GEORGIA FARM *A*SYST

FARM ASSESSMENT SYSTEM

NUTRIENT MANAGEMENT

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PRE-ASSESSMENT:

Why Should I Be Concerned?

Nitrogen, phosphorous and other nutrients are essential to good crop production. But, the nutrients that are beneficial for plant growth can be harmful if they are present above certain *concentrations** in streams, ponds, coastal waters, or ground water. In most of our fresh *water bodies*, phosphorus is the nutrient in shortest supply. When excess phosphorus from animal manures, fertilizers, or other sources enter these waters, it causes *algae* to grow faster and turn water a green color. This process is called *eutrophication*. It can prevent recreational uses such as fishing and swimming. In brackish waters such as marshes and estuaries, a similar situation can occur when too much nitrogen is present.

Excess nitrogen can also be a problem in ground water. Nitrate is a form of nitrogen that can pose health problems for both humans and animals if *concentrations* are too high in the drinking water. The drinking water standard for nitrate-nitrogen is 10 parts per million (ppm). When *concentrations* are above this limit, infants younger than six months can develop a disorder called methemoglobinemia or blue baby syndrome. Nitrate-nitrogen *concentrations* in the range of 20-40 ppm can cause reproductive problems or other health problems in ruminants, horses, or baby animals.

Because we need clean drinking water and enjoy water-based recreational activities, excess nutrients in water are a concern to everyone. As a farmer, you are paying to supply your crops with nutrients, so it also makes economic sense to manage these resources as efficiently as possible. Good nutrient management can improve your profitability as well as protect the environment.

How Does This Assessment Help Protect Drinking Water and the Environment?

- This assessment allows you to evaluate your potential impact on the water quality on your farm and in nearby *water bodies*.
- The assessment uses your answers (rankings) to identify high risk practices that should be modified.
- The nutrient management facts provide an overview of practices to prevent pollution.
- The assessment assists you in writing an action plan based on your needs as identified by the assessment.

How Do I Use This Farm *A*Syst Assessment?

- This assessment asks a series of questions about your nutrient management practices.
- You are encouraged to complete the entire document.
- Farm *A*Syst is a voluntary program.
- No information from this assessment needs to leave your farm.
- The assessment should be conducted by you for your use. If needed, a professional from the Georgia Cooperative Extension Service or one of the other partnership organizations can provide assistance in completing the assessment or action plan.

** Words found in italics are defined in the glossary.*

ASSESSMENT:

Assessing Your Nutrient Management Practices

For each category listed on the left, read across to the right and circle the statement that best describes conditions on your farm. If a category does not apply, for example, it asks about animal manures and you don't use animal manures, then skip that question. Once you have decided on the most appropriate answer, look above the description to find your rank number (4, 3, 2 or 1) and enter that number in the "RANK" column. The entire assessment should take less than 30 minutes. A glossary is on page 11 to clarify words found in italics throughout this assessment.

NUTRIENT MANAGEMENT PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
POTENTIAL FOR SURFACE WATER POLLUTION					
Main soil textures at the surface	Coarse textures such as sands and loamy sands.	Coarse textures such as sandy loams and loams.	Fine to medium textures such as silt, silt loams, and sandy clay loams.	Fine textures such as clays, silty clay loams, and clay loams.	
Presence of soil crusts	No soil crusts present at the surface.	_____	Some crust present, less than 1/4 inch thick, crumbles with pressure.	Thick crust greater than 1/4 inch thick present over most of the soil surface.	
Presence of restrictive layer or hard pan under the surface stopping downward water movement.	No layer; water never ponds.	Restrictive layer at 60 inches; water rarely ponds.	Restrictive layer at 24 inches; water sometimes ponds and runs off.	Restrictive layer such as tight clay, heavily compacted soil, pow pan, or rock; water ponds or runs off quickly.	
Average slopes	0% to 2%	2% to 6%	6% to 12%	Greater than 12%	
Cover crops used and/or crop residues left	Cover crops used every year and/or crop residues left.	_____	_____	Cover crops never used and/or crop residues never left.	
Width of vegetation buffers along defined streams or ditches	Buffers greater than 90 feet; buffers greater than 120 feet if buffer slopes greater than 15%.	Buffers 30 to 90 feet in width if buffer slopes less than 15%; buffers greater than 90 feet in width if buffer slopes greater than 15%.	Buffers 15 to 30 feet in width if buffer slopes less than 15%; buffers 30 to 60 feet in width if buffer slopes greater than 15%.	Buffers 0 to 15 feet in width if buffer slopes less than 15%; buffers 15 to 30 feet in width if buffer slopes greater than 15%.	

