Restrictions are not always setbacks

Restriction maps serve several purposes.

by Scott Fleming

Nutrient management planning takes place on every farm — whether owners and managers specifically cite it as such or not. Like most things in this world, restrictions are a key component of the process. Specific protocols vary from state to state or even across counties due to locality-based needs and concerns, but the basic tenet of planning remains the same: limit the risk of nutrient delivery into water. One of the best ways to do this is with help from restriction maps.

The most straightforward of all nutrient management planning constraints are those you can see. In a brief survey of U.S.-based restrictions, some sort of surface water setback was present in all regulations. Surface waters that clearly demand restrictions include lakes, ponds, rivers, and streams. But some states have enacted restrictions for surface waters not typically categorized as such. These may include drainage and irrigation ditches, intermittent streams, or grassed waterways. After all, these waterways may not always contain water, but they are the first point of entry for any precipitation into a navigable waterway.

The next landscape restriction class is visible but with features often hiding in plain sight. These direct conduits to groundwater give contaminants a shorter path into the groundwater aquifer. Many of these paths are man-made, including drinking water wells, irrigation wells, oil or gas wells, and gravel pits. One that may slip under the radar is drain tile surface inlets. These inlets are designed to quickly remove ponded water from a low area and drain it underground through the tile drainage system. This water drainage shortcut may remove standing water quickly, but it also acts as an alternate route for nutrients and pathogens into ground or surface water.

Sinkholes are not common in the U.S., but they pose major challenges for some producers as a direct route to groundwater. Sinkholes are generally formed when limestone bedrock is dissolved by water. Since rainwater is slightly acidic, the water will slowly dissolve the bedrock, leaving a void beneath the soil surface. If the roof of the resulting cave is not strong enough, it will slowly or suddenly collapse, resulting in a sinkhole.

Out of sight

The next restriction category is one we cannot see: soil. Soil is one of the most limiting and restrictive features on a farm. Soil has three restrictions that can cause nutrient application challenges — all of which are in place to limit the risk of nutrients, namely nitrogen, to groundwater.

First up is bedrock. If bedrock is located too close to the soil surface, manure may not be applied. As with all nutrient management-related restrictions, the subtle nuances of the rule vary from state to state. In the case of Wisconsin, this restriction even varies depending on the type of bedrock. Generally, application is greatly restricted or prohibited if soil is less than 2 feet deep.

Depth of groundwater is the distance from the soil surface to the water table. In the eastern U.S., the depth to groundwater parameter is more likely to be called "frequently flooded soils," but the outcome is the same. The soil is likely wet too close to the point of application. When manure is applied near a shallow water table, nitrates are more likely to reach groundwater.

Soil permeability can also complicate application. A measure of how fast water moves through soil, permeability causes groundwater issues when water flows through soil before the growing crop has a chance to capture the nutrients. When manure is applied in the fall on permeable soil, the water captures and transports the dissolved nitrate on its way to the water table — before the plants ever have a chance to use it. Finer-textured soils like silt loams would have a slower infiltration rate than coarser-textured soils such as sandy loams. Heavy soils are generally not subject to any fall permeability-related restrictions, whereas light soils almost always face regulation.

A drain tile surface inlet to remove ponded water from fields quickly.

Know the rules

Understanding the restrictions for your locality is the first step to compliant and environmentally-sound nutrient applications. Generally, application restraints are broken into three categories:

1. Spreading prohibited
2. Rate or incorporation restrictions
3. Seasonal restrictions

While spreading prohibited seems

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obvious, the others have some bumpers to help guide manure applications. Rate restrictions curb applications to a specific gallons-per-acre rate, while incorporation restrictions stipulate that you can apply, but they require injection or incorporation. Seasonal restraints allow you to apply manure, but only after a specific date or below a specific soil temperature. Nutrient management restrictions are very state-specific, so always look up your state's guidelines.

Surface water regulations are similar, yet diverse, throughout the world. There is generally a form of mandatory setback. For instance, in Nebraska, manure may not be applied within 100 feet of surface water. If a permanent vegetative buffer is used, manure can be applied up to 35 feet from surface water. Maryland has a 10-foot setback if injecting manure but a 35-foot setback when broadcasting manure. Heading up the coast to Vermont, rules change. All fields must have a 25-foot buffer from adjoining surface waters, but only a 10-foot buffer from ditches. In Wisconsin, there is a 50-foot prohibition from any surface water, but there are incorporation and rate-related restrictions within 300 feet of a stream and 1,000 feet of a lake or pond.

Direct conduits have similar constraints to surface water. In fact, the Nebraska regulations call for the same setbacks from almost all surface and groundwater resources. In Pennsylvania, the private drinking water well setback is 100 feet. Municipal wells have a greater risk of contamination and tend to have a greater setback requirement, almost universally.

Generally, permeable or wet soil types have a rate restriction, if not prohibition, when it comes to fall manure application. There could be additional timing or soil temperature requirements. All these rules and guides are in place to reduce the risk of nitrates moving through the soil. When soil temperatures are low, nitrate is bound more tightly to soil, limiting the risk of nitrate moving through the rooting zone and into the groundwater. As previously stated, when depth to bedrock is involved, there is generally a moratorium on nutrient application if the bedrock is found within a certain depth.

Restriction maps are a vital part of safely spreading manure. While the finer details may fluctuate state to state, the heart of these tools remains the same. These maps exist to help locate the areas that may lose manure nutrients to the environment. After all, manure is a valuable commodity, and using these maps above and beyond their intended purpose will help extend fertilizer dollars. ■

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