



**MARYLAND POLICY  
FOR NUTRIENT CAP MANAGEMENT  
AND TRADING IN MARYLAND'S  
CHESEAPEAKE BAY WATERSHED  
PHASE II – A  
GUIDELINES FOR THE GENERATION OF  
AGRICULTURAL NONPOINT NUTRIENT CREDITS**

Maryland Department of Agriculture  
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**Draft**

**“Not for Regulatory Purposes”**



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# **Maryland's Guidelines for the Generation of Agricultural Non-point Nutrient Credits in the Chesapeake Bay Watershed**

## **INTRODUCTION**

Maryland's water quality standards for the Chesapeake Bay require significant reductions in nutrient loadings. The State is developing and implementing Maryland's Chesapeake Bay Tributary Strategy and TMDL's to achieve reductions from point sources and nonpoint sources necessary to meet Maryland's allocation under the Bay Program ([see http://www.dnr.state.md.us/bay/tribstrat/implementation\\_plan.html](http://www.dnr.state.md.us/bay/tribstrat/implementation_plan.html)). The States goal is a 60% reduction in nitrogen loadings to the bay. For agricultural sources, the Tributary Strategy identifies nutrient load reductions based upon a variety of Best Management practices (BMPs). Maryland intends to help meet its obligation to reduce agricultural loads to the Bay through a combination of regulatory and voluntarily application of agronomic and Best Management Practices.

Nutrient trading is a cost effective approach to achieve water quality and environmental benefits. Trades can take many forms and involve many different partners, for example, point to non-point, point to a third party or non-point to non-point. This document establishes the basic guidelines and policies that will govern the generation of agricultural non-point trade credits through on farm enhancements. The generation of load reductions for urban lands are not part of this document and will be part of a separate guidance to be developed.

**Purpose:** This document is intended to provide information to watershed stakeholders, especially credit generators, interested in participating in agricultural non-point nutrient trading opportunities. The key goals and purposes of the policy are as follows:

- To provide guidelines to farmers, landowners and aggregators on how the process works to generate credits and participate in nutrient trading.
- The role of the Department of Agriculture in certification, registry and verification of agricultural nutrient credits.
- To enhance and foster an opportunity for a viable trading program to occur in the Chesapeake Bay Watershed.

### Effect of Policy

The policies and procedures outlined in this document are not intended to supplement existing requirements. Nothing in the policies or procedures reduces or replaces existing regulatory requirements.

The policies and procedures herein are not legislation or a regulation. This document establishes the framework for the generation of agricultural non-point nutrient credits and for MDA to exercise its

administrative discretion for the certification of agricultural nutrient credits in the future. Neither the load allocations nor the credits generated under this policy are a property right.

The generation of agricultural trading credits and the use of a trading program, in Maryland, is not intended to accelerate the loss of productive farmland. Therefore, credits will not be approved for idling of whole or substantial portions of farms to generate credits for use off site.

## **1. BACKGROUND**

The Chesapeake Bay is one the nation's largest estuaries and home to more than 15 million people. Since 1983, the Bay Program has recognized that pollution levels in the Bay were increasing. Chief among these pollutants were nutrients, nitrogen and phosphorus. These substances were entering the Bay from direct discharges (or point sources) as well as from diffuse sources (non-point sources) such as urban and agricultural runoff, along with atmospheric deposition. In order to protect the Bay's living resources it is necessary to drastically reduce the amount of nutrients entering into the Bay. Improving water quality is recognized as the most critical element in the overall protection and restoration of the Chesapeake Bay and its tributaries. To address this issue in 1987 the Bay Program agreed to a 40% reduction of the controllable nutrient load entering into the Chesapeake. In 1992, they committed to tributary-specific reduction strategies to achieve this reduction and agreed to stay at or below these nutrient loads once attained. In 2000, the Bay Program reaffirmed their commitment to restoring the Bay with the signing of the Chesapeake 2000 Agreement. Each jurisdiction was assigned a maximum amount of nutrient load that represented their allocation of the Bay-wide nutrient load sufficient to support the Bay's living resources. For Maryland, this maximum load was 36.59 million lbs of nitrogen and 2.86 million lbs of phosphorous. For Agriculture, the maximum loads were 11.57 ml lb. /N and 1.11 ml lb. /P To achieve Maryland's goal would require more than a 60% reduction of nutrients entering the Bay from all sources (point and non-point). In 2004, Maryland finalized their nutrient reduction strategies for all of the major watersheds. These strategies, collectively called the "Maryland Tributary Strategy" identified the steps necessary to reduce nutrient load from the major Maryland tributary systems draining into the Chesapeake Bay. To achieve and maintain the identified levels of nutrient load reduction will require considerable sacrifice from all segments of society and will be costly to implement.

