Reducing Soil & Water Losses from Arable Fields

Project Background

A Countryside Stewardship Facilitation Fund (CSFF) Group is operational in the **Great Eau Catchment**. It is facilitated by the **Lincolnshire Chalk Stream Project (LCSP)** and looks to bring farmers together to disseminate information. An issue raised by this group has been the **increase in sediment in the Great Eau.**

In 2018, the LCSP commissioned a Great Eau fluvial audit and the EA commissioned an internal aquatic ecological survey highlighting the fine sediment behaviour and sediment hotspots along the Great Eau catchment. The reports found that **where sediment was building up, the ecology was poor.** Several sediment hotspots were found on: **Muckton Beck, Main Great Eau Channel, Calceby Beck and Burwell Beck.**

Sediment from agricultural fields can be lost into **nearby watercourses** due to **soil movement.** Sediment can carry with it phosphate and pesticides which is adsorbed into the soil particles. The combination of sediment and phosphorous entering the watercourse can cause issues for the aquatic habitat by smothering gravels causing nutrient enrichment and increased turbidity. **Increased turbidity** is a particular issue for Anglian Water as the more cloudy or turbid the water coming into our water treatment works, the harder it is for the UV filters to work, which can also adversely affect pesticide treatment too.

What did we do?

In autumn 2020, a partnership project with Anglian Water, the LCSP, funding from Lincolnshire County Council and equipment donated by the University of Lincoln, began. **Three sediment barriers and catch pits** were erected in three different fields across the Great Eau catchment. Crops varied across the sites and cultivations varied from very minimal disturbance to four cultivation passes (Table below).

A **sediment barrier** is a concept borrowed from the construction industry where it acts as a **physical barrier to stop sediment run off.**

A **catch pit** is a 2m long pit dug into the ground, lined with plastic. The catch pit has a plastic roofed covering to prevent any rain water getting in. This makes sure that the catch pit just collects the water and sediment from surface or overland flow from that particular field.

This trial is a **novel and innovative design,** which worked very successfully as it allows us to **quantify both water and sediment run off overland** via the catch pit, and the sediment movement at the sediment barrier itself.

	SITE 1	SITE 2	SITE 3
Current Cropping	Winter Barley	WOSR	WW
Previous Cropping	Beans, WW, Spring barley (ploughed before spring barley)	WW, WW, WOSR	WOSR
Soil Type	Clay loam to sandy loam	Clay loam to sandy clay loam	Chalk Wold
Cultivations	Topdown about 6" deep. Cultipress then rexius twin	Direct drill, double roll	Direct drilled with a catch/cash crop
Pre-emergence herbicides	Defy (Prosulfocarb) Crystal (Pdm, Flufenacet)	None. Post em - Cleravo (Imazamox+Quinmerac), Astrokerb (Propyzamide+ Aminopyralid)	Flufenacet

Being careful with water is an all-year-round challenge.
Not just when there's a dry spell.

We love every drop, come rain or shine.
Find out more at AnglianWater.co.uk /farming

love every drop
anglianwater

What did we find?

Three pesticides were consistently present across all sites in the raw water analysed from the catch pits, these were, **Flufenacet, Prosulfocarb and Glyphosate**. A head scratcher has always been; why are pesticides detected which have not recently been used? This trial shows that a pesticide doesn't have to have been used recently for it to be detected, it could have been used two seasons ago and still at risk of being lost to nearby water courses.

The individual pesticide limit for drinking water is 0.1µg/l (ppb), the following results were obtained across the three sites. The highest results were all from Site 1 - This field was drilled following the slope and had increased cultivations compared to the other sites.

Herbicide	Min µg/l	Max µg/l	Avg µg/l
Flufenacet	0.127	10.14	2.2
Prosulfocarb	0.025	0.992	0.3
Glyphosate	0.14	4.97	1.4

- On one site **Propyzamide levels reached 633.1µg/l and Quinmerac 44.38µg/l** – a direct spray line into the catch pit? A warning to be careful when spraying near water courses
- **TSS (Total suspended solids)** is a measure of how turbid the water is. Anything above 40mg/l provides a cloudy sample. Only one site on one occasion was below this level. **The highest reading was 4660mg/l**
- **Total P** is a measure of the ecological status of a water body. >200ppb could cause poor conditions downstream if this P level in runoff was seen from many fields in one catchment. **The highest reading was 5340ppb**

Sediment Barrier Sample Results

- There was movement of sediment seen at the barrier but no quantifiable amount
- Glyphosate was present in all sediment analysed
- There was no significant difference in Phosphorous loading, between soil samples taken at the sediment barrier and those taken in the rest of the field, does this suggest bulk movement of soil rather than particular fractions?

"I found the results from the trial most interesting, particularly the aspect of legacy amounts not related to the recent application. The eventual fate of herbicide applications is something we do not always appreciate or necessarily understand - as is often the case with diffuse pollution" John Youles, Agronomist, The Arable Group

Mitigation Measures

Independent Soils & Cultivations expert, Philip Wright visited the sites and suggested the following measures be looked at in any of the situations:

1. Can permanent buffers be placed to stop water/sediment movement such as trees?
2. Can longer term buffers/margins be placed in higher risk areas e.g. alongside woodland, watercourses, bottom of slopes?
3. Ensure tramlines are across the slope – the tramlines act as a barrier to break the flow
4. Disrupt tramlines to avoid compaction and improve filtration by (a) oblique drilling ahead of setting tramlines by the sprayer if suitable guidance is available; (b) ensure where tramlines are permanent that they are low disturbance loosened from either side rather than by a central tine. This will avoid creating a loose, unsupportive tramline prone to laying wet, and instead, will help to channel water to either side where the growing crop can make best use of it.
5. Review cultivations e.g. reduce Intensity, number of passes and tyre pressures if possible
6. Improve soil health to e.g. improve soil structure and nutrient and water capture

Kelly Hewson-Fisher
Catchment Management Team
07802 856663
khfisher@anglianwater.co.uk

Rebecca Carter
Catchment Management Team
07773 962372
rcarter2@anglianwater.co.uk

Chalk Streams Of Lincolnshire
Lincolnshire Chalk Streams Project

Lincolnshire COUNTY COUNCIL
Working for a better future

love every drop
anglianwater

More information about Anglian Water's work in catchment to improve the quality of our drinking water can be found at http://www.anglianwater.co.uk/environment/our-commitment/our-plans/catchment-management.aspx
Twitter: @AWCoastCountry