NUTRIENT MANAGEMENT PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
POTENTIAL FOR GROUND WATER POLLUTION					
Main soil textures throughout the profile	Fine textures such as clays, silty clay loams, and clay loams.	Textures such as silt, silt loams, and sandy clay loams.	Textures such as sandy loams, and loams.	Coarse textures such as sands and loamy sands.	
Depth to water table	Greater than 50 feet.	Between 10 to 50 feet.	Between 5 and 10 feet.	Less than 5 feet.	
Presence of a restrictive layer or hardpan under the surface stopping downward water movement	Restrictive layer present	_____	_____	No restrictive layers	
Buffers around ponds, wells, sinkholes, or other water-related areas	Buffers greater than 50 feet around all wells, ponds, sinkholes, or other water related areas.	Buffers 10 to 50 feet around all wells, onds, sinkholes, or other water-related areas.	Buffers around some wells, ponds, sinkholes, or other water related areas.	No buffers in place.	
NUTRIENT MANAGEMENT					
Freqency of soil testing	Yearly.	Every 2 years.	Every 3 years.	Less frequently than every 3 years.	
Soil samping	At least 15 cores or slices mixed together for a representative sample from fields or areas no bigger than 15 acres, according to CES guidelines.	At least 7 cores or slices mixed together for a representative sample from fields or areas bigger than 15 acres.	Single soil samples taken from areas greater than 15 acres.	No soil samples taken.	
Realistic yield goals	Yield averagesf rom 5 or more recent years used to set yield goals.	Yield goals based on 3 to 5 recent years averages.	Yield goals based on 1 to 2 years averages, or old yield information.	Yield goals not based on farm performance.	
Nutrient credits for manure and legumes	Nutrient credits calculated and deducted from nutrient appication rate using CES guidelines.	_____	Nutrient credits are calculated and partially deducted from nutrient application rate.	No deductions for using legumes or manures.	
Fertilizer application rates	Fertilizer is applied at recommended rate based on soil tests and realistic yield goals.	_____	Fertilizer application exceeds recommendation by one-half times rate.	Fertilizer application exceeds recommendation by two times rate or fertilization with no guidance.	

NUTRIENT MANAGEMENT PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
Lime application rates	Lime application based on annual soil test recomendations.	Test at least every three years and lime application is based on recommendations.	Lime applied based on reasons other than soil test.	No idea of soil pH or soil never limed.	
Plant analysis as a tool for nutrient management decisions	Plant analysis used when appropriate to determine if nutrients were over or under applied during the growing season.	Plant analysis used only when there are growth problems.	_____	Plant analysis never used.	
Timing of nitrogen fertilizer (row crops or small grains)	Split applications according to CES guidelines during active plant growth, or use of fertigation in Coastal Plain.	_____	_____	All fertilizer applied at planting.	
Timing of nitrogen fertilizer (hayfields and pastures)	Multiple applications during active growth phase of grass.	Two applications during active growth phase of grass.	One application during growth phase.	One or more applications during dormant phase.	
Equipment calibration	Fertilizer or manure is applied by equipment that has been calibrated and spread pattern checked yearly.	Equipment is calibrated once a year, but spread pattern is unknown.	Application is estimated visually.	No calibration or estimates of application.	
ORGANIC SOURCES OF FERTILITY					
Other organic sources	Other sources of organic material such as composts, and off-farm animal manures are tested and used at appropriate rates.	_____	_____	Other sources of organic material are accepted without testing or at non-appropriate rates.	
Proper storage of manures, composts or other organic materials	Storage at least 100 feet down-slope from wells and 100 feet away from surface water.	Storage within 100 feet downslope of wells and/or within 50 to 100 feet of surface water.	Storage greater than 100 feet upslope from wells or within 25 to 50 feet from surface water.	Storage within 100 feet upslope of wells or within 25 feet of surface water.	
Manure nutrient content	Nutrient content determined through analysis on a regular basis or when conditions change.	Nutrient content determined annually.	Nutrient content based on book values.	Nutrient content is never tested or estimated through book values.	