Analogous to the nutrient limits established for the Chesapeake Bay, the federal Clean Water Act calls for Total Maximum Daily Loads (TMDLs) to be established for pollutants causing violations of water quality standards. Briefly, in Maryland, TMDLs for nutrients are established at a finer geographic resolution than the Bay allocations. Thus, TMDLs provide an additional layer of load reduction necessary to restore and protect local water quality<sup>1</sup>.

An innovative approach to solving these kinds of complex water quality problems is water quality trading. Water quality trading is a market-based approach that offers greater efficiency in achieving water quality goals on a watershed basis. It allows one source to meet its regulatory obligations by using pollution reductions created by another source at a lower cost. As a market-based approach, the focus is on performance. Increased efficiency and cost-effectiveness are achieved through competition, by letting the market determine which sources can best reduce pollution without prescribing how. Nutrient trading is a form of water quality trading that focus on controlling nitrogen and phosphorous loads. To achieve a desired load allocation, trades can take place between point sources (usually wastewater treatment plants), between point and nonpoint sources (a wastewater treatment plant and a farming operation) or between non-point sources such as farming operations.

Population and economic growth pressures in Maryland and other Bay States may, without

appropriate policy implementation, lead to increases in nutrient loads due to increases in sewage flows and non-point source flows in urban areas. Maryland supports a Trading Strategy with offsets and a load reallocation policy as a creative and innovative approach to address growth and maintain nutrient load caps.

Nationally, EPA also supports trading to achieve early reductions and progress towards water quality standards and to reduce the cost of implementing Total Maximum Daily Loads (TMDLs) for impaired waters. Specific to the Chesapeake Bay Program, U.S. EPA Region III has also publicly supported nutrient trading programs in both Pennsylvania and Virginia.

The Chesapeake Bay Program has been very interested in the application of trading to the Bay's nutrient reduction problem. In 2001, the Bay Program published a report entitled: "Chesapeake Bay Program Nutrient Trading Fundamental Principles and Guidelines". This report was the result of the deliberations of a group of interested stakeholders convened by the Bay Program to explore the feasibility of nutrient trading in the Chesapeake Bay. This document represents the basis for developing a nutrient trading program in Maryland.

In January 2008, the Maryland Department of the Environment (MDE) finalized a document entitled "Maryland Policy for Nutrient Cap Management And Trading In Maryland's Chesapeake Bay Watershed". The MDE document represented the initial phase of the State's policy development on nutrient trading. The MDE document outlines the procedures for trading between point sources (WWTP's). This document represents a next phase part of the program and relates to generating credits for trading agricultural non-point sources with point sources and other interested buyers. Thus the document does not replace the MDE document and represents an extension to that document.

This document reflects the Maryland Department of Agriculture's best efforts to address the many diverse comments, views and suggestions received during an initial review process with an Advisory Committee. This committee was formed with representation from a cross section of public and business interest to provide guidance to the MDA. Members of the committee are listed above.

Effective Date: PENDING

### **3. KEY PRINCIPLES**

The following key principles apply to the generation of agricultural credits for trading in Maryland.

#### Key Principle #1

- Any generator of agricultural non-point source credits must first demonstrate they have met the baseline water quality requirements of their watershed. These include the minimum level of nutrient reductions outlined in the Tributary Strategies or the applicable TMDL requirements.

#### Key Principle #2

- Agricultural generators must be in compliance with all local, state, federal laws, regulations and programs. The credit generator and trade can not cause or contribute to water quality effects locally, downstream or, bay wide.

#### Key Principle #3

- Those portions of BMP's funded by federal or state cost share can not be used to generate credits during the life span of the project. However credits derived from practices implemented with the sellers out of pocket share are eligible after the effective date.

#### Key Principle #4

- The Agricultural Trading Program is not intended to accelerate the loss of productive farmland. Therefore, credits will not be generated under this policy for the purchase and idling of whole or substantial portions of farms to provide nutrient credits for use off site.

