

# Quantifying the effects of alternative surface inlet protection strategies on water quality

## Abstract:

Subsurface drainage systems with surface inlets are widely used to divert water in crop producing areas, but pose problems because they can allow unfiltered, sediment-laden water to travel quickly to other waterways. The project tested several modest, uncomplicated inlet protection practices with potential to keep nutrient and sediment flows in check.

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*Current designs of surface inlets can allow water with high concentrations of sediment, sediment-bound phosphorus, and dissolved phosphorus to enter the drainage system. Blind inlets and filter socks amended with alum can reduce these concerns, but choosing the best practice to use will depend on site-specific conditions.*



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## What was done and why?

Subsurface drainage that removes excess water from soils is used to facilitate optimum crop production in many parts of the world including Iowa and much of the U.S. Corn Belt. As a result, the Iowa landscape has been extensively altered by stream channelization, terracing, and installation of subsurface drainage systems. Often these drainage systems contain surface intakes to collect surface water that accumulates in natural depressions and behind ditch banks and constructed terraces. Unfortunately, these surface inlets bypass the soil's filtering capacity and rapidly transmit water to streams and drainage channels. This can increase the amount of sediment and nutrients reaching these bodies of water and contribute substantially to declines in water quality.

The project objective was to quantify the effectiveness of three relatively simple, surface inlet protection practices for improving water quality:

1. Install a blind inlet,
2. Surround the surface inlets with 15-ft wide grass filters strips, or
3. Encircle surface inlets with woodchip-filled filter socks.

## What did we learn?

It is unlikely that any single alternative inlet design will be suitable for all locations and circumstances. The project results indicate, however, that tile line surface inlets can be a significant contributor to water quality problems in Iowa. Installing surface risers can reduce this concern, but other modifications should be considered. Selection of alternative inlets will be dependent on site characteristics and the contaminants of concern. Blind inlets will function longest in sites with limited erosion, but will not be as effective as filter socks in reducing TDP. Grass buffers may be difficult to establish and maintain in some locations, but also should be effective in reducing TSS and TP transport. In areas where prolonged inundation is a regular occurrence it is unlikely that filter socks and grass buffers will be effective in improving water quality. Additionally, it may be uneconomical to produce row crops in these areas due to depressed crop yields. Consideration should be given to taking these areas out of row crop production.