

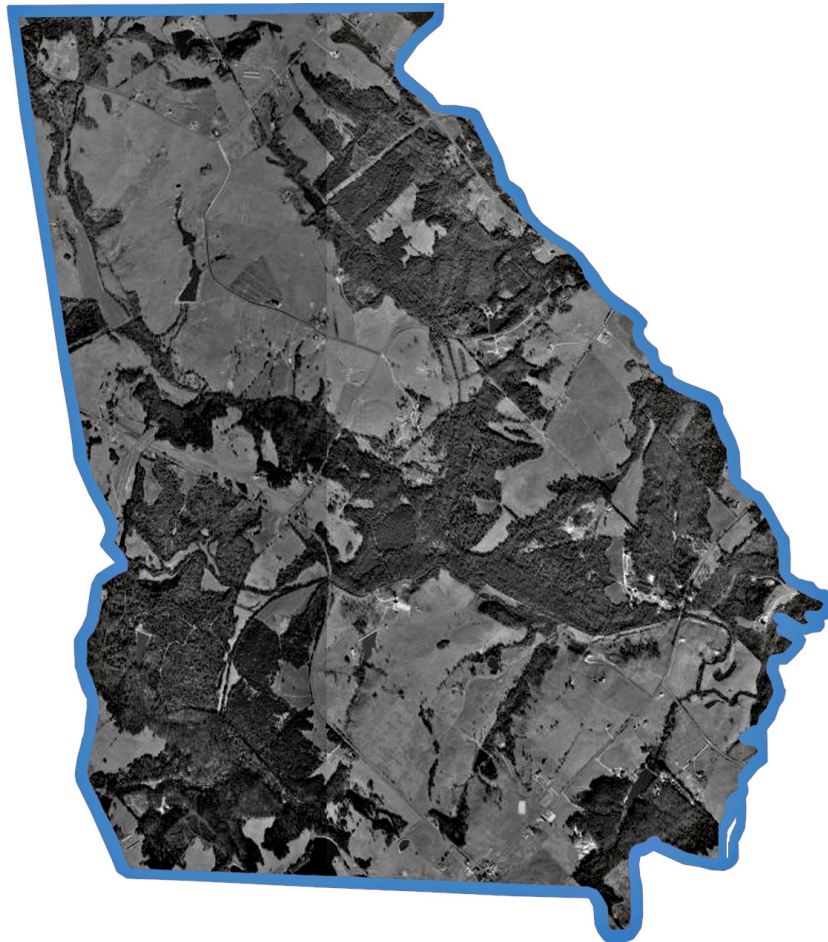


THE UNIVERSITY OF GEORGIA  
**COOPERATIVE EXTENSION**  
Colleges of Agricultural and Environmental Sciences & Family and Consumer Sciences

# Maps for Nutrient Management Planning

---

---



# Table of Contents

Introduction .....	3
Dry Poultry NMP Exceptions .....	3
Making a Base Map .....	3
NRCS Toolkit .....	3
Online Maps .....	4
Photocopied Maps .....	4
Additional or Supporting Maps .....	5
Land Suitability .....	5
Setbacks and Buffers around Sensitive Areas .....	6
Calculating Acreage .....	6
Limitations of Land Application Equipment .....	7
Summary .....	7

---

---

# Maps for Nutrient Management Planning

Thomas M. Bass and Julia W. Gaskin, Biological & Agricultural Engineering Department  
Casey Ritz, Poultry Science Department

---

---

## Introduction

A nutrient management plan (NMP) is a tool for making wise use of manure nutrients while protecting water resources. Accurate farm maps are a central component to the NMP. The map will help you identify areas suitable for land application of manure and areas that need protection or special management due to environmental sensitivity. Maps will also help you evaluate your crop rotation and calculate acreage you have available for using animal manure. This document will explain the process of preparing maps for the management of nutrients from organic sources such as manures.