#### Key Principle #5

- Trades must result in a net decrease in loads. A portion of the agricultural credits generated in a trade will be retired and used to achieve Tributary Strategies or TMDLs, the other portion becomes tradable credit.

#### Key Principle #6

- An agricultural practice can only generate credits once it is installed, or placed in operation.

## **4. FUNDAMENTALS**

### 4.1 Generating and Selling Credits

There are two steps necessary for an agricultural trade. The first step is to assess if you are eligible to trade and if you have the ability to generate credits above the baseline requirements. The second step is the mechanism by which you can post and sell credits with potential partners and how the trade is administered by the State of Maryland. The following outlines the guidelines for the generation of agricultural credits. A companion document will describe the mechanism for the selling of credits with potential buyers.

### 4.2 Who May Sell Agricultural Credits?

Generation of an agricultural credit for sale involves the reduction or prevention of a set amount of a nutrient from entering local surface or ground waters. Almost anybody can sell credits, however each seller must meet the eligibility requirements discussed in Sec. 4.3. Examples of sellers include but may not be limited to the following:

- Any generator of agricultural non-point source loads:
  - Farm owners
  - Landowners
  - Renter or lessee that can demonstrate permission by the owner to sell credits.
- Aggregators
- Maryland state entities
- Parties who remove agricultural nutrients from the environment

### 4.3 Eligibility of Generators to Sell

In order to sell nutrient credits as part of this program, credit generators must meet the following requirements:

- Must be in compliance with all applicable federal, state and local laws, obtain the necessary permits.

- Agricultural operations generating credits must have a current nutrient management plan, an updated Soil and Water Conservation Plan including, if applicable, a Waste Management System Plan.
- Any entity wanting to acquire and resell credits, such as aggregator:
  - Must be in compliance with all applicable federal, state, and local requirements.
  - Must demonstrate an intent and ability to acquire and deliver sufficient offsets from multiple projects or sites.
  - Must be able to demonstrate permission by the credit generator to sell credits.
  - Must be able to demonstrate that the credit owners meet all compliance and eligibility requirements.

#### 4.4 Baseline Requirements for Agricultural Non-point sources

Maryland’s agricultural non-point nutrient trading program requires that operators of agricultural operations or other landowners wishing to generate credits must have achieved a level of nutrient reduction known as a baseline. Additional nutrient reductions undertaken by the credit generator through other agronomic or structural BMP’s, including land conversion, are eligible as credits for trading once the baseline nutrient reduction have been met.

Baselines are applied to the pasture/field/animal area that is being used to generate credits and must first achieve the stricter of:

- a) the level of nutrient reductions called for in the tributary strategies; or
- b) the level of nutrient reductions called for in an applicable TMDL for the watershed where the credits are generated from.

To calculate these baseline requirements, Maryland’s Tributary Strategy/TMDL goals are translated into a numeric per acre annual loading rate for each watershed. A seller enrolling agronomic or structural BMP’s to generate credits must have achieve the annual loading allocation for agriculture in the watershed. Loading allocation are based upon the 2010 cropland’s Tributary Strategy goals. This loading allocation is determined by the calculation of nitrogen and phosphorous Edge-of-Segment Loads (in pounds per acre) as modeled by Tributary Strategy Basin in the Chesapeake Bay Model. Tradable credits will only be generated for practices that provide additional nutrient reductions that are below the numeric loading goal.

TMDL loads reductions for impaired watersheds are determined by MDE. Sellers in a TMDL impaired watershed must demonstrate they have met their obligation for the watershed load allocation (LA) in order to generate additional tradable credits.

An agricultural operator/landowner does not have to ensure that the entire farm operation has achieved this loading rate, only the portion of that parcel that is being used to generate credits.

A combination of current agronomic and structural practices can be utilized to meet baseline load reductions.

Baseline requirements may require additional implementation of BMP to achieve the watershed load reduction.

An agricultural operator or landowner may use federal and state cost-share programs to implement BMP’s that are used to meet the baseline nutrient reductions.



Determination on whether the landowner/operation has reached the target per acre loading shall be made using Department-certified estimation methodologies/tools. Appendix A provides a worksheet and technical information to determine if a parcel has achieved the baseline requirements. The Department intends to develop an Agricultural Nutrient Credit Calculation Tool to assist potential seller determine their eligibility.

