

# Water Innovation Network



Recycling nutrients on the farm - cleaning up rivers, reducing costs, increasing profits.

## What we learned from our pilot projects



**Ballinderry**  
Rivers Trust  
freshwater life



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**Agriculture, Environment  
and Rural Affairs**  
[www.doe-ri.gov.uk](http://www.doe-ri.gov.uk)



The European Agricultural Fund  
for Rural Development. Europe  
investing in rural areas

# About the project

The water innovation network (WIN) is made up of a group of farmers from the Ballinderry catchment supported by experts in agriculture, water quality and innovation. The mission is defined:

“We are seeking **WIN WIN solutions** – innovative ways to make farms more productive, profitable or efficient that also protect and improve water quality.”

Over the last year the team has been looking at the root causes of agricultural pollution and designing and trialling systems that will work - both for the river and the farmer. **Nature-based systems** have been set up on four farms in the Ballinderry catchment.

This project is a European Innovation Partnership (EIP) project and is funded by the European Agricultural Fund for Rural Development and DAERA.

## So what's the problem?



Water poses a constant management problem for farmers in Northern Ireland (NI). On average around 1000mm of water falls on every square meter of NI each year. Rain falling on farmyards, silage pits and areas of high animal traffic can pick up nutrients, chemicals and soil as it finds its way to the river - and that's not good for the water quality or wildlife.

There are a number of pollution risk factors on most farms, for example; cracks in silage pits and farmyard concrete allowing effluent to run away, danger of slurry spills from above ground stores or lagoons, dirty water running off the yard and into sheughs and drains heading to the river, fertiliser and pesticides being spread too close to waterways.

# The Swale Solution

We've trialled two types of swales; open and pebble filled.

**Open swales** are widely used in urban drainage systems as a way to carry storm water and to treat run-off, like a ditch but wider with gentler slopes.

For the pilot, swale systems were carefully designed with a suitable gradient so that dirty water from the farmyard can run very slowly through the system, **diffusing the water and the nutrients into the soil.**



**Pebble swales** are trenches two-thirds filled with pebbles with a pipe at the top of the pebbles to keep the water flowing. The top third is back filled with top soil so **farm machinery can travel over the whole plot.** Pebble swales use about 40% of the land required for open swales but they have less flexibility and carrying capacity.

The swales can be planted up so that nutrients are absorbed along the way by plants that can be harvested. It works on the same principle as Integrated Constructed Wetlands but the theory is that these will be **lower cost, won't use so much land, can be positioned to fit around the usual farm activities and have the potential to yield useful crops** - so land stays in production. The pilot used comfrey and willow.



# The power of plants

Using plants for bioremediation is nothing new. AFBI\* has been at the forefront of much of the research into the use of Short Rotation Coppice Willow for treating waste water for years.

This project incorporates the same thinking. Willow is a profitable and harvestable crop which can be used for biomass and there happens to be a local farm which will buy and harvest the crop.

Willow planted in the pilot scheme shows the impact of planting where there is a source of nutrient rich water. In year one, the willow planted in the dirty water path is twice the size of the rest.

The secret weapon in the system is Comfrey. This incredible plant acts as a **nutrient recycler**. Comfrey can be found growing wild around the countryside.

It's a brilliant absorber of nitrogen, phosphorous and potassium so a very useful plant in situations where we need to mop up nutrients before they get into waterways.

It's a perennial and will happily grow in most conditions. It flowers from early spring and bees and other pollinators love it. It puts down strong, 2-3m roots and pulls nutrients and minerals up into its leaves. The plants can be cut and ensiled when grass is being cut. Another valuable use is as **liquid fertiliser, as compost accelerant or for mulch.**



This wild plant produced 9kg of leaves by September

There are different types which can grow from seed or from root cuttings and it competes well with weeds and grass. Our native varieties can go a bit mad as they grow from seed but the Russian variety is sterile and stays where you put it.

