Ponds remove 20% of nitrogen that would have been delivered without the Detention Ponds. A pass-through value for a BMP is calculated and is simply 100% minus the efficiency value. In this case, the pass-through value for Dry Extended Detention Ponds is 80%. Efficiency values of practices can vary across hydrogeomorphic region and load source.

### 6.3.3 Load source change with efficiency values

Some BMPs work as both a load source change and an efficiency BMP. In these cases, the load source change is calculated first, and then an efficiency is applied to an additional number of acres of the original load source. The load source change BMPs that also have an efficiency value are: grass buffers, grass buffer-streamside with exclusion fencing, forest buffers, forest buffer-streamside with exclusion fencing, wetland creation for floodplain and headwater and wetland restoration for floodplain and headwater. It is assumed that the presence of these BMPs reduces the amount of nutrients delivered from upland acres as water and nutrients move through the soil matrix. Figure 6-3 illustrates an example of a forest buffer applied to agricultural land. An agricultural forest buffer is applied to 10 acres, converting those 10 acres of agricultural land to forest land. There is a nitrogen efficiency that treats four times the acres converted.

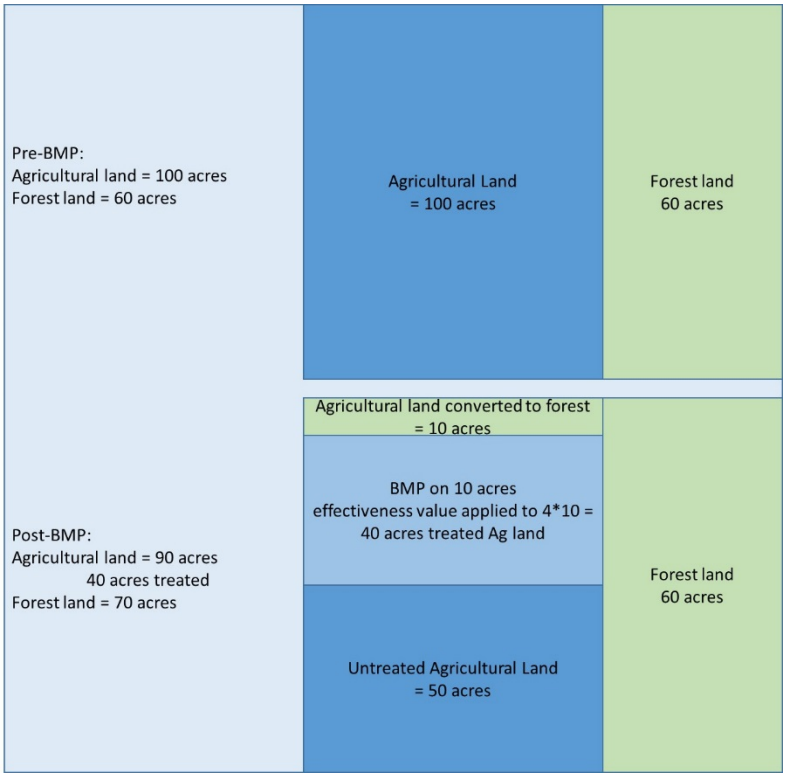

*Figure 6-3: Load source change with efficiency example*

If Figure 6-3were illustrating phosphorus or sediment, only two times the acres are treated. For urban land, the upland acres receiving the efficiency are a one to one ratio with the acres converted. When a BMP is

put on a specific load source, the benefit of the efficiency BMP is applied to all load sources within that group. For example, if put on pasture, then the efficiency is applied to all agricultural load sources.

There is no backout applied to the efficiency portion of load source change BMPs. In the example of Figure 6-3, a forest buffer applied in a past scenario would not have any agricultural land converted to forest, but would still receive the BMP effectiveness on 40 acres of agricultural land.