#### 4.5 How to Generate Credits

Once a landowner or operator has determined they have achieved the baseline requirements for the watershed additional implementation of water quality improvements can be considered as a tradable credit.

Tradable credits can be generated from any planned agronomic, land conversion, or structural practice which is shown to reduce nutrient loadings below the applicable baseline. Credits will be determined using BMP efficiency rates that utilize the latest science and technical information. The Department will review and approve methods for determining nutrient reductions that occur from activities that reduce nutrient application, or increase nutrient uptake and retention, or result in net export of nutrients from the watershed. In order to generate credits, any proposed on planned practices must be installed/implemented to generate credits. All practices must be maintained according to Department-approved specifications. Consistent with the Chesapeake Bay Model, multi-year projects with variable credit production capacity will be assumed to generate credits that reflect average annual performance. Landowners or operators may utilize the worksheet and technical information in Appendix A or the Agricultural Nutrient Trading Tool to calculate credits.

#### Agricultural Credit-generating practices fall under three categories:

BMP's with Approved Load Reductions: that are currently in widespread use, with well-established and understood nutrient removal efficiencies. The installation and maintenance specifications for these practices are well documented. Currently, all "Approved BMPs" listed in table #1 are in this category. These practices have recently received a rigorous peer review by the Chesapeake Bay Program and have uncertainty ratio's built into their efficiencies. They will not be subject to an additional uncertainty ratios.

BMP's Requiring Technical Review: Those practices listed in table #1 that are currently in use but require additional technical review to ascertain the appropriate nutrient removal efficiencies and installation and maintenance specifications. The Department reserves the right to adjust the uncertainty ratio applied to these practices to reflect a higher degree of uncertainty in nutrient removal efficiencies.

Other BMP's: Innovative practices that are not in widespread use for which no recognized estimates of nutrient removal capacity exist. These practices will be examined by the Department and appropriate specifications for project installation, monitoring and maintenance as well as the applied uncertainty ratio shall be determined on a case-by-case basis. The approval process for these credits will likely take longer than that of the BMP's currently in use but requiring technical review.

**TABLE #1  
TRADEABLE BMP'S**

BMP's with Approved Load	BMP's Requiring Technical	Other BMP's
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<b>Reductions</b>	<b>Review</b>	
Riparian Forest Buffers Continuous No-Till	Dairy Precision Feeding	Ammonia Emission Reductions
Riparian Grass Buffers	Precision Agriculture	Algal Turf Scrubber
Wetland Restoration	Conservation – Tillage Precision Grazing	Oyster Aquaculture
Tree Planting	Poultry Litter Transport Water Control Structures	Carbon Sequestration
Cover Crops (Early – and Late – Planting)	Stream Restoration	Alternative Crops
Off – Stream Watering w/Fencing	Cropland Conversion	
Off – Stream Watering w/o Fencing	Enhanced Nutrient Efficiency	
Off – Stream Watering, Fencing & Rotation Grazing	Commodity Cover Crops	
Animal Waste Management Systems: Livestock		
Animal Waste Management Systems: Poultry		
Barnyard Runoff Control/Loafing Lot Management		

This list is not inclusive and is subject to modification.

The Table #1 represents the most current list of practices for offset generation. This list will be modified as needed. “BMP’s with Approved Load Reductions” will be incorporated into the Maryland Agricultural Nutrient Credit Calculation Tool which will determine forth their appropriate loading rate and uncertainty ratio.

BMP’s listed as “Requiring Technical Review” or “Other BMP’s can not be incorporated into the Maryland Agricultural Nutrient Credit Calculation Tool as they will require a Technical Panel’s review of any trading proposal before efficiencies and load rates can determined and credits are be certified for the market. Proposals will be reviewed on a case-by-case basis and may include requirements for demonstration projects, the collection of sufficient data to evaluate results and any other requirements needed to determine the validity of the credits. In some cases, development of the specifications and certification of the credits could be a multi year process.

Duration and Lifespan of Credits:

Credits may only be applied as offsets in the year in which they are generated and cannot be banked for future years. For example, if an agricultural BMP generates an average of 10 credits per year and has a life span of five years, 50 credits cannot be applied in the fifth year.