Maps for NMPs should include:

- farm property lines
- land use – cropland, pasture, forest, etc.
- farm field boundaries with field identification
- surface water locations, including streams, rivers, ponds, ditches and wetlands
- arrows showing the direction of stream or river water flow
- well locations
- buffers around sensitive areas including surface water, wetlands, wellheads, springs, rock outcrops or sinkholes
- any residences or public gathering areas
- spreadable acres
- north arrow
- road names or numbers
- name of county
- legend with map symbols
- BAR SCALE on the map
- date prepared
- name of person who prepared map

## Dry Poultry NMP Exceptions

In Georgia, a nutrient management plan for a dry litter poultry operation has less detailed mapping requirements. The map is still a valuable planning tool, but it is required to have only the following:

- road names or numbers
- farm field boundaries with field acreage
- field identification (should match related documents in the NMP)
- farm property lines

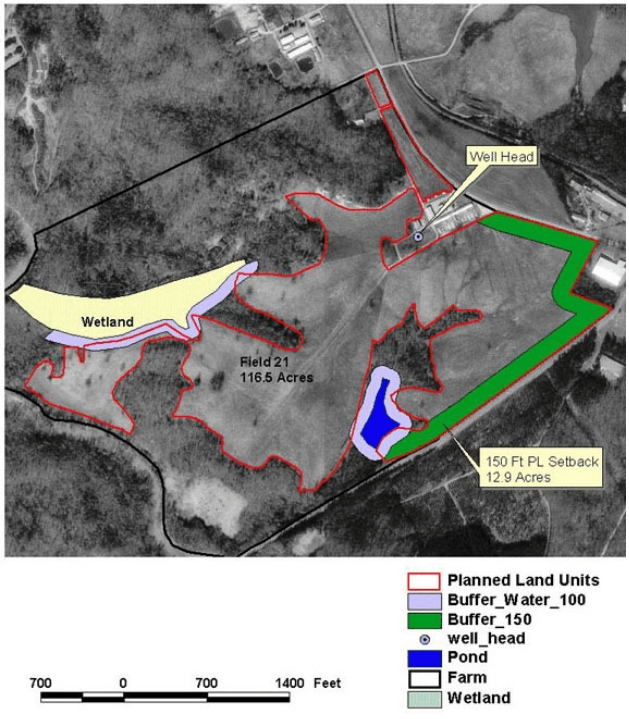
## Making a Base Map

There are several ways to create a farm map; one is with computer generated maps. Most of these options require the assistance of a professional.

## NRCS Toolkit

The easiest way to acquire map information needed for an NMP is to use the Natural Resources Conservation Service Toolkit. U.S. Department of Agriculture Service Center Offices are equipped with computers and technology that can generate a map for you. A conservationist can provide an aerial photo of the farm with the Farm Service Agency property lines and field lines. You can work with the conservationist to add streams and other water bodies, and locate buffers. This technology is in place in many district offices and is widely available throughout the state in local offices.

Figure 1 (page 2) is an electronic aerial photo with the farm boundaries (black line), field boundaries (red line), 150-foot setback around the property line (green line), 100-foot buffer around surface water and wetlands (light violet), well (small circle), streams and pond (blue) overlain on the photo. This electronic map was developed