### 6.3.4 Animal BMPs

These BMPs are applied to the animal manure for specific animal types and can change loads in several ways. Some animal BMPs, like Dairy Precision Feeding, reduce the concentration of nitrogen or phosphorus in a ton of manure. Other animal BMPs relocate the manure from one load source to another, such as with Animal Waste Management Systems. Some animal BMPs reduce the amount of nitrogen deposited on the feeding space, such as Poultry Litter Amendments.

Figure 6-4 shows the impact of animal BMPs on the loads in the model. When load input reduction BMPs, like manure transport or feed additives, are used, then the manure application decreases in that geography. However, the crop need is not changed so inorganic fertilizer makes up the difference in the crop need. Manure load input reduction BMPs typically have little effect on nitrogen loads. Nutrients are applied to meet the nitrogen crop need, which typically results in an over application of phosphorus where manure is the nutrient source. Load input reduction BMPs will typically produce a phosphorus reduction where manure becomes less available and inorganic fertilizer is used as the nutrient source.

Animal waste management BMPs reduce the amount of manure that is lost during manure storage. That manure becomes available to spread on crops. Thus, the load on the animal feeding operation and concentrated animal feeding operation load sources decrease, but the load from manure on the crop land increases. In these cases, the crop need is met at the same level as before the BMP, but with more manure than inorganic fertilizer. Where there was an excess of crop nutrient requirements, this same excess is applied but in the form of manure. Thus, animal waste management BMPs can result in higher loads on some load sources even as loads on animal feeding operations decrease. It is recommended that the BMP be combined with Nutrient Management Application Rate reduction if it is anticipated that fewer nutrients will be applied.

Concurrent to the BMP impacts, reduction of agricultural land can decrease the acres available for manure application. Development of rural areas and BMPs, such as grass and forest buffers or retirement of highly erodible land, reduce the acres of land available to receive manure. Even where the amount of manure remains the same, the application rate may increase because of the reduction of acres.