## Eligibility for Agronomic, Structural and Land Conversion Practices:

### Agronomic Practices

Credits can be generated from agronomic nutrient reduction practices, that do not count towards the baseline requirements. Agronomic practices reduce or minimize surface, groundwater or air emissions, such as; manure injection, reductions in nitrogen fertilizer application, precision agriculture, cover crops, no-till, etc. These are considered an annual practice for the year they are generated, regardless of what year the practices were first initiated. See “cost share” section for restrictions.

### Structural Practices

Credits can only be generated from existing structural investments that do not count towards the baseline requirements, (manure sheds, waterways, fencing, etc.) under the following circumstances:

- 1) If the structure was not paid for using State or Federal cost-share monies and is currently maintained by the owner/operator at his own expense; or
- 2) If the structure was funded through State or Federal cost-share but has exceeded its “funded-lifespan” (i.e. the standard NRCS structural lifespan or MACS cost share requirements) and is now being maintained by the owner/operator at his own expense. These structural practices will require annual inspections and certification.

### Land Conversion

Credits can be generated for the conversion of several types of agricultural land to a less nutrient intense land use. Examples include: riparian forest buffer, riparian grass buffers, wetlands, conversion to alternate crops, etc. Credits can not be approved for the idling of whole or substantial portions of productive farm to provide nutrient credits. Credits can only be generated for conversions that do not count towards the baseline and meet all the eligibility criteria of a structural practice.

### Cost Share:

Practices funded with Federal or State cost-share funds can generate credits in proportion to the landowner/operator’s share of the project costs after the effective date of this document. The Federal or State portion of the funding is not eligible for generating credits during the funded lifespan of the project.

### Timing of Installation of Practice and Credit Generation:

A practice can only generate credits once it is installed.

Because practices will be installed at different times during the year, the Department will consider that the total estimated annual credits generated from any practice installed within a given year to be generated the following year starting January 1. For example, installing streambank fencing in June of 2008 means that the full annual credit will be given to that project for calendar year 2009.

## 4.6 Trading Ratios

Will be used by the Department to calculate the credits that can be derived from nutrient reduction activity. They serve to 1) translate how various activities on a parcel of land result in a delivered pollutant load reductions; 2) account for inherent uncertainties in nonpoint source load reduction

estimates; 3) account for the BMP's locations within the Bay watershed. The Department intends to utilize the following:

Delivery Ratios:

The Department will use the Delivery Ratio to simulate the diminished physical and biological processes that occur on nutrient loads as they travel downstream; thus a pound of nitrogen that is released in the upper watershed has less impact on the bay than a pound of nitrogen released at the mouth. Two types of Delivery ratios will be applied:

Edge of Segment Delivery Factor (EOS)

Edge of Segment Delivery Factor is the amount of land-applied nutrients expected to reach the surface waters at the boundary of the Chesapeake Bay Watershed Model segment through surface runoff, groundwater flows, and atmospheric deposition. The EOS factor is derived from the Chesapeake Bay Watershed Model.

In-Stream Delivery Factor (DF)

The In-Stream Delivery Factor is a function of the distance from the edge of the watershed segment and the fall line of the Chesapeake Bay. This represents the pollutant effect of the nutrient reductions between upstream and downstream points. The delivery factor is derived from the Chesapeake Bay Watershed Model.

Uncertainty Ratio:

The uncertainty ratio will be applied to certain BMP's and is an allowance for the relative uncertainty in the relationship between credit generation efforts and actual resulting pollution reductions in the Bay – this accounts for uncertainties related to the absence of monitoring data and the challenge of estimating how individual actions affect stream loads over time and space.

Retirement Ratio:

A retirement ratio will be applied and represents the percentage of the total generated credits to be retired towards net water quality benefit. The retirement ratio applies to all credits traded and will be set at 5 percent of total reductions.

4.7 Credit Certification Process

The completion of a Maryland Agricultural Nutrient Credit Certification form (Attachment A) is necessary to ensure that your proposed structural BMP/Agronomic enhancements will meet the requirements of the agricultural nutrient trading program. Credit Certification forms can be downloaded from the Maryland Agricultural Credit Calculation Tool at web site ([www.???.???](http://www.???)) or using the Attachment "A" worksheet and the technical guide information can be submitted to the Maryland Department of Agriculture 50 Harry S. Truman Parkway, Resource Conservation Operations, Annapolis, MD 21401 Attention: Nutrient Trading Program.