NUTRIENT MANAGEMENT PRACTICES					
	LOW RISK (rank 4)	**LOW-MOD RISK (rank 3)**	**MOD-HIGH RISK (rank 2)**	**HIGH RISK (rank 1)**	**RANK**
Soil phosphorus (P) levels in fields	Have identified the soil P level in each field and do not apply P to very high soil test P fields.	Have identified the soil P level in each field and only apply what crop needs.	Soil phosphorus is fields is unknown.	Soil test P is very high but there is no management to reduce the excess P loss.	
Manure application rates	Manure application to meet plant phosphorus needs based on soil test.	_____	Manure appication is based on nitrogen without regard to P.	Manure applicatio nis not based on nutrients.	
Manure application timing	Manure applied during active crop growth and avoided during wet weather.	Manure applied as near as possible to tiimes when crops ned fertilization.	_____	Manure applied nearly every day, or when lagoon or manure storage facility needs emptying or applied during wet weather.	
PLANNING AND RECORD KEEPING					
Record keeping	Good records are kept on fertilizer and manure applications, soil, plant and manure tests, and yields. Maps of fields and soil types for the farm are available.	Records are kept on soil tests, some manure or plant tests; information is organized enough to be used for managment decisions.	Some records kept, but information is not complete or organized enough to make most management decisions.	No records kept.	
Nutrient management plan	Current (within last two ears) nutrient management plan.	_____	Nutrient management plan prepared within last five years and not updated .	No nutrient management plan.	

Number of Areas Ranked _____
(Number of questions answered, if all answered, should total 28.)

Ranking Total _____
(Sum of all numbers in the "RANK" Column)

ASSESSMENT EVALUATION:

What Do I Do with These Rankings?

STEP 1: Identify Areas That Have Been Determined to be at Risk

Low risk practices (4s) are ideal and should be your goal. Low to moderate risk practices (3s) provide reasonable protection. Moderate to high-risk practices (2s) provide inadequate protection in many circumstances. High-risk practices (1s) are inadequate and pose a high risk for causing environmental, health, economic, or regulatory problems.

High risk practices, rankings of "1" require immediate attention. Some may only require little effort to correct, while others could be major time commitments or costly to modify. These may require planning or prioritizing before you take action. All activities identified as "high risk" or "1s" should be listed in an action plan. Rankings of "2s" should be examined in greater detail to determine the exact level of risk and attention given accordingly.

STEP 2: Determine Your Nutrient Management Risk Ranking

The Nutrient Management Risk Ranking provides a general idea of how your farming practices might be affecting your ground and surface water.

Use the Ranking Total and the Total Number or Areas Ranked on page 5 to determine the Nutrient Management Risk Ranking

RANKING TOTAL	÷	TOTAL NUMBER OF AREAS RANKED	=	NUTRIENT MANAGEMENT RISK RANKING
_____	÷	_____	=	_____

NUTRIENT MANAGEMENT RISK RANKING	LEVEL OF RISK
3.6 to 4	Low Risk
2.6 to 3.5	Low to Moderate Risk
1.6 to 2.5	Moderate Risk
1.0 to 1.5	High Risk

This ranking gives you an idea of how your farming practices might be affecting ground and surface water on or around your farm, including your drinking water. This ranking should serve only as a very general guide, and not as a precise diagnosis since it represents the average of many individual rankings.

STEP 3: Read the Information/Fact Section on Nutrient Management Practices

While reading, think how you could modify your practices to address some of your moderate and high-risk areas. If you have any questions that are not addressed in the nutrient management facts portion of this assessment, consult the references in the back of this publication or contact your county Extension agent for more information.

STEP 4: Transfer Information to the Total Farm Assessment.

If you are completing this assessment as part of a "Total Farm Assessment," also transfer yourNutrient Management Risk Ranking and your identified high-risk practices to the overall farm assessment.

NUTRIENT MANAGEMENT FACTS:

Improving Nutrient Management on Your Farm

The goal of nutrient management is to maximize farm productivity while minimizing the movement of nutrients into surface and ground water. Nutrient management includes developing a nutrient budget and site management practices. The goal of a nutrient budget is to only put out the nutrients that crops need and thereby reducing excess nutrients. The goal of site management practices is to reduce the potential of any excess nutrients reaching either surface or ground water. Both nutrient budgets and site management practices have to be developed for a particular farm. What works on one farm may not be appropriate for another. Soil characteristics, crops, use of manures or other organic sources, the lay of the land, and closeness of surface water are a few of the things that can influence what the best site management practices may be.

