

FARM PRACTICE

STORMWATER MANAGEMENT

Description

Stormwater runoff contributes to flooding and water quality degradation, particularly in areas that receive frequent and severe rainstorms or heavy snowfalls that produce large quantities of surface runoff.

Storm water runoff is defined as that portion of rainfall or melting snow that flows overland away from the area it originally precipitated on.

There are two different categories of stormwater runoff:

1. Non-point source runoff which originates from fields and forests
2. Point source runoff which flows from specific – usually impervious – areas such as roofs or feedlots

Stormwater runoff from impervious surfaces on farm operations should be permitted to enter the municipal drainage system or natural watercourses if a stormwater management plan has been prepared in accordance with municipal bylaws. For large impervious areas, local governments may require storage structures such as detention ponds to reduce post-development peak flows to those prior to development. Infiltration systems can be effective as an alternative to detention storages in areas where water normally recharges ground water and where underlying soils exhibit percolation rates in excess of 1.3 centimetres (0.5 inches) per hour. Stormwater should be kept separate from other waste water collected on the farm.

Improperly managed runoff can cause downstream erosion; can contaminate lakes, streams, marshes and other surface waters with sediment and nutrients; and can cause extensive flooding to low lying areas. Many agricultural areas experience problems associated with poor stormwater management, especially in urbanized upland areas.

Activities and Operations

Channel Protection

When overland flow is left unchecked and concentrates over unprotected soil, rills or gullies form. Channel degradation through altered flow can also take place. Degradation of stream banks increases their vulnerability to erosion by storm water runoff. Adhering to soil and water conservation principles, upgrading existing channel capacity when increased runoff volumes are anticipated, and fencing critical riparian areas are techniques that can be used to reduce the potential for channel degradation. A tool which can be used to assess how well a site is capturing rainfall and returning it to the ground rather than having it run off as stormwater is available at the following website: www.waterbalance.ca.

Outdoor Livestock Areas

The *Agricultural Waste Control Regulation* and applicable environmental guidelines provide guidance on runoff from outdoor livestock areas. Due to higher animal densities and the increased risk of compromised runoff water quality, confined livestock areas – such as feedlots, livestock and poultry barns and outdoor animal pens – may require runoff collection. The stored runoff may be applied at opportune times to agricultural land as a fertilizer or as a soil conditioner. Off-site uncontaminated runoff and contaminated on-site runoff must be kept separate to reduce the volume of storage required. Perimeter ditches, roof gutters and land shaping can be used to achieve this goal.

See also Farm Practice: [Fertilizers and Soil Conditioners](#)

Contaminated Runoff from Impervious Surfaces

Some commodity operations such as mushroom farms require that production material such as compost be stored for later use. Used materials may also be stored for subsequent reuse or disposal. Proper storage facilities and practices are required to ensure that contaminated runoff does not result.

See also Farm Practices: [Storage of Farm Supplies and Products](#)
[Storage of Hazardous Material](#)

Fill Placement for Flood Protection

Unless otherwise prohibited by local government bylaw, the construction and maintenance of certain specified works for the purposes of drainage and irrigation or to combat the threat of flooding are permitted activities for land within the Agricultural Land Reserve. These specified allowable works fall into two categories: (i) dikes and related pump houses, and (ii) ancillary works including access roads and facilities. As part of such works and if necessary, soil removal and the placement of fill is allowed. Regulations, however, do not allow wide-spread or area-wide filling to create a uniform elevation above a flood plain. The Agricultural Land Commission allows, as part of general policy, the placement of fill for perimeter or sectional flood control or irrigation measures. In addition, fill placement is permitted for the construction of related dikes or ditches.

Greenhouses and Other Large Covered Areas

Greenhouse operators and farmers with large barns and storages require management plans that address both the quantity and quality of stormwater runoff. Plans should include the incorporation of drainage systems that keep rainwater separated from contaminated water. In this context, greenhouse irrigation water containing nutrients would be considered contaminated. Similarly, greenhouse roof water that flows over concrete slabs could create contaminated runoff. Roof water should therefore also be kept separated from contaminated water.

On-site stormwater detention structures should also be provided to avoid overloading municipal or regional drains or waterways. The post-development stormwater flow release rate from a farm property should be similar to pre-development flows unless other mitigative drainage measures are taken. Local government bylaws should be checked for guidance.

Manure Applications

Manure application rates should not exceed the agronomic requirements of the soil and the crop to be grown. Care must be taken to ensure that there is no runoff. Manure cannot be applied on frozen fields or in areas of high precipitation or snowfall, if runoff or escape of agricultural wastes under such conditions causes pollution in nearby watercourses or goes beyond the farm boundary.

See also Farm Practice: [Manure Storage and Use](#)

Field Management

Sheet erosion is caused by overland flow of water over a large area of unprotected soil. This type of erosion causes sediment and nutrient loads to rise in both surface water and groundwater supplies. Appropriate soil conservation techniques can reduce the risk of erosion. Recommended techniques include the planting of cover crops, conservation tillage, the installation of subsurface drainage systems, and the planting of buffer strips.

See also Farm Practice: [Habitat Management](#)

Related Farm Practices

Other farm practices that pertain to stormwater management include, but are not limited to, the following.

Drainage

Drainage ditch systems are often designed to manage localized stormwater flow.

See also Farm Practice: [Drainage](#)

Manure Storage and Use

Manure storage facilities should be constructed to prevent the entry of stormwater.

See also Farm Practice: [Manure Storage and Use](#)

Storage of Farm Supplies and Products

Storage structures must be sited, designed and managed to prevent stormwater from negatively impacting such facilities.

See also Farm Practice: [Storage of Farm Supplies and Products](#)

Composting

Composting sites must ensure that all leachate generated from storm events is contained.

See also Farm Practice: [Composting](#)

Legislation

Information on federal and provincial legislation can be found in Appendices B and C. Acts, regulations and bylaws that regulate or may affect stormwater management practices include, but are not limited to, the following.

Federal Legislation

The *Fisheries Act* protects fish and fish habitat and prohibits the discharge of deleterious substances such as manure and wood waste into waters frequented by fish.

Provincial Legislation

The *Environmental Management Act* provides direction on regional stormwater plans. This includes the requirement to design and implement liquid waste management plans, where appropriate.

Publications and Websites

Publications that provide further information on stormwater management include, but are not limited to, the following. Refer to Appendix D for details.

British Columbia Agricultural Drainage Manual
Best Management Practices Guide for Stormwater
Planning for Agricultural Drainage
Stormwater Planning: A Guidebook for British Columbia
Urban Runoff Quality Control Guidelines for British Columbia

The website www.waterbalance.ca offers useful information and tools which can be used to evaluate design, and implement systems to minimize stormwater runoff and to maximize its entry into the groundwater system.