As outlined in section 4.5 BMP's with approved load reductions will be incorporated into the Maryland Agricultural Credit Calculation Tool which set forth their appropriate loading rate and uncertainty ratio. "BMP's requiring Technical Review" or "Other BMP's are not currently part of the Credit Calculation Tool and will require a written submittal utilizing the Maryland Agriculture Nutrient Credit Certification form (Attachment A) and detailed application.

The Department will review applications to verify:

- a) Baseline requirements are met
- b) Credit Calculation is correct
- c) Conservation Compliance
- d) Reasonableness of Credits generated or proposed
- e) Landowner/operator consent
- f) USDA/FSA Tract information

The Department or its agent may require more information or an on site examination prior to approval or certification of credits. The Department will convene a Technical Panel to review and approve the Load Reduction values for some Best Management Practices. The Department may require some additional contractual obligations and/or direct monitoring to ensure the load reductions are met. All back up documentation shall be maintained for a minimum of 10 years.

#### Credit Approval

Upon approval the certification document will be signed off by MDA and will receive a unique registration number to be tracked by the program and logged in the Maryland's Trading Registry. Documents with non approved credit certification will be returned to the applicant with a reason for non-approval.

#### 4.8 Mechanism to sell credits – Maryland's Trading Registry

The Department intends to utilize a central Trading Registry to post, track and market agricultural credits once certified. Credits once certified will be assigned a unique registration number. The Maryland Trading Registry will provide a market place where registered offers to sell credits can be posted, as well as to place bids to purchase credits. Users will be able to manage and post registered credits and manage offers from buyers through their account. The Department intends to make this available as a web based service. A companion document Titled "Guidelines for Agricultural Non-Point Credit Purchases" describe the process for selling of certified agricultural credits with potential buyers.

## 2. DEFINITIONS

**Aggregator:** An individual or entity that can collect and compile credits from individual agricultural non-point sources.

**Agronomic Practices:** Annual Crop and/or soil practices that reduce or minimize the probability of creating nutrient pollutants into surface and/or ground waters. Crop practices are implemented to balance nutrient availability with crop demand so as to not cause either net economic losses from yield reductions or nutrient losses to water resources. To optimize crop nutrient recovery efficiency requires selection of the right nutrient sources and application of these sources at the right rate, right time and right placement.

**Agricultural land:** Land used to produce food, feed, fiber, sod, animals, plants, trees, or plants in containers, or for out-of-ground production.

**Baseline for Agricultural Non-Point Source Sellers:** The pollutant control requirements that apply to sellers as specified in this policy. Sellers must first achieve their applicable baselines before they can enter the trading market and sell credits.

**Best Management Practice:** A conservation or pollution control practice that manages soil loss due to farming practices or manages nutrients, animal wastes, or agricultural chemicals so as to minimize movement into the surface waters of the State.

**Credit Generator:** An individual, partnership, corporation, trust, or other business enterprise which as an owner, landlord, or tenant, participates in the operation of a farm.

**Certifier:** An individual or entity that could certify and verify that either the estimated nutrient reductions are creditable and/or the nutrient reductions are being generated. Possible certifiers may include: Certified Crop Advisors (CCA), Maryland Professional Engineers (PE), USDA-NRCS Technical Service Providers (TSP), or Soil Conservation Districts (SCD).

**Chesapeake Bay Watershed Model:** The Hydrologic Simulation Program in Fortran (HSPF), used to simulate the surface water run off, groundwater flow and the transport of nutrient and sediments to the Chesapeake Bay.

**Contract:** Written agreement between the parties, permit, in which the parties may address a variety of financial or legal considerations and contingencies, including what happens in the case of default by any party.

**Credit or Pollutant Reduction Credit:** A measured or estimated unit of pollutant reduction per unit of time adjusted to account for applicable trading ratios. A seller may generate Edge of Segment Loads (EOS) load reductions beyond what is needed to meet their baseline through balancing their annual crop nutrient inputs with their expected biomass outputs (yields) and through the implementation of multi-year structural changes to control residual surface flow discharge concentrations. EOS load reductions (beyond their baseline) that are then converted into credits by using trading ratios. Credits are expressed as pounds per year of nitrogen or phosphorus that is delivered to the Chesapeake Bay.

**Crop Nutrient Recovery Efficiency:** calculation of the difference between cropland nutrient inputs and outputs; the remainder is then utilized to determine Edge of Segment (EOS) Load after the application of the watershed specific EOS Ratio.

