

Drainage Management



Informational Factsheet #19

DRAINAGE WATER QUALITY

Introduction

Water draining off a farm, whether from subsurface drains or from overland flows, presents an opportunity for pollution to enter watercourses and result in a violation(s) of water quality standards. The pollutants that are most likely to be generated from agricultural operations or Drainage Improvement District (DID) operations include:

- Pathogens (fecal coliform, *E. Coli* bacteria)
- Nutrients (e.g. Nitrates and Phosphorus)
- Pesticides (insecticides, fungicides, herbicides)
- Sediment (field runoff, bank failures, stormwater from development)

Landowners may be held responsible for pollutants released into watercourses from their land. DIDs also may be held accountable for the quality of water leaving their district boundaries, much like cities and other municipalities are held responsible for their stormwater releases. Both can be subject to \$10,000/day fines for water quality violations.

Under certain circumstances, DIDs may be required to obtain a municipal stormwater permit. One way this could happen is if a third party petitions the Washington State Department of Ecology (WDOE) or the Environmental Protection Agency (EPA) to determine that the DID is a significant contributor of pollution to surface waters. The DID need only be the conduit and not the source of the pollution. A stormwater permit will impose significant regulatory burdens, see *Factsheet #2 Water Pollution Control Acts*. DIDs should work closely with landowners to ensure that landowners' operations result in clean water leaving their lands and entering the drainage system

Water Quality Guidelines

Farmland drainage systems in Whatcom County typically follow a familiar pattern. Water is collected in subsurface drains, which flow into constructed watercourses, which lead into modified and natural watercourses. Finally it is discharged into Bellingham Bay, Lummi Bay, Birch Bay or Drayton Harbor. Along

the way water can be used for a variety of beneficial uses including: drinking, irrigation, crop washing, livestock water, swimming, boating and for shellfish culture. Poor drainage water quality can affect the usefulness of the water supply for downstream members of your community.

This same water supports fish (including Endangered Species Act listed species) and other aquatic life. Important water quality criteria include water temperature and dissolved oxygen levels. Both criteria are critical to fish life and are directly affected by land uses, specifically the quality of or lack of riparian buffers (native trees and shrubs) along watercourses.

Criteria for drainage water quality are based on end use and the potential impact on aquatic habitat. The drainage water quality criteria selected should not alter or impair the use of the water sources for other purposes. For example, water with high levels of pathogens is not available for downstream vegetable farms to irrigate their crops because of the potential for contamination and resulting illnesses.

Water Quality Monitoring

The California spinach *E. Coli* outbreak of 2006 underscores the potential for having widespread and costly impacts due to poor water quality. Short of such drastic effects on people, fish or animals, water quality sampling is necessary to determine if drainage water is polluted beyond the water quality standard.

When to Sample

Samples should be collected when the risk of contamination is highest. The risk of drainage water contamination is elevated following the first significant rains of the season. It is also higher when there are increased activities on the ground such as when farmers are spreading manure, commercial fertilizers, or pesticides.

Where to sample

Landowners may consider sampling immediately

upstream and downstream of their property and a Drainage Improvement Districts may want to sample at:

1. Its boundaries to see if it is a potentially significant contributor to pollution.
2. A specific area where there is a suspected source of pollution.

Collecting and Storing Samples

The laboratory should be able to provide containers for samples. Samples may need to be kept at a cool temperature and need to be taken to the lab within a certain time for the test to be accurate. For pathogens, samples should be submitted to a lab on the same day of sampling. Be sure to ask the lab to confirm any of these requirements.

Watercourse Maintenance Activities

Watercourse maintenance, whether implemented by landowners or by Drainage Improvement Districts can be significant sources of water borne sediments that must be monitored and controlled. Detailed information about how best to do this can be found in *Factsheet #16 Water Quality Protection Measures*.

Controlling Contaminant Sources

The best way to manage pollutants in a watercourse is at the source, whether it be an agricultural operation, development, or human influenced stream bank erosion. *Factsheet #21 Bank Stabilization Techniques* and *Factsheet #22 Farm Practices* provide detailed information on how to manage these sources.

Stormwater Management Monitoring

Although it is not required to have a stormwater permit and to monitor regularly under that permit, a DID should be aware of the water quality conditions entering and leaving its boundaries. This is so the DID can proactively take steps to avoid being put under permit by encouraging landowners within its boundaries to take steps to protect water quality. Also, since cleaning ditches is expensive, adopting a policy that discourages erosion and sediment runoff from fields can save everyone money.

River and stream water quality monitoring data are available from Washington Department of Ecology (WDOE). WDOE maintains a website at: http://www.ecy.wa.gov/programs/eap/fw_riv/rv_main.html#4. Another source of information is your local Watershed Planning Unit. For Water Resource Inventory Area No. 1 (WRIA1), which covers most of Whatcom County, the Whatcom County Public Works Department collects and maintains water quality data. The DID may want

to conduct some sampling to establish a “baseline” of information. Baseline conditions are those which exist before some event that affects water quality occurs, such as development in the watershed or addition of an industrial discharge. Comparing data collected before and after an event is one way of assessing its impact on water quality.

Additional means to control contaminant sources:

Controlled Drainage

Controlled drainage refers to holding back water within a ditch or reservoir by means of an instream structure. Such a structure would have adjustable or removable boards to control runoff.

- For the first rainfall of the season or if there is rainfall soon after manure, fertilizers or pesticides have been applied to the field, water would be impounded to prevent contaminated water from immediately entering a sensitive watercourse.
- The drain water could be held for treatment or released later in the season when stream flows are higher.
- These same structures could be used to impound water for passive subsurface irrigation during the summer growing season. Control boards would be removed in the spring to allow cultivation, then replaced in the summer for subsurface irrigation, then removed again in the fall for harvest.

Interrupting Macropores

Direct movement of manure or fertilizers to subsurface drains can occur through macropores, relatively large holes or cracks in the soil that allow direct access from the soil surface to the subsurface drains. If these macropores can be interrupted and the direct conduit to the drains closed, the soil will act as a filtering agent to allow nutrients to be taken up by the crop and pathogens to die off in the soil. Macropores can be interrupted by tilling the field before applying manure.

Subsurface Drainage System Control

Discharges from subsurface drainage systems may contain nutrients or other deleterious substances that are toxic to fish or that degrade water quality for irrigation purposes. Discharged water from subsurface drainage systems may be controlled by:

- Installing a water control structure at the downstream end of the drainage ditch.
- Having all subsurface lateral drainage lines connected to a collector pipe. A control valve on the collector pipe may then be used to control discharge of contaminated drainage water.