ARRT Project Summary

Project Title/Name: Crows Hole Sediment Trap	**Date** (Start Date (Month/Year) – Finish (month/year)) Start Date: Jan' 2012; End Date: Completed 2016

Location: Grid Ref & Place Name: Grid Ref: SU 973205, nearest postcode address: GU28 0DU

Country and County: United Kingdom, England

Project Status: complete/in-progress/planned: Completed

River Name: tributary/main river/catchment: Western Rother/Arun, Rother & Western Streams Catchment

Contact Name of Project Officer/Manager and Organisation: Ses Wright, ARRT

Funding Body/Budget: UK Government, Environment Agency, total project: £45000.00

Project Themes/Drivers: Pick all that apply: ☒In-channel habitat & biodiversity ☒Flood risk management ☐Urban rivers ☒Environmental flows/water resources ☒Land use management–agriculture ☒Economic aspects ☒Fisheries ☐ Hydropower ☒Water quality ☐Land use management–forestry ☒Social benefits ☐Hydromorphology ☒ Climate resilience ☒ Monitoring ☒ Education & Engagement ☒ Catchment planning and survey work

Project Aims and Objectives: There are relatively high levels of sediment in the Western Rother due to its natural Greensand geology however excess sedimentation has occurred over recent decades due in part to changes in agriculture, especially from mixed to more arable/cereal farming since the 1970s. This has impacted the ecological functioning of rivers, impacting on fish spawning by smothering gravel reaches used for spawning, reducing the extent of suitable habitat. Water quality in the Rother can also be adversely impacted through nutrients and pesticides attaching to sediment particle runoff. Sediment traps have been trialled as a 'last option' outcome to help prevent active field runoff entering the Rother at multiple points. The key object of the ARRT Sediment Trap project was to assess whether sediment traps located within field ditches (as opposed to field corners) could aid the control and management of field runoff to the Rother. A trap site was to be identified, designs prepared, any underground facilities/risks avoided, contractors and quotes assessed, stakeholder views gathered and monitoring planned.

Project Outcomes: Discussions with a local estate and tenant farming business helped to identify a suitable field ditch for a sediment trap. A theoretical evaluation of how large a trap is needed to catch all active field erosion was calculated. This concluded that the required sediment trap would cover approximately one-third of the field, with concerns over the risks related to managing a sediment trap of this size and what to do with the excavated drained material.

Understandably this was not a viable option for the farmer so an agreed (arbitrary) trap size was set within the existing field ditch. A design incorporating runoff from 2 adjacent fields that fed into the field ditch trap was drafted and agreed. The design also prevented runoff from reaching the Rother via a nearby road. Further works were later needed to ensure a culverted farm track (linked to one of the traps) could take up to ~44 tonne farm vehicles and fencing of the trap to minimise the risk of people/dogs falling into it.

Monitoring the effectiveness of the trap involved measuring the depth of sediment accrued over time compared with local rainfall levels and crops, in addition to laboratory tests of trap runoff material and associated field soil, helping to characterise the runoff and also the effectiveness of the traps. Laboratory based soil and trap runoff analysis was kindly undertaken by Professor Ian Foster of Northampton University, linked to the SMART (Sediment Mitigation Actions for the Rother) Ph.D research project. Field runoff was found to be strongly bi-modal, with traps successfully holding back the larger, heavier soil-water runoff particles by a factor of approximately four-fold however much of the smaller finer particles in soil-water runoff went straight through traps. This has potential implications for river water quality and the overall health and ecological functioning of the Rother.

Financial evaluation of the traps showed that any movement of the excavated spoil immediately doubled the cost of managing it, making options to improve the organic structure and value of the runoff material (through added organic matter) largely unviable. Returning the excavated spoil to surrounding fields actually reduces soil quality but this was typically undertaken as the least cost and most practical option.

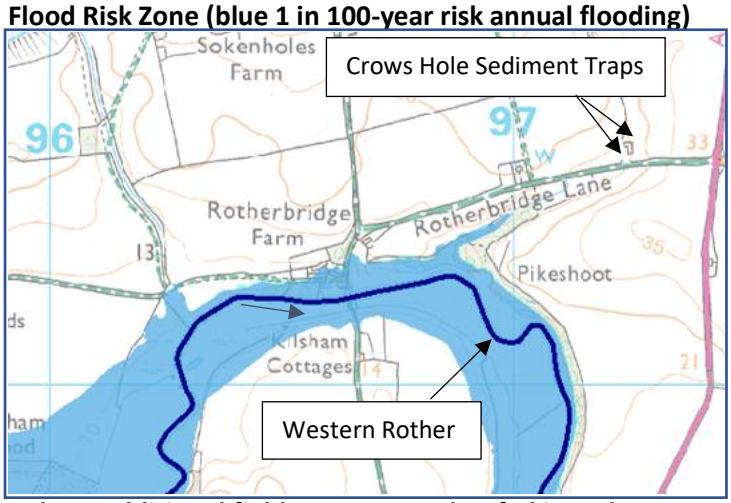
In-ditch field traps such as that trialled at Crows Hole were found to be harder to clear and empty compared with field-corner traps. This is because the traps have to be isolated from flowing ditch water during their excavation and maintenance works. This proved to be problematic as the traps are fullest during the winter when field ditches are often continuously flowing with surface runoff. By-passing field ditch runoff around the trap during excavation works was achieved at the Crows Hole trap via an existing land-drain that circumvented part of the field, however, the naturally highly erodible soils meant that ditch runoff could often find its way back into land drains rather than to the

sediment trap, reducing efficiency. Further investment into the traps was not deemed to be economic as farmers/landowners would only consider them on a low-cost basis; there is no financial incentive to invest in them.

The project demonstrated that sediment traps located in field ditches can be problematic to maintain, especially in highly erodible sandy catchments, where field-corner traps may be preferable. Regular maintenance is needed to avoid a sediment trap becoming a sand pit and needs to be managed as part of a farm-wide surface drainage plan tailored to a soil health management plan. Sediment traps have the ability to hold back significant amounts of the heavier/larger soil particles that more readily drop out in suspension and are therefore a useful 'last option' during high rainfall events that are likely to over-top beetle banks and grass margins around fields.

Project partners: Local landowners/farmers/local EA, CSF Officers

Location of Crows Hole In-ditch Sediment Traps and EA Flood Risk Zone (blue 1 in 100-year risk annual flooding)

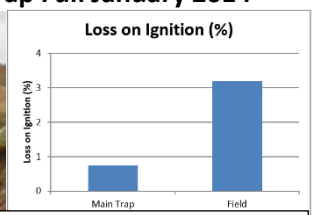


Below: Additional field-corner trap that fed into the same field-ditch trap (above, right) draining adjacent field

Below: Additional field-corner trap at Crows Hole, full & operating well: January 2014

The Construction Works: Excavation of In-Ditch Trap - looking up the existing field ditch that will fill the trap

Below: Crows Hole In-Ditch Trap Full January 2014



Above graph: percentage of organic matter in field soil (right) compared to organic matter in field runoff in the trap: most goes straight through.

Below: Diffuse agricultural pollution after summer rainfall: June 2012: traps aimed to mitigate impacts