SITE CHARACTERISTICS

Looking at the soils on your farm can help you identify whether you are at risk for polluting surface water or groundwater. Surface water, including streams and ponds, can become contaminated by water flowing over the surface (*surface runoff*) and water flowing through the soil. *Surface runoff* most often occurs when the soil surface has a high clay content so that rainfall tends to collect on the surface rather than move into the soil. In sandy soils, *surface runoff* can also occur when the soil surface forms crusts. *Surface runoff* may carry eroded sediments as well as excess nutrients. Using *cover crops* and leaving *crop residues* can help reduce *surface runoff*. There is a higher risk of runoff in fields with steeper slopes. Traffic patterns in the field can create soil compaction that promotes *surface runoff*. Restrictive soil layers or bedrock that stop the downward movement of water can cause water to flow through the upper soil layers into nearby streams and ponds. This water flow can carry excess nutrients, such as nitrate or phosphorus, into these surface *water bodies*.

Buffers are areas near water that are either left in a natural state or carefully managed to keep vegetation. *Buffers* can be either grassed or wooded areas. These are very important for reducing the amount of nutrients and sediments entering a stream or pond. Buffers help spread out and filter *surface runoff*. Spreading out the *surface runoff* allows a chance for surface runoff to infiltrate into the soils rather than move directly into the stream. Most sediments are trapped by vegetation in the buffer and the plants can use the excess nutrients. Plants growing in buffer zones can also take up nitrogen and phosphorus from water flowing in the soil. Research is showing that the *slope* of the buffer as well as its width is important for protection of surface water. *Buffers* work best when they have slopes less than 15% or, 15 feet of drop in 100 feet. If the buffer *slope* is greater than 15% then a wider buffer is needed to protect the surface water.

Groundwater pollution is more common in sandy soils, particularly where the *water table* is shallow (less than 10 feet). Water moves quickly through sandy soils and the soils have little ability to retain nutrients. But, groundwater contamination can also occur anywhere excessive nutrients are applied next to wells, sinkholes, or other areas with direct connections to groundwater. *Buffers* around these types of areas are the best method for protecting groundwater.

NUTRIENT MANAGEMENT

A number of practices can be used to make sure the nutrients needed for realistic yield goals are applied to the site. The first and maybe most important is regular soil testing to determine to nutrient status of the soil. Soil testing allows fertilizer recommendation to be tailored to your field and crop. In order to get good results from the soil tests, fields should be sampled using Cooperative Extension Service (CES) guidelines found in Soil Testing (Leaflet No. 99). These guidelines show you how to take many small samples in fields with fairly uniform soils and mix them to obtain one sample per field or soil type. For a sample to represent the conditions in a field, it is important to take many small subsamples to create a sample that is representative of the entire area. Soils have a lot of varia-

tion and one sample from a field could give you misleading results.

A program of regular soil testing can help you identify nutrient trends in your soils. Yearly testing is especially important in sandier soils. These soils are less buffered and have less capacity to hold nutrients.

For the nutrient recommendations for nitrogen to be accurate, you should indicate a yield goal for your crop that is achievable. Realistic yield goals are most accurate when based on average yields from your farm for the last five years or more. This type of average will give you a good idea of what your field or farm can produce with different weather conditions. Although adding extra nitrogen can often increase yields, there is a limit to what certain sites and soils can produce. Continuing to add nitrogen above the recommended level can bring diminished returns for the amount of money spent. Too much nitrogen can decrease yields or make crops, like forages, dangerous for animal consumption by creating high *concentrations* of nitrates. Crop recommendations are based on field research that shows an optimal point for nitrogen addition. In this case, most of the nitrogen fertilizer is used by the plants, decreasing the potential loss to ground water.

The full amount of fertilizer recommended based on soil testing should not be used if you are using manures, legumes, or other organic sources of fertilizers. The amount of nutrients supplied by these organic sources should be deducted from the recommended rates to determine how much additional fertilizer is needed. This will prevent over application of nutrients. Table 1 gives the estimated residual nitrogen from a good stand of legumes. Extension bulletins or Circulars such as Developing a *Nutrient Management Plan* for the Dairy Farm (Circular 819-16) indicates how to calculate manure *nutrient credits*. Use of these *nutrient credits* can also increase profitability by reducing fertilizer costs.