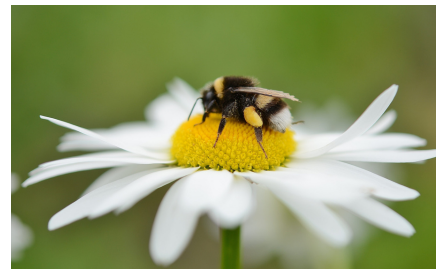
# Results ...so far

The swale systems are still in a trial phase but results so far look good. **Biodiversity is improving.** After the swales were filled and the willows came into leaf, skylarks, cuckoo and mallard ducks were seen around the site and probably nested there. Since then, teal ducks come daily to feed in the swales. There are also bees, butterflies and dock beetles feeding on the wildflowers and comfrey. The receiving waterway at our first site – the Tulnacross River – is now scoring **10 out of 10 for water quality** based on biological assessment (i.e. the presence of invertebrate species indicative of good water quality).

Over the next two years the results will continue to be monitored. Winter 2022 will test all of the systems but as the plants reach maturity in Summer 2023 we hope to see even more positive results.

The farming families involved in the pilot can sleep more easily knowing that the pollution risk seems to have been resolved and the farm yard should be able to carry more livestock throughout the year.

For updates visit [www.waterfriendlyfarming.com](http://www.waterfriendlyfarming.com)



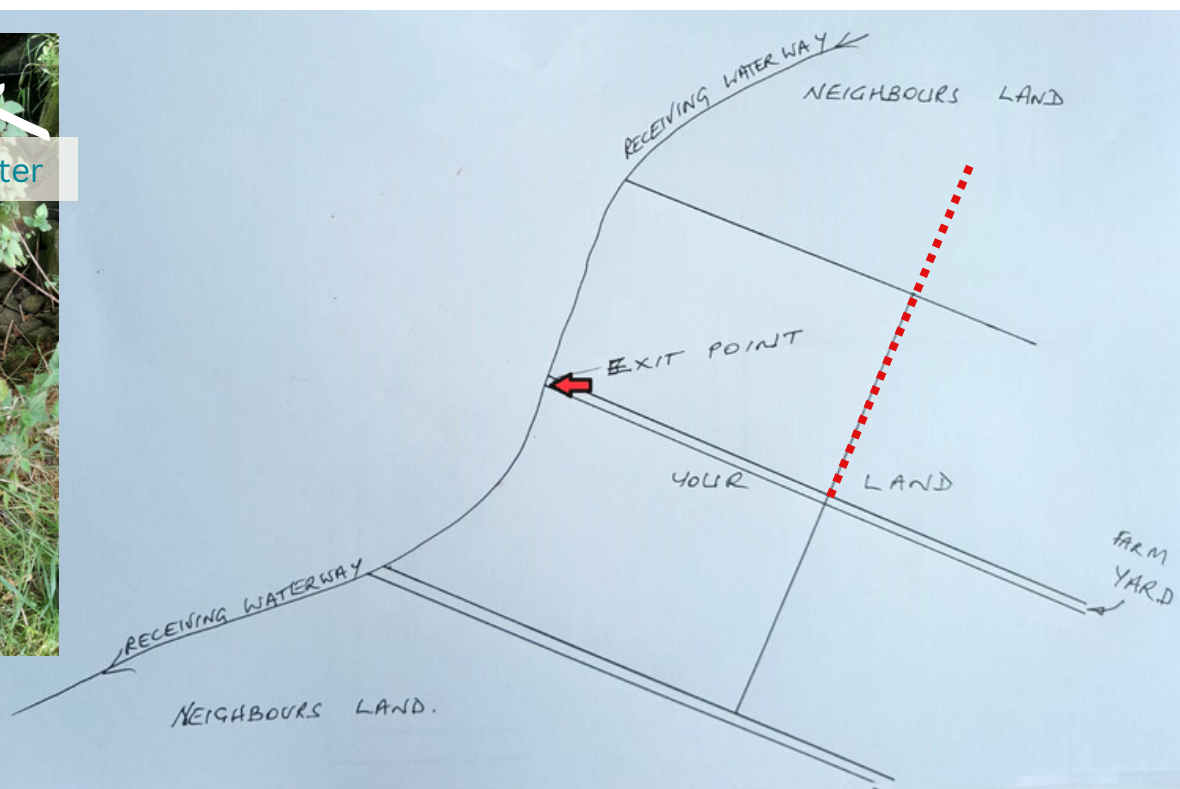
# Checking your own farm

Water running through your farm will end up back in the river at some point. If you have streams or rivers running through or around the farm check the wildlife to know how they are doing.

