

# MONITORING THE EFFECTIVENESS OF PESTICIDE REMOVAL AND FARMER ENGAGEMENT POTENTIAL OF BIOBEDS AND A BIOFILTER IN ESSEX AND SUFFOLK

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# CONTENTS

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1 Construction and Installation

2 Sampling Results

3 On-Farm Best Practice Recommendations

4 Catchment Effects



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# CONSTRUCTION AND INSTALLATION

## CONSTRUCTION AND INSTALLATION

### ESSEX & SUFFOLK WATER INVESTMENT

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- Large arable catchments used for drinking water abstraction
- Pesticides can be an issue for treatment, especially metaldehyde, propyzamide, carbetamide, clopyralid
- Studies showed that the farm yard can be the origin of a significant proportion of pesticides

**ESSEX & SUFFOLK**  
**WATER** *living water*



# CONSTRUCTION AND INSTALLATION

## AIMS OF RESEARCH

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### Aims:

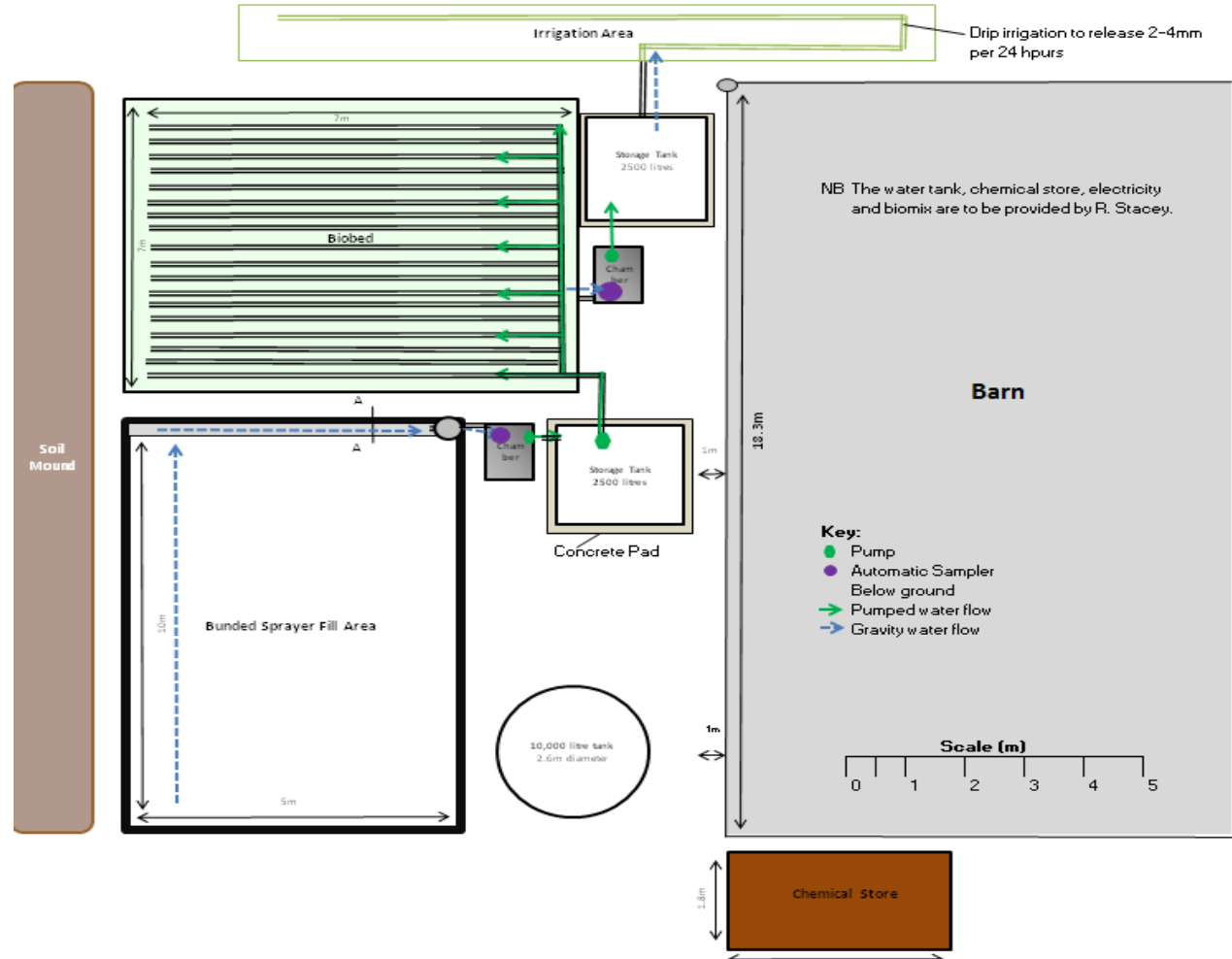
- To allow for farmer engagement events to be held, to encourage knowledge exchange and further construction
- Carry out sampling of the influent and effluent from the biobeds and biofilter, to contribute to research on their effectiveness.