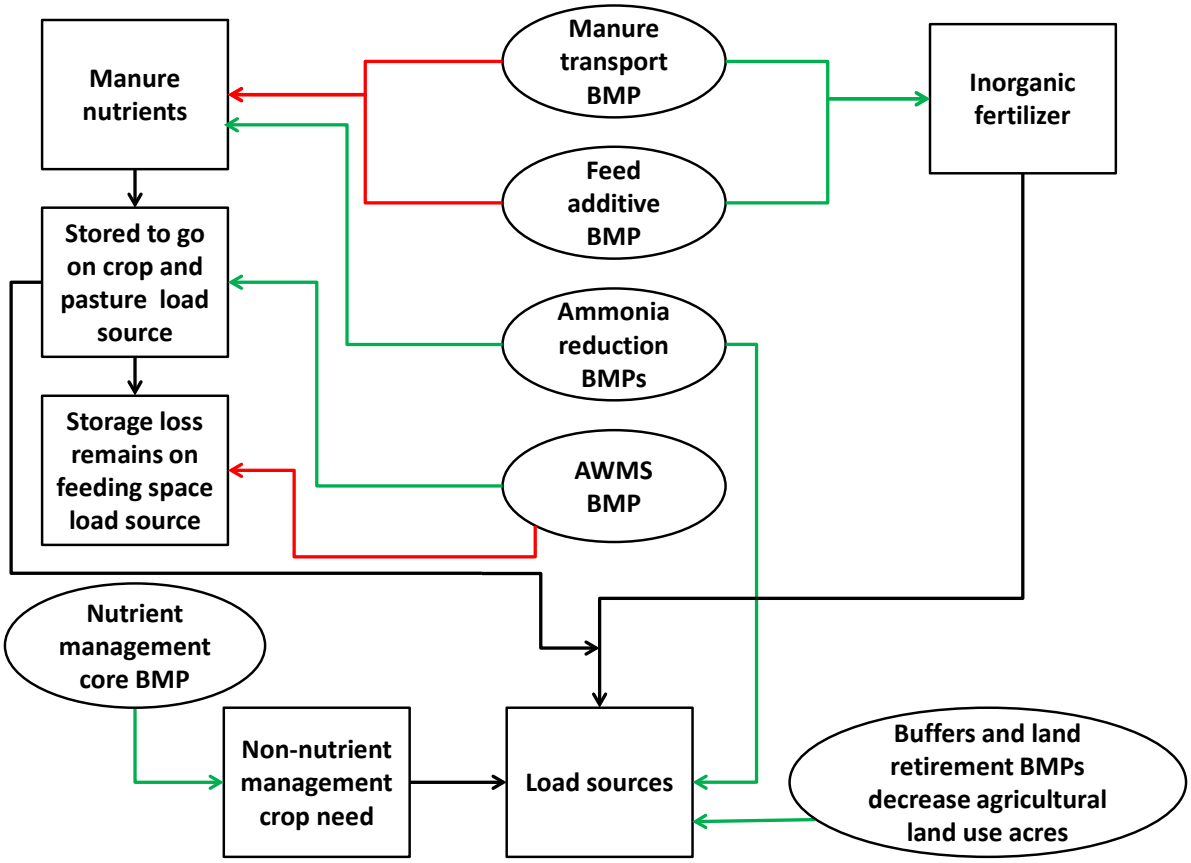


*Figure 6-4: Impact of Animal BMPs on Loads. Red arrows indicate decreasing amounts; green arrows indicate increasing amounts; black arrows indicate calculation procedures. All manure storage loss stays on feeding space load sources. For any scenario that is post 2012, fertilizer is projected and the green arrow showing an increase is correct. For 2012 and earlier, we have actual fertilizer data and the fertilizer amount does not change. Nutrient management core BMP only impacts the non-nutrient crop need.*

### 6.3.5 Load Source Input Reduction Practices

Some BMPs directly modify the amount of nutrients applied to each acre of land. These practices alter the inputs in the top line of Figure 6-1. Animal BMPs in Section 6.3.4 are a subset of load source input BMPs. Changes in atmospheric deposition, fixation, crop uptake and other inputs also fall into this category. The reduced application rate is taken into account before applying efficiency BMPs or load reduction practices.

### 6.3.6 Load reduction

Load reduction BMPs include algal flow-way, oyster aquaculture, stream restoration, shoreline management, dirt and gravel roads, street sweeping, and storm drain cleaning. These are modeled as a simple removal of pounds of nitrogen, phosphorus, and/or sediment from the edge-of-stream, edge-of-river or edge-of-tide load. For every unit of BMP submitted, such as feet, an amount of nitrogen, phosphorus, or sediment is removed. In some cases, the amount submitted is the pound of nitrogen, phosphorus and/or sediment removed.

## 6.4 Calculating total pass-through factors

Just as each acre of land on the landscape may be impacted by multiple practices which reduce nutrient runoff, each acre in the BMP efficiency calculation can have multiple practices contributing to a final pass-through factor. Sets of BMPs that cannot physically occupy the same acre of land, such as two separate types of cover crop, are known as mutually exclusive BMPs. All other BMPs are assumed to be randomly distributed in an area so that the probability of overlap increases as the implementation level of each BMP increases.

Mutually exclusive BMPs can be thought of as 'additive' since their efficiencies are added together. For example, if 50 acres of a 100-acre load source have cover crop 'A' and 50 acres have cover crop 'B' and both BMPs result in a 12% reduction on covered acres, then cover crop 'A' effects a 6% reduction over the entire 100 acres as does cover crop 'B'. The individual percentages can be added to arrive at a 12% total reduction for the load source.

Alternatively, consider overlapping BMPs on a 100 acre load source with 100 acres of cover crop at 12% reduction and 100 acres of a nutrient input reduction BMP with an 8% reduction. The reductions are not additive since they apply to the same areas. The second BMP that is applied would have an 8% reduction on the reduced load (the reduced load is 88% of original load). Thus the overall reduction is 19.04% (1.00 - [1.00 – 0.08] × [1.00 – 0.12]). BMPs that can be applied to the same acre are called overlapping or 'multiplicative' due to the nature of their calculation.