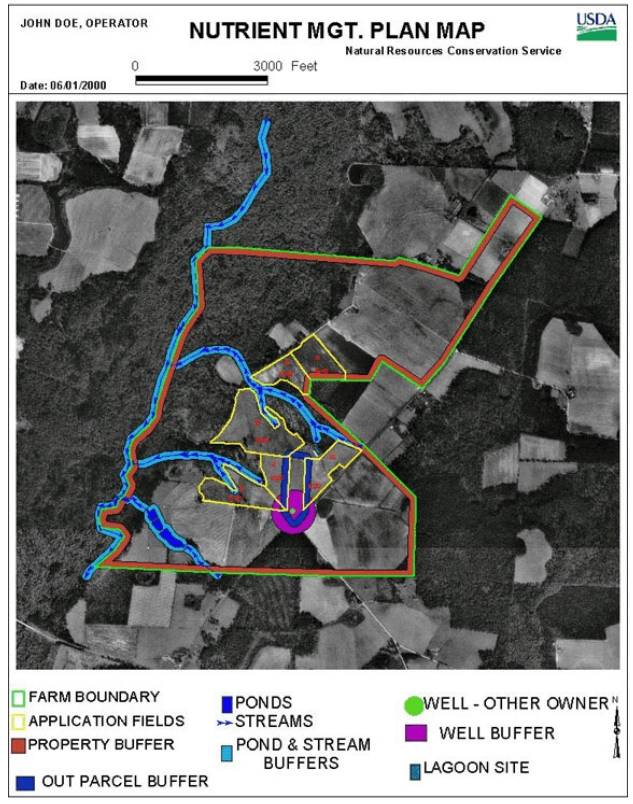
**Figure 1. Example of NMP Base Map**

with the NRCS Toolkit. The Toolkit can calculate the area of the fields, buffers and any other area desired. USGS topographic maps and some soil maps are available for overlaying on the base aerial photo.

The map labeled “Nutrient Mgt. Plan Map” (Figure 2) is an example of an actual map from a nutrient management plan prepared using the NRCS Toolkit. Revising or updating electronic maps can be done with minimal time and effort. The map shows the basics for nutrient management plans, including property boundaries, field numbers, size and boundaries, the lagoon or holding pond, sensitive areas and buffering, setbacks required by the Environmental Protection Division rules, and a scale. Note that on Figure 2 the 150-foot setback from the property line is continuous around the farm. This 150-foot setback could be placed only on fields that will be used for manure application, similar to Figure 1.

### Online Maps

There are several sources for maps online, three of which are listed below. These maps can serve as your base from which to build a more detailed depiction of the farm and its surroundings. The aerial photographs available at some of these sites can also be used to make the base map for your NMP. After you have obtained the topographic map or aerial photograph of your farm, you can hand draw the property boundaries, streams, fields,



**Figure 2. Example of NMP map from NRCS Toolkit.**

etc., or use computer software to add the needed features. You will have to determine the scale of the photograph by measuring a known distance on the map. More details on how to add features and determine scales follow in the “Photocopied Maps” section.

**FREE:** TerraServer USA:

<http://terraserver.microsoft.com>. From the home page, use the “advanced find” function to search for the property in question by address. If available, both a USGS topographic map and aerial photo will be offered.

**FEE BASED:** Topozone, by Maps a la carte, Inc.:

<http://www.topozone.com/>

**ADVANCED TOOLS:** Georgia GIS Clearinghouse web site

<http://gis.state.ga.us/>

### Photocopied Maps

You can also construct a base map from photocopies. You will need the following:

- copies of the FSA maps of your farm, an aerial photograph or topographic map
- a ruler
- a transparent dot grid, planimeter or other method to determine acreage

Any time a document is photocopied, the image size may change, so use a bar scale to make sure your scale is accurate. Draw a 1-inch line on a piece of paper and place it on the map **before** it is copied. Then measure the 1-inch line on the map copy to make sure it still measures 1 inch. If it does not, you will have to set up a ratio to determine the true scale of the map.

An example of how to set up a ratio for a map follows. The original scale is 1 inch = 660 feet, and on the copy, the 1-inch line measures 1.2 inches. On the new map, 1.2 inches = 660 feet as well. If you wish to adjust the new map back to a 1-inch scale, the ratio looks like this:

