United States Department of Agriculture

Cropland Conservation Practices

to protect groundwater sources of drinking water

Natural Resources Conservation Service
Des Moines, Iowa

Helping People Help the Land
www.ia.nrcs.usda.gov

Ninety-two percent of Iowa's public water systems use groundwater as their source. Rainwater, which leaches and infiltrates through Iowa's farmland, is the source of much of this water. Landowner and farm operator decisions influence water quality, safety, treatment costs, and even drive the need to find alternative water sources to replace contaminated public and private water supplies.

Impacted wells could be on your farm, which provide water for your family or livestock. The well may supply a rural water system or serve your neighbors in a nearby community. Fields in your operation might have been identified as part of a public well's source water capture zone, possibly for a well already showing signs of contamination.

As you develop the production and conservation system for your farm, consider the pollution risk that agronomic and fertility options will have to the groundwater. NRCS staff and your local soil and water conservation district (SWCD) are available to help you make decisions to sustain your operation and protect drinking water sources. To build your strategy:

1. Use nutrient management to avoid exceeding the nitrogen needs of the crop and to optimize N use efficiency.
2. Trap nitrogen using cover crops.
3. Build a resilient N management system using multiple conservation strategies and improve your soil's health.

Consider installing the following conservation practices to improve drinking water quality while meeting your production objectives.

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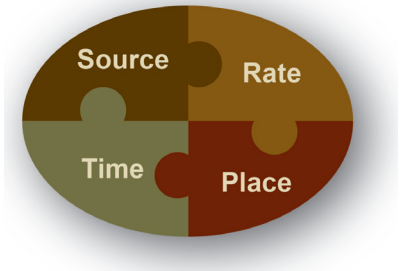
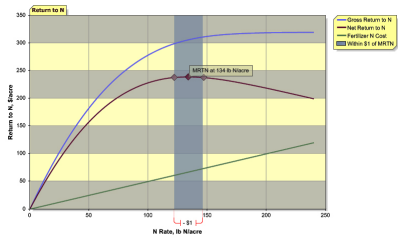
Conservation Practice	Description	Key Points	Decision
Nutrient Management (590): 4R Nutrient Management Plan			
	The 4Rs of nutrient management – apply the **R**ight nutrient source at the **R**ight rate at the **R**ight time in the **R**ight place – to improve nutrient use efficiency by the crop and to minimize nutrient losses to the surface and groundwater.	• Apply the plan to optimize production using Iowa State University recommendations • Consider how chaning one "R" impacts others. • Account for all nutrient sources • Keep records • Update plan as needed	**Field #**
Nutrient Management (590): Right Source			
	Determine the nitrogen, phosphorus, potassium and other nutrient needs based on crop requirements and soil properties. Examples: swine or poultry manure, alfalfa or clover rotation, or nitrapyrin for fall applied anhydrous.	Select the Right nutrient source, considering: • what the crop needs • cost • availability • method of delivery • environmental risk	**Field #**
Nutrient Management (590): Right Rate			
	Match application rates with crop requirements. Use soil testing, crop history, in-season testing, crop nutrient budgets and adaptive management to determine application rates.	Use ISU recommendations to select the Right rate: • Use the Corn Nitrogen Rate Calculator to determine the recommended Maximum Return to Nitrogen rate. • Apply P and K based on the soil test.	**Field #**
Nutrient Management (590): Right Time			
	Synchronize nutrient availability with crop demand and reduced environmental risk.	• Consider applying nitrogen in the spring. • Consider a split application of N based on testing. • For fall applied anhydrous ammonia and high ammonium manures, apply when daily soil temperatures, at a 4-inch depth, are 50 degrees and trending colder.	**Field #**
Nutrient Management (590): Right Place			
	Place and keep nutrients where the crop can get to them, where nutrients are least likely to leave the field, and efficiency in maximized.	• Inject or incorporate nutrients to prevent runoff • Place the nutrients where the crop's roots can efficiently get to them.	**Field #**