Table 1. Estimated residual nitrogen provided by a good stand of legumes grown in rotation.*

Legume	Residual Nitrogen (lb/ac)
Alfalfa [1]	80-100
Hairy Vetch [1]	80-100
Crimson Clover [1]	60-75
Austrian Winter Pea [1]	50-60
Soybeans [2]	15-30
Peanuts [2]	20-40

[1] Killed before planting current spring crop
[2] Legume is planted in previous season. More nitrogen will be available if fall-planted crop immediately follows the legume. On sandy soils and in years with high precipitation, less nitrogen will be available to spring-planted crops.
*From CES Circular 819-16

Following soil test recommendations for liming is also important. Most nutrients are more readily available to the plant at a soil pH range of 6.0 to 7.0. Keeping the soil pH in the range from 5.5 to 6.5 will promote efficient use of nitrogen, phosphorus, potassium and calcium.

Fertilizer should be applied at the recommended rates based on soil test results using realistic yield goals and deducting the *nutrient credits* for other sources. Analysis of the plant tissue can help you determine if the fertilizer supplied adequate nutrients, or if nutrients were over applied. Plant tissue analysis can also identify micronutrient deficiencies that may be reducing yields and be used to make in-season adjustments of nutrient levels.

The discussion above helps you focus on the best way to determine the amount of nitrogen, phosphorus, potassium and other nutrients your crops need for realistic yields without over applying nutrients that can move into surface and ground water. How you apply fertilizer is also important, particularly for nitrogen losses. Under most conditions in Georgia, nitrogen fertilizers are converted fairly quickly into nitrate-nitrogen. Nitrate nitrogen is not held by the soil. In our climate where rainfall is relatively high, it moves through the soil into ground water or through shallow subsurface flow into surface water. This process is called leaching. Consequently, nitrogen fertilizer should be applied when plants are actively growing and using it. Crops with heavy nitrogen demands or those grown in sandy soils

should receive split applications. This will reduce nitrate-nitrogen leaching and provide a more even supply of nitrogen for plant growth. In the Coastal Plain, where irrigation is used extensively, *fertigation* can be a cost-effective and environmentally safe way of supplying nitrogen and potassium.

Regardless of the application method, calibration of your equipment is critical. *Equipment calibration* includes measuring the application rate and determining the spread pattern. Spread patterns that are uneven can create areas with too little fertilizer that can reduce yields, and areas with too much fertilizer that can become a potential pollution source. Information such as Extension Circular 825 – Calibration of Manure Spreader Including Swath Width can be used to calibrate manure spreaders or dry fertilizer spreaders.

ORGANIC SOURCES OF FERTILITY

Using organic sources of nutrients can have many benefits. First, as a fertilizer, the nutrients in organic matter are released over time. This can provide a more constant nutrient source for the plants and reduce the likelihood of excess nutrients moving into ground or surface water. Second, organic matter itself can improve soil tilth. Better soil tilth can increase the amount of water that moves into the soil and reduce erosion. The additional organic matter can also hold more water in the soil and decrease droughtiness. Third, organic sources usually contain many of the micronutrients crops need for maximum yield. Some studies indicate improved yields and pest resistance in fields with higher organic matter. Use of organic sources can decrease the costs for fertilizer, improving your profitability.

The first step in adding organic matter to the soil is using all available on-farm sources. This includes the use of *cover crops*, *green manures*, and animal manures. *Cover crops* are grown in the winter and tilled in the spring. These crops decease erosion and add organic matter to the soil. Common *cover crops* in Georgia are rye and winter wheat. *Green manures* are legumes that are grown in the winter and killed in the spring to increase the organic matter content of the soil and supply nitrogen. Some *green manures* used in Georgia are vetch and crimson clover. The nitrogen supplied by legumes should be subtracted from the total amount of nitrogen needed for your crop.