$$1 \text{ in}/1.2 \text{ in} = x \text{ ft}/660 \text{ ft}$$

$$(660 \text{ ft}) (1 \text{ in}/1.2 \text{ in}) = x$$

$$(660 \text{ ft}) (.83) = x$$

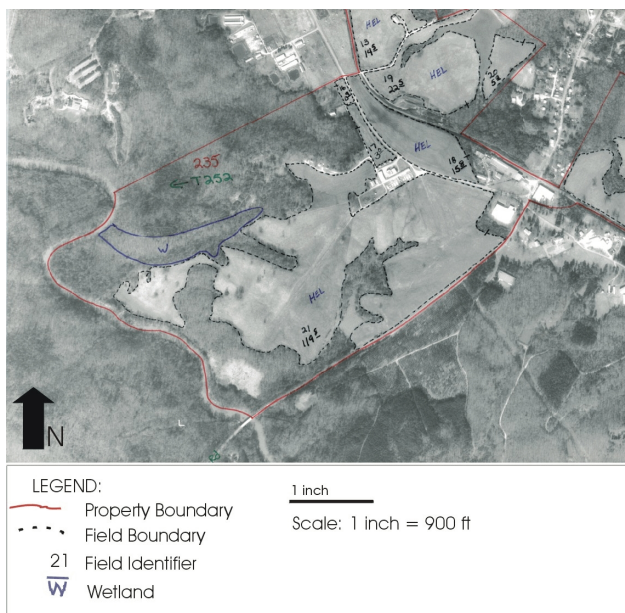
$$x = 550 \text{ ft}$$

New scale is 1 inch = 550 feet

Because the FSA maps are aerial photographs, they will show land use and many surface water features as well as roads with road names or numbers. Identify your property lines and field boundary lines if not shown on the base map. Fields must be identified with a unique name or number, and the total acreage and spreadable acreage of each field must be shown. (See the section on “Calculating Acreage” for explanation.) You can add these features by hand with pens or colored pencil. Leaving a blank or white area below the map will leave you room for the legend, scale and any necessary comments.

### Additional or Supporting Maps

A soil survey map may also be a valuable tool in planning for nutrient applications. It is especially valu-



**Figure 3. Example of hand-drawn features on photo**



**Figure 4. Example of soils map**

able when considering phosphorus application and using the Georgia Phosphorus Risk Analysis Index (P Index).

### Land Suitability

Site suitability for manure application is largely determined by the soils, topography and location of surface water. You also may want to consider how close a field is to public roads, public gathering areas or residences. The best sites for manure application are on level to gently sloping, deep, well-drained soils with some clay content. You should avoid:

- ❑ Soils less than 24 inches to bedrock
- ❑ Soils with water tables less than 36 inches below the soil surface
- ❑ Slopes greater than 12 to 15 percent.

You should also be careful about irrigation with manure wastewater on deep sandy soils. Water moves very rapidly through these soils and they have a limited ability to hold nutrients.

You probably have a good idea where these types of soils occur on your farm, but you can obtain this soils information from the county soil survey. Your soils map will have symbols on it that indicates the type of soils you have. Look up the symbol in the Soil Legend to get the name of the soil and the range of slopes associated with that map unit. Then go to the Soil and Water Feature Table, where you can look up the water table depth and depth to bedrock for that map unit. Remember, the county soil survey is on a large scale and maps the dominant soils on the site.

This means that soils other than the one mapped can and most likely will exist in a given field. If you have questions about whether the soils on your farm have the above characteristics, contact the NRCS.

If you have fields or parts of fields with the characteristics listed above, you may need to exclude them from

manure or wastewater application. Mark these areas on your base map. Discuss these areas with NRCS or Cooperative Extension personnel to determine if they need to be permanently excluded from your land application program, or if they can be used seasonally or with special management. Keep the soils information you have developed with your NMP. The information may prove useful if the NMP needs to be modified.

## Setbacks and Buffers Around Sensitive Areas

Sensitive areas such as wellheads, streams or wetlands may be impacted by nutrient inputs. Setbacks are areas where manures and nutrients are not applied. Buffers are setbacks that are managed with certain types of vegetation to help prevent nutrients and sediments from reaching surface waters.

Setbacks around wellheads will reduce the potential for groundwater contamination due to nutrients from manures, fertilizers or pesticides. Table 1 gives the distances required by law that you need to have separating wellheads from various potential contaminants. Table 2 gives recommendations for separation distances from potential contaminant sources.