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Nutrient Management (590): Soil Sampling			
	Take soil samples typically six inches deep. For one sample, take 15-20 soil cores representing the sample area. A sample represents a maximum 10-acre area, smaller for precision ag.	• Determines nutrient, pH, and organic matter content. • Agronomic interpretations determine recommended P, K, and lime application rates. • Used to determine risk of P runoff. • Late Spring Soil Nitrate Test	**Field #**
Nutrient Management (590): Calibration			
	Calibrate equipment used to apply fertilizer and manure to assure that what you plan to apply is actually applied.	• Calibrate using scales when unit is full, empty, and acres covered. • Properly plumb and main-tain anhydrous ammonia applicators. • Maintain equipment. • Speak with your custom applicator to verify.	**Field #**
Cover Crop (340): Winter Hardy (e.g. cereal rye)			
	Winter hardy cover crops are planted into or after a cash crop to scavenge nutrients, reduce erosion, suppress weeds, provide winter grazing for livestock, and increase soil organic matter. Examples include rye, winter wheat, and hairy vetch.	• Select species that fit your cropping system. • Learn from producers who have experience with cover crops. • Have a plan to terminate the crop in the spring, so that it does not compete with your cash crop.	**Field #**
Cover Crop (340): Winter Kill (e.g. oats)			
	Winter killed cover crops are planted into or after a cash crop to scavenge nutrients, reduce erosion, and increase soil organic matter. Examples include oats, radishes, and turnips.	• Need to be planted early to have enough fall growth to make a difference. • Do not require spring termination.	**Field #**
Cover Crop (340): Multiple Species			
	Planting a diverse mix of cover crops prior to or following harvest can improve the vigor of the cover crops, reduce compaction, feed livestock, and improve soil health.	• Every year farmers who use cover crops experiment with new mixes of cover crops to improve their management. • As part of the conservation planning process, develop mixes to test in your operation that will meet your needs.	**Field #**

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Conservation Practice	Description	Key Points	Decision
Conservation Crop Rotation (328): Perennials			
	Growing a perennial crop in the rotation reduces nitrate loss and soil erosion and improves soil health. Legume perennials fix nitrogen for future grain crops. Crop sequences can break weed and insect cycles and reduce the need for pesticides.	• Weather conditions and marketing considerations may affect year to year cropping decisions and require a change in scheduled rotation. • Markets for perennial crops are needed.	**Field #**
Conservation Crop Rotation (328): Extended Rotations with Small Grains			
	Including small grains in your rotation reduces soil erosion, reduces nitrogen leaching, and improves soil health. Extended rotations diversify a farming operation economically.	• Extending rotations can improve soil health. • Markets for small grain crops are needed.	**Field #**
Conservation Crop Rotation (328): Grazed Pasture			
	In a conservation crop rotation that includes perennials and runs 6-7 years, livestock producers can optimize their land use by adding grazing to the rotation. Consecutive years of alfalfa or clover can provide essential livestock grazing.	• Alfalfa may require more intense management to attain desired yields. • Consider no-till planting alfalfa after soybeans. This requires uniform planting depth, good soil to seed contact and a firm seedbed.	**Field #**
Integrated Pest Management (595)			
	Implement diverse management practices to limit agricultural pests and to reduce potential adverse effects on plant growth, crop production, human health, pollinators, and wildlife.	• Respond to cropping system and pest complex changes, and avoid the development of pest resistance. • Periodically review your plan when the rotation changes or when new pesticides need to be used.	**Field #**
Filter Strip (393)			
	A strip or area of vegetation next to a stream, lake, or other water body that helps remove sediment, organic matter, and other pollutants from runoff and wastewater. Filter strips also provide cover for wildlife.	• Minimize the development of rills and small channels within filter areas to allow re-establishment of sheet flow. • Maintain vigorous vegetation. • Fence off livestock from filter strips.	**Field #**