To generate the total efficiency of all BMPs for a single load source, the aggregate efficiency of sets of mutually exclusive BMPs are first calculated, and then overlapping BMP sets are combined with the previously calculated sets. A pass-through factor is calculated within the load source, land-river segment, agency, and for nitrogen, phosphorus and sediment. Within a group of mutually exclusive BMPs, a single pass-through factor is calculated using Equation 6-1. This equation is valid even when there is only one BMP within a group.

*Equation 6-1: BMP group pass-through factor*

$$F_{glrp} = 1 - \sum_{k=1}^{n_g} \left[\frac{A_{klr}}{T_{lr}}\right] E_{kp}$$

Where:
$F$ = pass-through factor
$g$ = BMP group
$l$ = load source
$r$ = land-river segment
$p$ = pollutant
$n_g$ = total number of BMPs in BMP group $g$
$A_{klr}$ = implementation acres for BMP $k$, load source $l$ and land-river segment $r$
$T_{lr}$ = total acres available for load source $l$ and land-river segment $r$
$E_{kp}$ = effectiveness value for BMP $k$ and pollutant $p$

**Example: Group Pass-Through Calculation**

Assume the total available acres for a specific load source on a land-river segment is 2,000 acres. Further assume that three mutually exclusive BMPs are applied to 100, 400, and 500 acres of the load source. These BMPs have effectiveness values of 8%, 5% and 10%, respectively. The pass-through factor, using Equation 6-1, is as follows:

*0.961 = 1 – ((100 acres/2000 acres × 0.08) + (400 acres/2000 acres × 0.05) + (500 acres/2000 acres × 0.1)*

The group pass-through factors are then combined with pass-through factors from other BMP groups to allow each acre to receive treatment by multiple overlapping BMP groups. This is done by multiplying all the group pass-through values together as shown in Equation 6-2. This is done for every load source in each land-river segment for each agency. An overall pass-through factor is calculated by multiplying the pass-through for each group. The result will necessarily be less than or equal to one. If the result is one, then all pollutants pass-through and there are no BMP reductions.

*Equation 6-2: All groups pass-through factor*

$$FO_{lrp} = \prod_{g=1}^{G} F_{glrp}$$

Where:
FO = overall pass-through factor

**Example: Overall Pass-Through Factor with Two BMP Groups**
If a specific load source has two BMP groups applied to it, and the pass-through factors are 0.961 and 0.95, then the overall pass-through factor is as follows:

0.91295 = 0.961 × 0.95

## 6.5 Application methods

BMPs are compiled for each scenario. These may be available on a spatial scale different from the load source and land-river segment scale of the Watershed Model. There may be conflicts for the maximum available load source to apply the BMPs for both load source change BMPs and efficiency BMPs. The following rules are applied to arrive at the final BMP data set for each scenario.

### 6.5.1 Spatial distribution

BMPs are always applied to the model at the smallest spatial scale – a single load source in a single land-river segment for an agency. The load sources include classifications of land with area as well as sources that are direct loads to a stream that do not have an area attributed to the source. An example of a load source with an area is turfgrass. An example of a load source without an area is riparian pasture deposition. Land-river segments are the smallest scale at which the model calculates loads. Land segments are portions of counties. River segments are stream reaches and the area adjacent to that stream reach. The intersection of a land segment and river segment is a land-river segment. For a more complete description and land-river segments, see Section 11. The spatial distribution also includes agencies. Agencies are designations of federal and non-federal areas within a land river segment. There are nine federal agencies and three non-federal agencies. Of the three non-federal agencies, two are specific to Maryland only.

States can submit BMPs through the National Environmental Information Exchange Network (NEIEN) at a variety of scales. When BMPs are submitted at a level coarser then land-river segment, they are disaggregated proportionately based on the acres of the receiving load source in each land-river segment that comprises the aggregation.