If there are pollution issues, look for the points where drains, open or piped, flow into the waterway. See diagram below. Check for other potential sources from outside your land as well - illustrated by the red dotted line.

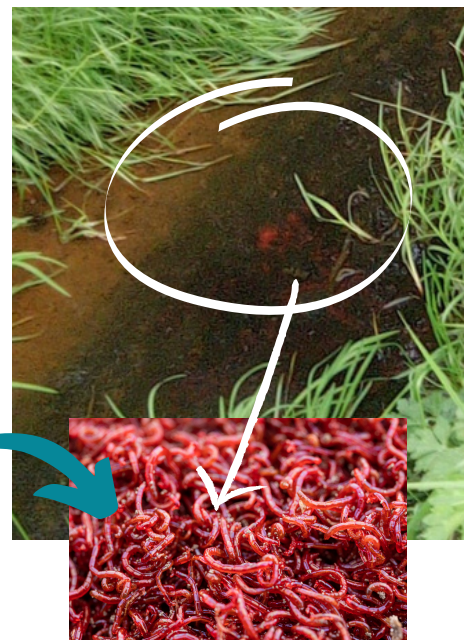


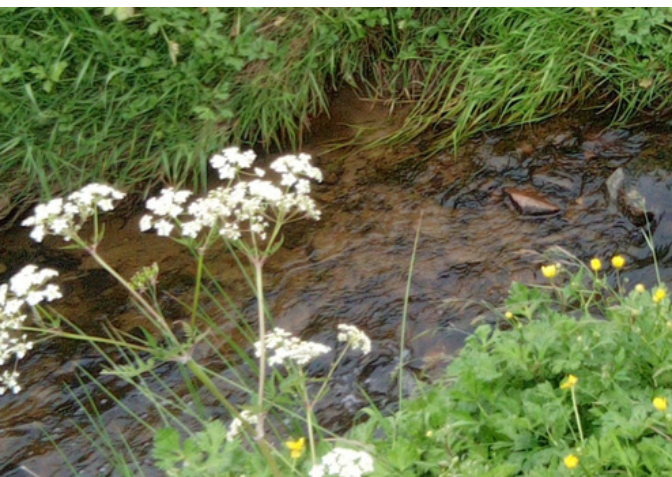
In this photo, the clean water above the farm discharge scores 10 out of 10 on NIEA's Biotic Scoring system, the discharge scores 1 out of 10



There are many indicators of pollution but the photo to the right and overleaf show some of the most common signs.

The Biotic score is a way of rating the water quality at any site based on the presence of indicator invertebrates. The most tolerant, like the red bloodworms in the photo to the right get a score of 1. The most sensitive like stonefly nymphs get a score of 10.





Another clear indicator of pollution is tan/grey sewage fungus growing on the stones on the river bed. This photo shows the receiving waterway downstream of a polluting pipe and gets a score of 1. Immediately above the pipe the river scores 10.



Near the exit point in this farm sheugh scores a six because of some farm yard run-off and a malfunctioning septic tank. Cleaning out the septic tank and a small swale system could bring this back to a 10 within a year.

## Things you can do

- If you have sources of clean water, coming off roofs or from springs - try to channel it so it doesn't get contaminated, make sure gutters and downpipes are in good order.
- Reduce sources of contamination, e.g. repair cracks in silage pits, slurry tanks, lagoons and concrete yards.
- If you have above ground slurry stores consider what your emergency plan would be in the event of a failure - contact BRT for advice on this.
- Keep animals out of the river, pasture pumps can be used to access drinking water.
- Contact BRT on 028 8676 1515 for advice if you have any concerns. Your call and the results of any survey will be held in strictest confidence by BRT.



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