**Table 1. Minimum distances between wells and potential contaminants based on the Georgia Well Standards Act of 1985.**

Potential Contamination Source	Distance from Well (feet)
Sewer line	10
Septic tank	50
Septic tank absorption field	100
Cesspool or seepage pit	150
Animal or fowl enclosure	100

**Table 2. Recommended separation distances from various potential contaminant sources.\***

Potential Contamination Source	Distance from Well (feet)
Waste lagoon	150
Dead animal burial pits	150
Pesticide storage, mixing & loading facilities	100
Fertilizer storage	100
Petroleum tanks	500
Manure or chemical application	150

\* Tyson, A. 1996. Improving Drinking Water Well Condition. Georgia Farm\*A\*Syst, Cooperative Extension Bulletin 1152-3.

Setbacks and buffers around streams, rivers, ponds and wetlands reduce the chance these surface waters will become overloaded with nutrients. Phosphorus in runoff or in water moving through the soil into the surface water can cause excessive algae growth that creates problems for recreation and other uses. Table 3 gives some general guidelines for buffer widths. Effective buffers are highly site specific and depend on land use, slope and vegetation. Review any proposed buffers with NRCS or county extension personnel. Governmental rules and regulations may require specific setback and buffer widths. Some permitted animal feeding operations are required to observe a 100-foot setback from surface waters for manure application. This setback may be substituted with a managed 35-foot vegetative buffer adjacent to the water feature. Such regulations take precedence over any recommended widths.

**Table 3. Guidelines for surface water buffers. Do not apply animal manures within these buffers. Use fertilizers carefully.\***

Distance from Surface Water	Feature
At least 50 feet	Ponds, sinkholes, wetlands
At least 90 feet if buffer slope is less than 15%	Streams, rivers
At least 120 feet if buffer slope is greater than 15%	Streams, rivers
At least 35 feet	Ditches

\* Gaskin, J., and G. Harris. 1999. Nutrient Management Farm\*A\*Syst. University of Georgia Cooperative Extension Bulletin 1152-16.

## Calculating Acreage

Now that you have determined the setbacks and buffers needed around these sensitive areas, you need to mark them on your map, determine the acreage, and subtract the acreage from the total acreage of the field. Make sure you know the correct scale for your map. First, measure the correct setback and buffer distance with your ruler and outline the buffer area in a distinct color. You may want to shade or otherwise mark the setback and buffer areas.

Now calculate the acreage in each field that is not usable for manure application due to the setbacks and buffers, sensitive areas or unsuitable areas. Setback and buffer areas can be calculated by measuring the area with a ruler or using a dot grid.

A dot grid is a transparent piece of paper or plastic with a known number of dots per square inch. Place the dot grid over the buffer area and count the number of dots within the buffer. If a dot falls on the buffer line, include

every other dot in your count for the buffer area. Divide the total number of dots by the number of dots per square inch to get the square inches of land in the buffer. Now, find the scale of your map. Multiply the number of feet per inch by itself to get square feet per square inch. Then multiply the number of square inches from your dot grid by the square feet for your base map, convert to acres, and you're done.

## Limitations of Land Application Equipment

The acreage remaining for application after all appropriate buffers and setbacks have been considered may still not be the actual acreage available. This is most true

when considering liquid waste applied through an irrigation system. For example, a center pivot system will not reach all the corners of a field. The map should show the wetted areas for irrigation systems. This final area is what should be used for budgeting applications in a field. NRCS Toolkit is recommended for illustrating coverage area and calculating actual acreage.

## Summary

You have now developed the basis for your NMP. These maps are critical for conservation, planning land application of manures and crop rotations. Keep them as accurately as possible.

# Learning *for* Life

---

**Bulletin 1195**

**Reviewed May, 2009**

---

The University of Georgia and Ft. Valley State University, the U.S. Department of Agriculture and counties of the state cooperating. Cooperative Extension, the University of Georgia College of Agricultural and Environmental Sciences, offers educational programs, assistance and materials to all people without regard to race, color, national origin, age, gender or disability.

**An Equal Opportunity Employer/Affirmative Action Organization  
Committed to a Diverse Work Force**