# CONSTRUCTION AND INSTALLATION

## BIOBED DESIGN

- Environment Agency guidance
- T32 exemption requirements
- Extra additions for research purposes





# CONSTRUCTION AND INSTALLATION

## BIOBED CONSTRUCTION

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Tinsley Farm



Church Farm



Hall Farm



## CONSTRUCTION AND INSTALLATION

### BIOFILTER CONSTRUCTION

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Ovington Hall



# CONSTRUCTION AND INSTALLATION

## SAMPLING

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- Sampling at influent and effluent
- Range of pesticides analysed
- Limitations of sampling



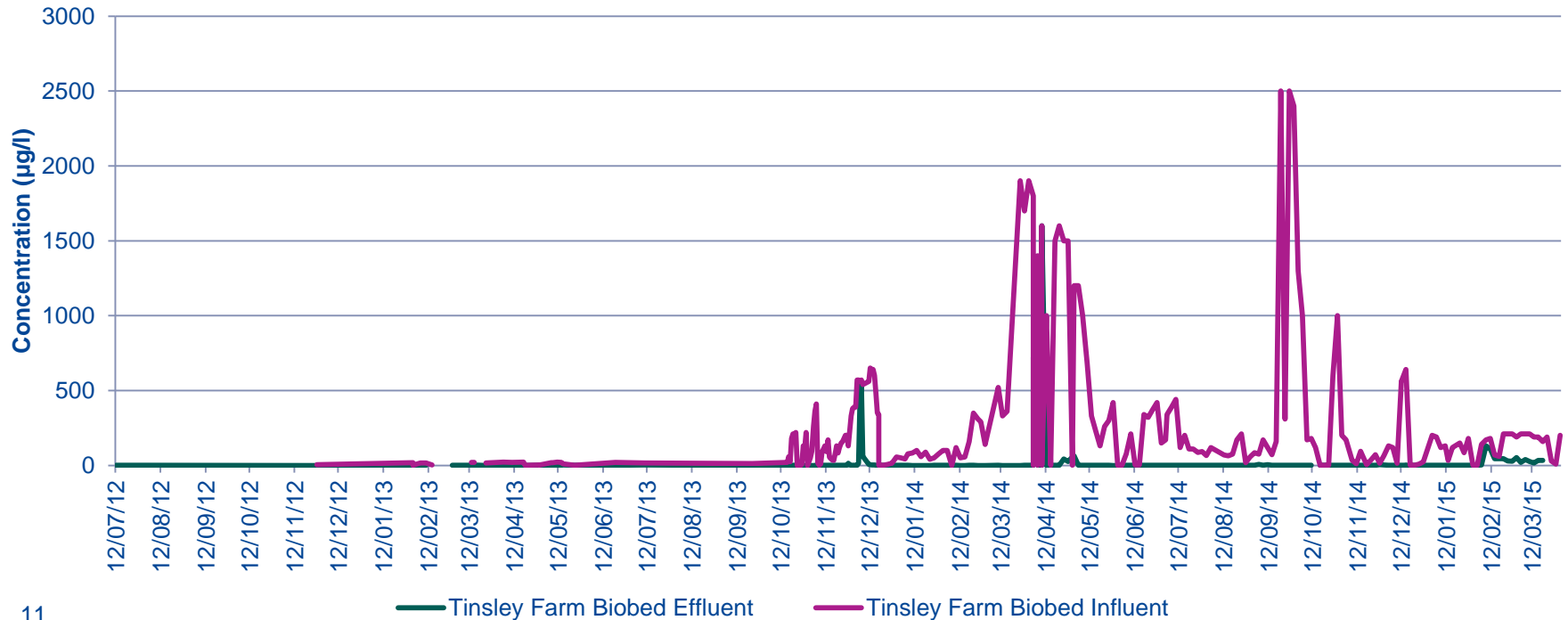
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# **SAMPLING RESULTS**