Annual implementation of BMPs are submitted to NEIEN, which is used for tracking annual progress of implementation, by latitude and longitude, county, state, or hydrologic unit code (HUC). HUC scales are available on even numbers from four to 12. For geographic areas that cross the Chesapeake Bay Watershed boundary, data can be submitted either by the entire county or for just the portion that is inside the watershed. For example, Chester County in Pennsylvania is mostly outside of the Chesapeake Bay Watershed (CBWS). BMPs can be submitted for Chester (CBWS-only) or the entire county and assumed to be evenly spread throughout the county.

For planning scenarios, such as Milestones and WIPs, larger spatial aggregations are typically specified. The Source Data available in CAST lists the geographies that can be used for BMP submittal.

### 6.5.2 Load source groups

BMPs can be submitted on defined load source groups. When submitted as a group, BMPs are divided according to the fraction of each area or load that comprises the group. The load source groups are provided in the spreadsheet under 'source data,' (see http://cast.chesapeakebay.net/). The tab is named "Load Source Group Components".

### 6.5.3 Order of load source change BMPs

Load source change BMPs that are applied to the same load source may be limited by the amount of load source available in that land-river segment for that agency. They are applied in an order such that BMPs higher on the list will be preferentially credited. Appendix 6B shows the order and the load source that the BMP modifies. This information is also available in the Source Data table on the CAST website.

Animal and load input BMPs are credited prior to the efficiency BMPs. The load reduction BMPs are credited last.

### 6.5.4 Enforcing maximum implementation values

BMP implementation values are capped at the available load source. The sum of BMPs for a load source and land-river segment and agency cannot exceed the available area. If this condition occurs, each BMP is reduced proportionally so that the sum of all the area equals the available area. An example follows:

*Submitted BMP amount:*

Total acres = 100
Cover Crop Traditional Barley Early Drilled = 90%
Cover Crop Traditional Forage Radish Plus Early Aerial = 60%

*Model Calculates:*

Barley acres: 90/(90+60)% × 100 = 60
Forage radish acres: 60/(90+60)% × 100 = 40

*Result:*

Barley acres = 60
Forage radish acres = 40

When using CAST download the "BMPs Submitted vs. Credited" report from the reports page to verify that acres were available.

## 6.6 BMP Exceptions

The BMPs listed below do not follow the rules defined for the BMP types identified in Section 6.3: Types of BMPs. Factors referenced may be found in the Source Data tables downloadable from http://cast.chesapeakebay.net.

### 6.6.1 Animal BMP exceptions

Animal Waste Management Systems (AWMS) store manure until it is needed by the crop during the growing season. This BMP moves manure from the feeding space load source to the crop and pasture load sources. Nutrient runoff is less likely from crop load sources than from feeding space load sources.

Animal Manure Biofilters trap ammonia in a filter that otherwise would have volatilized. The filter is then landfilled, and that load is not considered in the agricultural load.

Dairy Precision Feeding and/or Forage Management reduces the concentration of nutrients in dairy manure. There is less nitrogen and phosphorus per ton of manure than if this BMP were not used.

Lagoon Covers and Poultry Litter Amendments (alum, for example) reduce volatilization of manure in the feeding space load source so the manure that is spread on crops has more plant available nitrogen. A portion of the ammonia that would have been volatilized is deposited locally and is credited by the model to the edge-of-tide load for the load source and land-river segment to which the BMP is applied. Analysis of edge-of-stream loads will not show this BMP's effect since it is applied to the edge-of-tide load.

It should also be noted that these BMPs can create a negative load for feeding space in the calculation at the edge-of-tide. This result is expected. Feeding space BMPs may reduce atmospheric deposition loads, transported to the tidal waters, by more than the amount of runoff which makes it to tidal waters from that facility. The overall load is still positive in reality, but in the Phase 6 Model as an accounting system, the atmospheric deposition that is produce by the feeding space with no cover or amendment BMP is counted in the base atmospheric deposition load, rather than attributed to the feeding space land use.

Mortality Composters are intended to reduce the load from animals that die before sale. Since animal numbers are generated from sales data, there is no load to apply this reduction.

Poultry Nutrient Reduction is intended to reflect reductions in nitrogen and/or phosphorus in litter. The current nutrient concentrations already include reductions due to the phytase enzyme feed additive. This reduction is for an innovation other than phytase.