**Delivery Ratios:** Delivery Ratios apply discount factors to compensate for a pollutant's travel over land or in water (or both) and may be applied to point, as well as, nonpoint sources. Delivery ratios generally account for attenuation (i.e., the rate at which nutrients are reduced through natural processes, such as hydrolysis, oxidation, and biodegradation, on their way through tributaries to the mainstem of the water body). The ratio varies depending on the location of the source from the mainstem. Generally, the greater the distance the pollutant has to travel, the greater the pollutant loss will be. This ratio would work to equalize a trade between a source in the headwaters and one near the mainstem. This ratio is also often termed as "location ratio." Delivery ratios will be based on information from applicable and accepted data sources, such as the Chesapeake Bay Watershed Model.

**Department** – use in this document means the Maryland Department of Agriculture

**Expected Crop Yield:** A realistic crop yield for the agricultural operation for the length of the contract, determined by using yield records or soil productivity information.

**Crop Removal** (Uptake) – Bay Model – Table 5.5.1.1.1: Crop nutrient content per yield unit, NRCS Plant Nutrient Content Database

**Nutrient Applications** – fertilizers, animal manures, and biosolids: Fertilizer means a substance containing any recognized primary plant nutrient used for its plant nutrient content and designed for use in promoting plant growth. Manure management means operations and conditions specific to an agricultural operation that has animals, or uses animal manure or waste nutrients from animal production. The purpose of manure management in nutrient management planning is to improve efficiency and effectiveness of nutrient utilization and to minimize the potential for nutrient loss from the management of animals or their manure and associated waste nutrients.

**Soil Residual Nutrients** – balance of nutrients remaining in the soil not utilized for biomass generation.

**Edge of Segment (EOS) Load:** The amount of land-applied nutrients expected to reach the surface waters at the boundary of a Chesapeake Bay Watershed Model segment through surface runoff and groundwater flows. The EOS load is the value to which BMP model efficiencies to calculate nutrient reductions are applied.

**EOS Ratio:** A factor that is unique to each watershed model segment that has been determined by the Chesapeake Bay Watershed Model in order to estimate the EOS load for individual non-point sources within a watershed segment.

**In-Stream Delivery Factor (DF):** The In-Stream Delivery Factor is a function of the distance from the edge of the watershed segment and the fall line of the Chesapeake Bay. It represents the effective delivery of the pollutant load to the Chesapeake Bay and the related estimated diminution of the

pollutant effect of the nutrient reductions between upstream and downstream points. The delivery factor is derived from the Chesapeake Bay Watershed Model. This factor is applied to nonpoint source and point source reductions.

**Land Occupier:** Any person holding title to or possessing any lands, whether as owner, lessee, tenant, or otherwise.

**Nonpoint Source:** A source of pollution that is not a point source. Diffuse pollution sources (i.e., without a single point of origin or not introduced into a receiving stream from a specific outlet). The pollutants are generally carried off the land by stormwater or infiltrate the soil to reach groundwater. Common nonpoint sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets.

**Nonpoint Source Discharge Credit:** Credits generated by nonpoint sources through a variety of possible mechanisms. Baseline nonpoint source reduction requirements, defined in Phase II of this trading policy, must be met before offset credits can be generated. As with point source discharge credits, nonpoint source discharge credits are based on delivered loads, hence Chesapeake Bay watershed model delivery factors are applied to edge-of-segment loads.

**Nutrient Trading:** A market-based approach to achieving water quality standards in which a point source or 3<sup>rd</sup> party purchases pollutant reduction credits from another point source or a nonpoint source in the applicable trading region that are then used to meet the point source's pollutant discharge obligations. To be creditable to the point source purchaser, the credits must reflect an actual, pollutant load differential below the credit seller's baseline.

**Nutrient Reduction:** The difference in nutrient EOS Load to surface or ground waters achieved by implantation of best management practices, compared to the applicable baseline after meeting eligibility requirements.

**Point Source:** A NPDES-permitted discharge to surface water from a sewage treatment plant or industrial facility

**Registry:** A system utilized to track and record the generation and exchange of credits.

**Retirement Ratio:** The retirement ratio represents the percentage of the total generated credits to be retired towards net water quality benefit. The retirement ratio applies to all credits generated (point source and nonpoint source) and will be set at 5 percent of total reductions.