There are other sources of organic matter that can be beneficial. Composts are good sources of organic material. *Biosolids* are a good source of both organic matter and a slow release nitrogen fertilizer. When properly applied, *biosolids* can provide the benefits of organic matter and nutrients as well as lower fertilizer costs. Cotton gin trash is another off-farm organic material that can add organic matter and nutrients. There are also by-products from food processing, textiles or other industries that can supply some organic matter and nutrients. These are also by-products. These by-products should be tested for safety and value before use on the farm. Most suppliers of these by-products should be able to show you that the product is not hazardous, does not present growth problems, and has low metal content. In addition, they should tell you the amount of nitrogen, phosphorus, and potassium supplied by the by-product.

The most common source of organic matter is animal manures, including poultry litter. Animal wastes are a good source of nitrogen, phosphorus, and potassium. They also contain many essential micronutrients and can be an important component of your fertilizer program. Although manures are a good source of nutrients, the often do not supply nutrients in the same amounts that crops need. Animal manures are typically high in phosphorus compared to the amount of nitrogen needed for crops, so they are excellent for building phosphorus fertility in the soil. But if they are applied to meet the nitrogen needs of the crop, phosphorus is often over-applied. Over time, excess phosphorus can build up in the soil. This excess phosphorus can then move into nearby water and create pollution. Phosphorus can also be moved from manures that are surface applied into surface water by rainfall.

Animal manures vary widely in nutrient content. The amount of nitrogen and other nutrients present in the manure depends on the type of animal, the feed used, how old the manure is, how it was stored, and the waste handling facilities. The best way to know what nutrients the manure can supply is to have the manure tested at a laboratory on a regular basis.

The amount of nitrogen, phosphorus, and potassium the manure supplies should be subtracted from

the crop requirement. Over-application of manures can create water pollution problems and will not increase yields.

RECORD KEEPING

Record keeping is a vital part of farming, but it is often hard to find the time. Although there always seems to be something else more important, good record keeping will allow you to manage your resources more efficiently and help keep your operation profitable. You should be able to develop a convenient system of notebooks, charts or calendars for making notes that can then be systematically transferred to summary sheets for each field. This type of system can minimize the time spent on record keeping.

Good records include maps or aerial photographs of your farm with all fields marked, crops grown, soil test results for each field, records of fertilizer, manures or other soil amendment applications on each field, plant tissue results, and yields. Many farmers also make notes on weather and pesticide or herbicide applications. These types of field histories should help you make better management decisions.

A *nutrient management plan* is the best tool you can use for minimizing your fertilizer costs and protecting the environment. An important part of any *nutrient management plan* is a nutrient budget. The nutrient budget identifies the amount of fertilizer needed from realistic yield goals and soil test results, then subtracts the amount of fertilizer given by legumes, manures, or other sources, and finally supplement the needed nutrients with commercial fertilizer.

There are worksheets and computer programs available to help you with a nutrient budget. The *nutrient management plan* also includes the planned crop rotations, how much fertilizer and/or manure should be applied to each field, how manures and fertilizers should be stored, recommended methods of timing of nutrient application, and the locations of areas on the farm that might be particularly susceptible to pollution. These plans should be reviewed every year to see if modifications are needed.

NOTES:

GLOSSARY:
Nutrient Management

Algae: A plant that lives in water. Theses plants contain chlorophyll but lack true stems, leaves, or roots. Algae imparts a green color to water..

Biosolids: Municipal sludge that has been treated to stabilize organic matter and reduce pathogens.

Buffers: A strip of uncultivated land between farmed land and a sensitive area. Buffers can be grassed but often contain shrubs or trees. These are used to spread out water and sediments leaving the farmed area and help remove excess nutrients or other farm chemicals.

CES Guidelines: Cooperative Extension Service guidelines.

Concentrations: The amount of an element or compound found in a specified amount of another substance. For example, nitrate-nitrogen in water is expressed as milligrams per liter (mg/L) or parts per million (ppm). In solids, concentrations are expressed as milligrams per kilograms (mg/kg) or ppm.

Cover crop: Crops grown for ground cover to reduce erosion and add organic matter.

Crop residues: Leaves, stems or other plant parts left on the soil surface.

Dormant phase: An inactive phase for a plant where nutrient uptake and growth are slow or non-existent.

Equipment calibration: Checking or standardizing equipment so that application rates are even and at a known amount.

Eutrophication: The process by which increasing nutrients in a water body promotes plant over animal life.

Fertigation: Fertilizing crops through the irrigation system.