### 6.6.2 Efficiency BMP exceptions

Manure Injection and the Manure Incorporation BMPs are modeled with efficiencies and reduce the amount of field-volatilized ammonia. This allows more manure nitrogen to be plant available and less inorganic fertilizer is required.

Nutrient Management Core impacts crop acres not reported as Nutrient Management Core. The non-nutrient management acres have a factor applied to increase the nutrients applied, where the manure and fertilizer nutrients are available. This BMP may be applied to crop and pasture load sources; however; there are no changes to the pasture load sources.

Stormwater Performance Standard (Runoff Reduction and Stormwater Treatment) require multiple measures including acres treated, impervious acres and acre-feet of water captured. From this information, the efficiency is determined using a curve. The efficiency of each project or group of projects is determined by the area of impervious acres being treated and the total volume of water being treated. Curves describing these relationships were developed by the Stormwater Performance Standards Expert Panel (Comstock and others 2015).

Erosion and Sediment Control was an exception in prior versions of the model, but is no longer. The BMP is applied solely to the construction load source. In previous versions of the model the acres reported in excess of acres available were applied to the other developed load sources.

Forest Harvesting Practices was an exception in prior versions of the model, but is no longer. The BMP is applied solely to the harvested forest load source. In previous versions of the model the acres reported in excess of acres available were applied to the forest load source.

The six Wetland BMPs are submitted on the wetland load source. The Wetland Create floodplain and headwater, Wetland Enhance, and Wetland Rehabilitate BMP efficiencies are applied to agricultural load sources in the segment and the agency on which the BMP is reported. The Wetland Restore floodplain efficiency is applied to two, three or six times the amount reported for nitrogen and phosphorus depending on location. The Wetland Restore headwater efficiency is applied to one, two, or four times the amount reported for nitrogen and phosphorus depending on location. The differentiation is based on county and fits into categories of whether the county is on the eastern or western shore of the Chesapeake Bay or neither shore. Wetland BMPs may be submitted on agricultural load sources and any agency. Since federal agencies have the wetland load sources, but no agricultural load sources, there will be no agricultural land to which to apply the efficacy, so federal agencies will see no load change from this BMP.

### 6.6.3 Load source change BMP exceptions

Forest Buffer is both a load source change and efficiency BMP. The efficiency is applied to four times the amount reported for nitrogen and two times the amount reported for phosphorus and sediment on agricultural land. On developed land, the efficiency is applied to the same number of acres as were reported for both nitrogen and phosphorus.

Grass Buffer is both a load source change and efficiency BMP. The efficiency is applied to four times the amount reported for nitrogen and two times the amount reported for phosphorus and sediment on agricultural land. This BMP may be applied to developed land but has no effect; the change is from the developed land use to the same developed land use.

The Forest Buffer with Exclusion Fencing Streamside BMP reduces the amount of manure applied to the riparian pasture load source and applies the manure to the pasture load source. The acres submitted convert the land to forest. The efficiency is applied to four times the amount reported for nitrogen and two times the amount reported for phosphorus and sediment on pasture land. A user may enter units of feet of fence or acres excluded by the fence. There are 17.6 animal units excluded for every 1,000 feet of fencing. Acres are converted to length if the user enters a width. If width is not entered, 35 feet is used for streamside buffer and 10 feet is used for narrow buffer. Widths less than 35 feet must use the Forest Buffer-Narrow with Exclusion Fencing BMP. Widths greater than 34 feet must use the Forest Buffer – Streamside with Exclusion Fending BMP. The manure is then applied to pasture instead of

riparian pasture deposition. Forest Buffers Narrow with Exclusion Fencing works the same way but without the upland efficiency.

