

# Drainage Management FACTSHEET

## DRAINAGE WATER QUALITY

Water draining off a farm, whether from subsurface drains or overland flows, may pose some risks to water quality. The components that are of most concern from agricultural operations are:

- Pathogens
- Nitrate
- Pesticides
- Phosphorus

### Water Quality Guidelines

Farmland drainage systems often use ditches as the outlet. Ditch water can be used for a variety of purposes including irrigation, crop washing and livestock water. Poor drainage water quality can affect the usefulness of the watercourse as a potential water supply for downstream users and for on farm use.

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 source for other purposes. Quite often drainage water will impair the usefulness for irrigation, requiring treatment of the water prior to use. Factsheet 512.000-1 *Treating Irrigation and Crop Wash Water for Pathogens* provides information on the treatment of irrigation water for pathogens.

Tables 1 and 2 provide guidelines on water quality guidelines for British Columbia. Table 3 on the back page provides more detailed information on nitrates.

Use	Nitrate Threshold levels
Fresh Water Aquatic Life - maximum	200 mg/L (maximum)
Recreation and Aesthetics	10 mg/L (maximum)
Drinking Water	10 mg/L (maximum)

Source: BC Ministry of Water, Land and Air Protection



**Figure 1 Agricultural Drainage Ditch**

More water quality criteria guidelines can be found on the website for the *Ministry of Water, Land and Air Protection* at:

<http://wlapwww.gov.bc.ca>

The parameters to test for depend on the likely source of contamination as shown below:

Source	Parameter
Manure	E. coli, fecal coliform, nitrates, phosphorus
Commercial Fertilizer	nitrate, phosphorus
Pesticides or other chemicals	specified chemical of concern

Crops Eaten Raw		All Other Crops
<b>E.Coil</b>	≤ 77 / 100 ml	≤ 1000 / 100 ml
<b>Fecal Coliform</b>	≤ 200 / 100 ml	≤ 1000 / 100 ml

Source: BC Ministry of Water, Land and Air Protection / Health Canada

## Water Quality Monitoring

To determine if drainage water is negatively affecting water quality monitoring is required.

### Where to sample

Samples should be taken upstream and downstream of the point that drains enter the ditch. See Figure 1. Both samples should be tested for the same parameters to see if there is any change in water quality from the point the watercourse enters the farm until the water course leaves the farm.

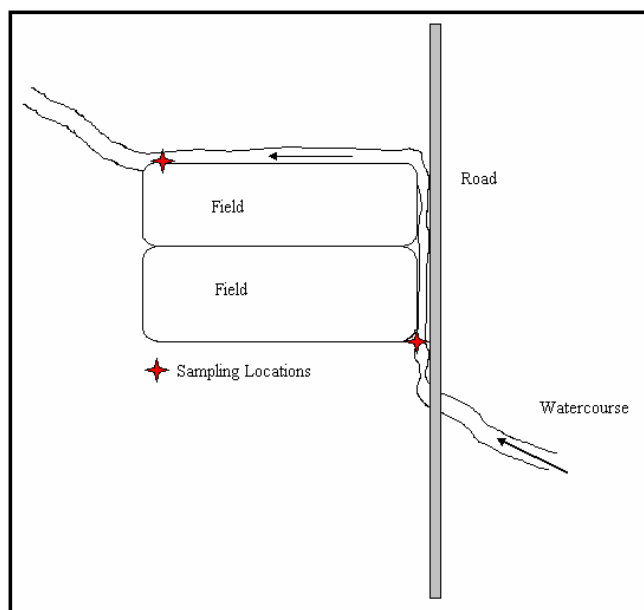


Figure 2 Sampling Locations

### When to Sample

The risk of drainage water contamination is elevated following the first significant rains of the season or when there is a significant rainfall event shortly after spreading manure, or applying fertilizers or pesticides.

Samples should be collected when the risk of contamination is highest. For example, if potentially contaminated water will be used to irrigate “ready to eat” produce, a sample should be collected prior to irrigating. Enough time should be given so the lab results come back prior to using the water.

## 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 for any of these requirements.

## Labs for Water Testing

### CANTEST

4606 Canada Way  
Burnaby, BC, V5G 1K5

Phone: (604) 734-7276  
Facsimile: (604) 731-2286  
Toll Free: (800) 665-8566

### CANTEST Kelowna Regional Office

Phone: (250) 765-7501  
Facsimile: (250) 765-7509

www.cantest.com  
cantest@cantest.com

### NORWEST LABORATORY

19575 55A Avenue 104,  
Langley, BC V3S8P8

Phone: (604) 514-3322  
Facsimile: (604) 514-3323  
Toll Free: (800) 899-1433

## Management Options

Recommended options for preventing poor quality drain water from negatively affecting watercourses can be either by controlling the drain water itself or using specified field management techniques.

### Controlled Drainage

Controlled drainage refers to holding back drain water within a ditch or reservoir. For the first rainfall of the season or if there is rainfall soon after manure, fertilizers or pesticides have been applied to the field, controlling the drainage would prevent contaminated water from immediately entering a sensitive water course. The drain water could be held for treatment or released later in the season when stream flows are higher.

The Factsheet 564.000-1 *Controlled Drainage/Subirrigation* and the *BC Agricultural Drainage Manual* provide more information.

### ***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 pathogen to die off in the soil.

The macropores can be interrupted by tilling the field before applying manure.

### ***Filter Strips***

Creating filter strips or cropping strips along the contour of a sloped field and at the edge of watercourses can act to slow down over land flows. The slower flows will allow sediments that may contain contaminants to settle out. The slower water will also have a chance to infiltrate into the soil instead of running directly off the field.

The *Riparian Management Field Workbook* provides additional information on filter strips, cropping strips and buffers.



**Figure 3** Water Sampling with Bottle



### ***Subsurface Drainage System Control***

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

The control devices allow for drainage water to be held back at a time of year when the drainage discharge is toxic to fish or impacting the irrigation of downstream users.

Table 3

**WATER QUALITY GUIDELINES FOR NITRATE**

<b>Water Use</b>	<b>Nitrate mg/L as Nitrogen</b>	<b>Nitrite mg/L as Nitrogen</b>	<b>Ammonia (total) mg/L as Nitrogen</b>
Drinking Water	10 mg/L (maximum)	1 mg/L (maximum)	None proposed
Fresh Water Aquatic Life - maximum	200 mg/L (maximum)	0.06 mg/L (maximum)	see <i>Nutrient Management Reference Guide</i>
Fresh Water Aquatic Life - average	≤ 40 mg/L (average)	0.02 mg/L (average) when the chloride ≤ .2 mg/L –  also see Nutrient Management Guide	see <i>Nutrient Management Reference Guide</i>
Marine Aquatic Life - maximum	None proposed	None proposed	2.5 mg/L (maximum)
Marine Aquatic Life - average	None proposed	None proposed	less than or equal to 1.0 mg/L (average)
Livestock Watering	100 mg/L (maximum)	10 mg/L (maximum)	None proposed
Wildlife	100 mg/L (maximum)	10 mg/L (maximum)	None proposed
Recreation and Aesthetics	10 mg/L (maximum)	1 mg/L (maximum)	None proposed