Green manures: Legume crops that are grown to supply nitrogen and organic matter.

Hardpan: A soil layer that limits root growth or water movement.

Nutrient credits: An addition of nutrients from legumes, animal manures or other sources that should be subtracted from the total amount of fertilizer needed.

Nutrient Management Plan: A plan for managing animal wastes to maxinmize economic benefit for the farmer and protection of the environment.

Restrictive layer: A soil layer that limits root growth or water movement.

Slope: Change in elevation across a horizontal distance. (Example: 2:1, first number is the horizontal distance and the second number is the vertical distance.)

Soil texture: Classes of soil with differing proportions of sand, silt, and clay. For example: loams, silts, sandy clay loams.

Surface runoff: Rainfall that moves over the soil surface into water.

Water bodies: All surface water, including streams, rivers, ponds, and lakes.

Water table: The level in the ground where the soil or bedrock is saturated; the upper surface of groundwater.

ACTION PLAN:

An action plan is a tool that allows you to take the needed steps to modify the areas of concern as identified by your assessment. The outline provided below is a basic guide for developing an action plan. Feel free to expand your plan if you feel the need for detail or additional areas not included. Consult the list of references at the end of this publication if additional assistance is needed to develop a detailed action plan.

Area of Concern	Risk Ranking	Planned Action to Address Concern	Time Frame	Estimated Cost

EXAMPLE RECORDS

Field Number ____ **Sample Area _____** **Soil Series _____**

Crop	Date Planted	Soil Test Date	Soil Test Results										Fertilizer Recommended (lbs/ac)					Fertilizer Applied (lbs/ac)				
			pH	Lime Index	P	K	Ca	Mg	Zn	Mn	B	Other	N	P_2O_5	K_2O	Lime	Other	N	P_2O_5	K_2O	Lime	Other

Crop	Date Planted	Application 1			Application 2			Application 3			Application 4			Application 5			Application 6		
		Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date

EXAMPLE RECORDS

Crop	Date Planted	Yield Goal	Actual Yield	Sample Date	Plant Analysis ----------Percent ---------- ----------ppm----------											Observations Def. Symptoms, Rains, etc.
					N	P	K	Ca	Mg	S	Mn	Fe	Al	B	Cu	Zn	

Crop	Date Planted	Application 7			Application 8			Application 9			Application 10			Application 11			Application 12		
		Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date	Chem.	Rate	Date

EXAMPLE RECORDS

FARM CROPPING PLAN (Specify crop, variety, plant population, etc.)

CROP	FIELD 1	FIELD 2	FIELD 3	FIELD 4	FIELD 5	FIELD 6
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						

REFERENCES:

CONTACTS AND REFERENCES			
Organization	**Responsibilities**	**Address**	**Phone Number**
Agricultural Pollution Prevention (P2AD)	Questions regarding opportunities for pollution prevention	BAE Department University of Georgia Driftmier Engineering Center, Athens, GA 30602	706-542-2154
Biological & Agricultural Engineering (BAE) Department University of Georgia	Information about Farm *A*Syst, by-product use, animal waste handling facilities, water quality	Extension Unit University of Georgia Driftmier Engineering Center Athens, GA 30602	706-542-2154
Cooperative Extension Service Soil, Plant and Water Laboratory University of Georgia	Testing of soils, plant tissue, water or animal wastes	2400 College Station Road Athens, GA 30602	706-542-5350
Crop & Soil Sciences Department University of Georgia	Information on soil sampling, fertilization practices, crop recommendations, nutrient management, water quality	Extension Unit Rural Development Center P.O. Box 1209 Tifton, GA 31793 or Extension Unit Plant Sciences Building University of Georgia Athens, GA 30602	912-386-3194 or 706-542-2461
USDA, Natural Resources Conservation Service (NRCS)	Guidance for developing nutrient management plans; help in designing waste handling and storage facilities	Field offic located near you	(Local)
State Soil and Water Conservation Commission	Information on Agricultural Best Management Practices	P.O. Box 8024 Athens, GA 30602	706-542-3065

PUBLICATIONS:

University of Georgia, Cooperative Extension
Athens, Georgia 30602

- Your Drinking Water: Nitrates, Circular 819-5
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- Agricultural Best Management Practices for Protecting Water in Georgia
- Planning Considerations for Animal Waste Systems for Protecting Water Quality in Georgia

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