Wetlands for Wastewater Treatment

Natural wetlands purify water by breaking down and assimilating nutrients, bacteria, and other contaminants. Wetlands can be designed and constructed to take advantage of these naturally occurring processes to treat wastewater from a variety of sources. On the farm, wetlands can be constructed to provide a natural, self-regulating mechanism to purify wastewater from livestock operations and provide wildlife habitat. This fact sheet provides information on constructed wetland technology for interested landowners.

What Constructed Wetlands Can Do

Run-off from traditional solid manure handling systems and milkhouse wastes is a source of contaminants for streams, wetlands, and groundwater. One alternative is a liquid storage system which temporarily stores manure and wastewater destined to be spread on farmland. Liquid manure tanks protect water resources from contaminated run-off, but the system can be expensive to set up.

Wetlands constructed to treat manure storage and milkhouse wastes from solid handling systems can remove a large portion of the solids, nutrients, detergents, and bacteria. This results in cleaner water being discharged into streams and wetlands. In addition, constructed wetlands can use the treated water to provide wetland wildlife habitat on the farm.

How Constructed Wetlands Work

Constructed wetlands are composed of a series of ponds or cells that perform different functions. Typically, run-off from solid manure piles and milkhouse wastes is conveyed via an underground piping system or a surface watercourse to a primary pond with a six month storage capacity. The effluent undergoes anaerobic digestion and solids are allowed to settle out of suspension in the primary storage pond. The overflow from the primary cell then enters a secondary or treatment cell with aquatic vegetation. In this cell physical, chemical, and biological reactions reduce contaminants. Dense growths of vegetation trap bacteria, which die due to a number of factors, including exposure to sunlight and being separated from their hosts. Nitrogen and phosphorous are used by wetland vegetation. Microorganisms
that live on vegetation transform nitrogen and phosphorous into nutrients that support the wetland ecosystem. The overflow from the secondary cell then flows into a tertiary cell that provides habitat for wildlife and applies the finishing touches to the wastewater.

![Wetland vegetation](image1)

**Advantages of Constructed Wetlands**

Wetlands constructed to treat farm wastes can bring numerous benefits to the farm. Constructed wetlands:

* provide a cost effective alternative to liquid storage systems

* help to ensure that water resources are protected from contaminants

* provide valuable wildlife habitat

* require very low maintenance and take advantage of processes that occur in nature

* look natural and add to the appearance of the farm.

**Constructed Wetland Technology on PEI**

The use of constructed wetland technology to treat farm wastes is new to PEI. A demonstration wetland was constructed on the Thompson farm in Frenchfort in 1995. Data collected from this site have been encouraging. Water sampling results indicate a substantial reduction in average concentrations of nutrients and bacteria. Waterfowl surveys indicated a minimum of six broods of wild ducks using the wetland in 1997. A constructed wetland is also being used by Cavendish Farms in New Annan to treat wastewater from their processing plant.

Wetlands for wastewater treatment are designed to treat the level of contaminants specific to each site. Constructed wetlands are sized according to the amount of effluent that enters them and would typically be 0.5 to 1.0 hectare in size for average PEI dairy operations. They are located adjacent to and down slope from the barn, and require soils with a high clay content to contain the liquids and prevent wastewater from contaminating ground water.

![Blue-winged teal brood](image2)

**Additional Information**

For more information on constructed wetlands contact the PEI Department of Technology and Environment, Fish and Wildlife Division (902)368-4683 or the PEI Department of Agriculture and Forestry (902)368-4880.