The Grass Buffer with Exclusion Fencing Streamside BMP reduces the amount of manure applied to the riparian pasture load source and applies the manure to the pasture load source. The acres submitted convert the land to agricultural open space. The efficiency is applied to four times the amount reported for nitrogen and two times the amount reported for phosphorus and sediment on pasture land. A user may enter units of feet of fence or acres excluded by the fence. There are 17.6 animal units excluded for every 1,000 feet of fencing. Acres are converted to length if the user enters a width. If width is not entered, 35 feet is used for streamside buffer and 10 feet is used for narrow buffer. Widths less than 35 feet must use the Grass Buffer-Narrow with Exclusion Fencing BMP. Widths greater than 34 feet must use the Grass Buffer – Streamside with Exclusion Fending BMP. Grass Buffers Narrow with Exclusion Fencing does not have the upland efficiency. Grass Buffers Narrow with Exclusion Fencing may be submitted in units of percent or the same units as the non-narrow version of the BMP.

Abandoned Mine Reclamation BMP is a load source change. It results in no load reduction since the change is from mixed open to the mixed open load source.

### 6.6.4 Load reduction BMP exceptions

Storm Drain Cleaning is a load reduction BMP that reduces the pounds of nitrogen, phosphorus and sediment based on a formula developed by the Expert Panel. Expert panel reports are available at http://www.chesapeakebay.net/groups/group/bmp_expert_panels.

Shoreline Erosion Control Non-Vegetated is submitted in feet and pounds. The feet are not used and the sediment pounds reported are reduced from the edge-of-tide shoreline load source.

Shoreline Management is submitted in feet. There is a reduction factor per foot that is used to determine the sediment pounds reduced from the edge-of-tide shoreline load source.

Shoreline Erosion Control Vegetated is submitted in feet and acres and/or pounds. The feet are not used and the acres are converted to pounds and reduced from the edge-of-tide shoreline load source. Where sediment pounds also are submitted, these are also reduced from the edge-of-tide shoreline load source.

Stream Restoration and Stream Restoration Protocol BMPs are submitted in feet and pounds reduced. The sediment pounds reported are reduced from the streambed and bank load source. If only acres are reported, the nitrogen, phosphorus and sediment pounds are reduced using a factor relating acres to pounds. This BMP can be submitted in excess of the stream bed and bank nitrogen, phosphorus and sediment amounts and there is no maximum amount of stream feet to which the BMP is applied. Thus, this BMP may drive the load negative from the Stream Bed and Bank load source. This is balanced by the positive load from the other load sources in a geographical area.

Site-Specific Monitored Oyster Aquaculture is reported as the number of oysters and pounds reduced. The number of oysters is not used in calculations and the pounds reported are reduced from the shoreline load source at the edge-of-tide load.

### 6.6.5 Load input reduction BMP exceptions

All Manure Compost, Manure Treatment Combustion, Pyrolysis, Aeration, Gasification, and Rotating Bin BMPs are submitted with an amount of animal manure from a source county and to a recipient county. The nitrogen in the recipient county is reduced from the source county's nitrogen. A portion of the reduced nitrogen amount is applied to the feeding space load source in the source county at the edge-of-tide, thereby increasing the atmospheric deposition on the feeding space at the edge-of-tide. Analysis of edge-of-stream loads will not show this BMP's full effect since some of the nitrogen is applied to the source county's edge-of-tide load. A full discussion of the calculation of the amount of atmospheric deposition and how it is credited is discussed in detail in Section 4.6.

Manure Treatment Direct Monitor is similar to the other Manure Treatment BMPs except that the amount of nitrogen reduced also is reported. This amount reduced is used instead of a factor.

### 6.6.6 BMPs on Combined Stormwater and Sewer and Septic Connections

Any BMP applied to the load sources that are in combined stormwater and sewer areas (CSS) are credited through the reported wastewater data. CSS areas discharge through a point source that reports loads. The BMPs in these areas are impacting those loads from the point source. To avoid double counting the impact of those BMPs, the monitored wastewater loads are used and not the estimated reductions from the BMPs in those areas.

The septic connection BMP eliminates the septic system and its load. The load that used to go to the septic system then goes to the waste water load. As with the CSS load, the wastewater loads are monitored and there is no need to reassign the septic load.