**Structural Controls:** Practices with multi-year life spans engineering and installed to meet or exceed NRCS Standards, to reduce or eliminate the introduction of pollutants into surface and/or ground waters.

**Third Party:** Any entity that does not discharge nutrients (or pollutants) and thus A third party can be a state agency, conservation district, private entity, or other organization or person. Third parties could assist in facilitating credit exchanges and verifying Best Management Practices (BMPs).

**Total Maximum Daily Load:** A calculation for an impaired waterbody of the maximum amount of a pollutant the waterbody can receive and still meet applicable water quality standards (accounting for seasonal variations and a margin of safety), including an allocation of pollutant loadings to point sources (WLAs) and nonpoint sources (load allocations (LAs)).



**Trading ratios:** Discount factors applied to pollutant reductions to account for uncertainty, water quality, delivery or special need concerns. The following are examples of trading ratios:

**Uncertainty Ratios:** Uncertainty Ratios are intended to account for variation in the expected reliability and efficiency of the source or type of reduction being applied toward credit for another. They are calibrated to create a margin of safety or otherwise attempt to ensure that the credited practice provides a minimum level of reductions, even if actual reduction efficiencies and units removed are on the low end of an expected range. In some instances uncertainty ratios will not be employed because they are already accounted for in quantification methods. Trades involving nonpoint sources may use uncertainty ratios of greater than 1:1.

**Tributary Strategies Program:** Maryland is divided into 10 watersheds. The Program establishes specific nutrient reduction targets for each of these watersheds from every source, including agricultural fields, urban and suburban lands, and wastewater treatment plants.

Maryland Ag Nutrient Credit Registration/Certification Form

1. Land Occupier Name \_\_\_\_\_

1A. Land Location – County: \_\_\_\_\_

1B. Watershed: \_\_\_\_\_

1C. Working Cropland Acres Enrolled: \_\_\_\_\_ (acres)

2. Baseline: 2010 Tributary Strategy – for this watershed segment (Table A):

2A. Nitrogen: \_\_\_\_\_ lbs. of N/acre EOS

2B. Phosphorous: \_\_\_\_\_ lbs. of P/acre EOS

3. Conservation Compliance – attest that all occupied crop lands under your operations (owned or rented) are in compliance with MD Nutrient Management requirements and you maintain a current Soil and Water Quality Plan and Waste System Plan (if applicable). Furthermore, you are following all recommendations of your plan. \_\_\_\_\_ (initial)

4. Acres Enrolled Baseline and Credit Calculation:

Baseline

4A. Ten Year Projected Corn Yields\* - \_\_\_\_\_ bu/acre/annual average

4B. Projected Annual EOS N Load - \_\_\_\_\_ lbs/acre

Planned

4C. Planned annual EOS N Load (as reduced) - \_\_\_\_\_ lbs/acre

4D. Projected Ten Year NLR EOS generating credits - \_\_\_\_\_ lbs/acre

5. Structural Controls Baseline and Credit Calculation (Table D)

Baseline

BMP's \_\_\_\_\_, Ac's/ft. \_\_\_\_\_ EOSN Load \_\_\_\_\_

BMP's \_\_\_\_\_, Ac's/ft. \_\_\_\_\_ EOSN Load \_\_\_\_\_

5A. Landowner has received NRCS or MACS payments for this Practice:

Planned

BMP's \_\_\_\_\_, Ac's/ft. \_\_\_\_\_ EOSN Load \_\_\_\_\_

BMP's \_\_\_\_\_, Ac's/ft. \_\_\_\_\_ EOSN Load \_\_\_\_\_

6. Land occupier has entered into a contract with:

6A. Aggregator name: \_\_\_\_\_ 6B. Date: \_\_\_\_\_

6C. Credits contracted: \_\_\_\_\_ (N) 6D. \_\_\_\_\_ (P)

Department Use:

Registration Received:

Credits Approved: \_\_\_\_\_ (N) \_\_\_\_\_ (P)

Reason for non-approvals: \_\_\_\_\_

\_\_\_\_\_  
(Land Occupier)

\_\_\_\_\_  
(Certifier)

\_\_\_\_\_  
(Department)

\*Based upon your actual yield for the last 3 years.

## Appendix

### Technical Calculation Worksheet And Tables

“To be added”