## SAMPLING RESULTS

### PROPYZAMIDE

- **93.11%** removal overall
- Significant maximum concentrations, eg. 3100µg/l in the Ovington Hall biofilter in December 2014



# SAMPLING RESULTS

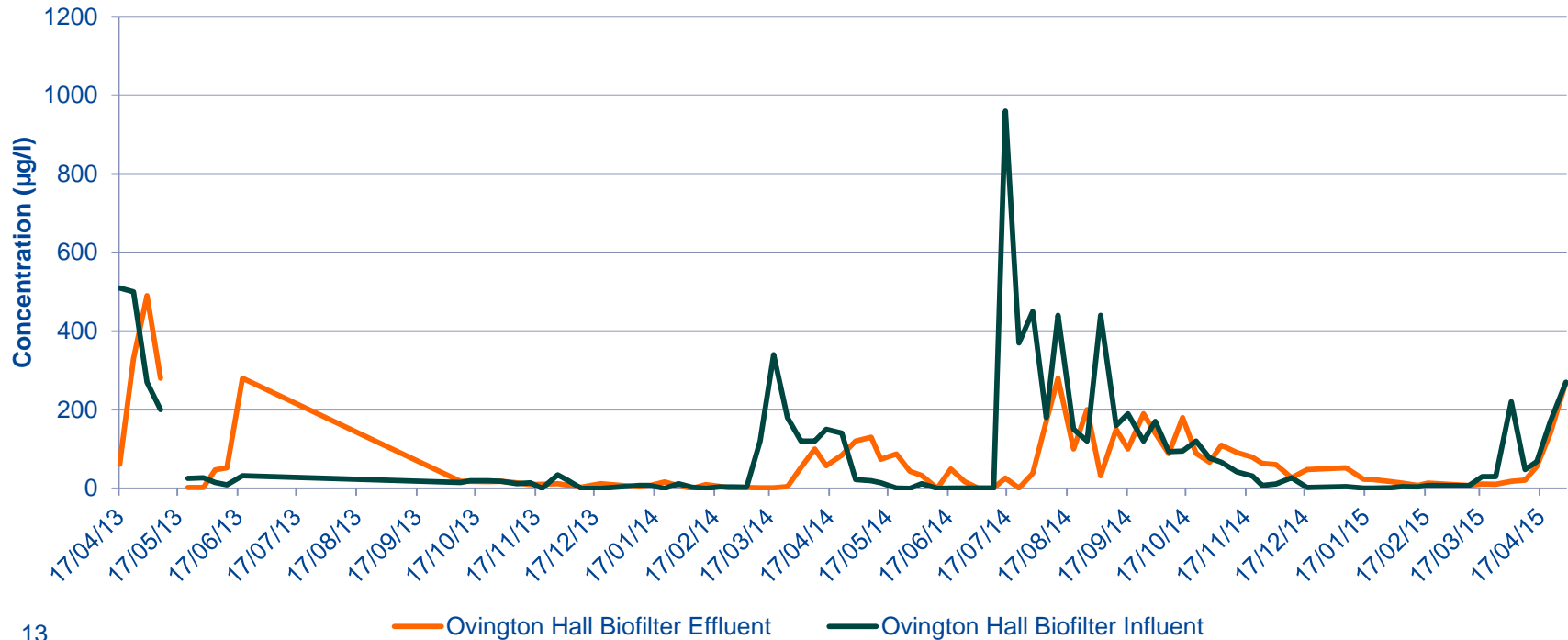
## BENTAZONE, FLUROXYPYR, MCPA, TRICLOPYR, CARBETAMIDE AND CTU

Pesticide	Removal rate
Bentazone (eg. Basagran)	86.05%
Fluroxypyr (eg. Starane)	88.65%
MCPA	98.35%
Triclopyr	89.76%
Carbetamide	99.65%
Chlortoluron	98.77%

## SAMPLING RESULTS

### CLOPYRALID

- Different pattern – held up in the biomix?
- Overall removal - **51.78%** (Biobed = 52.52%; Biofilter = 26.18%)

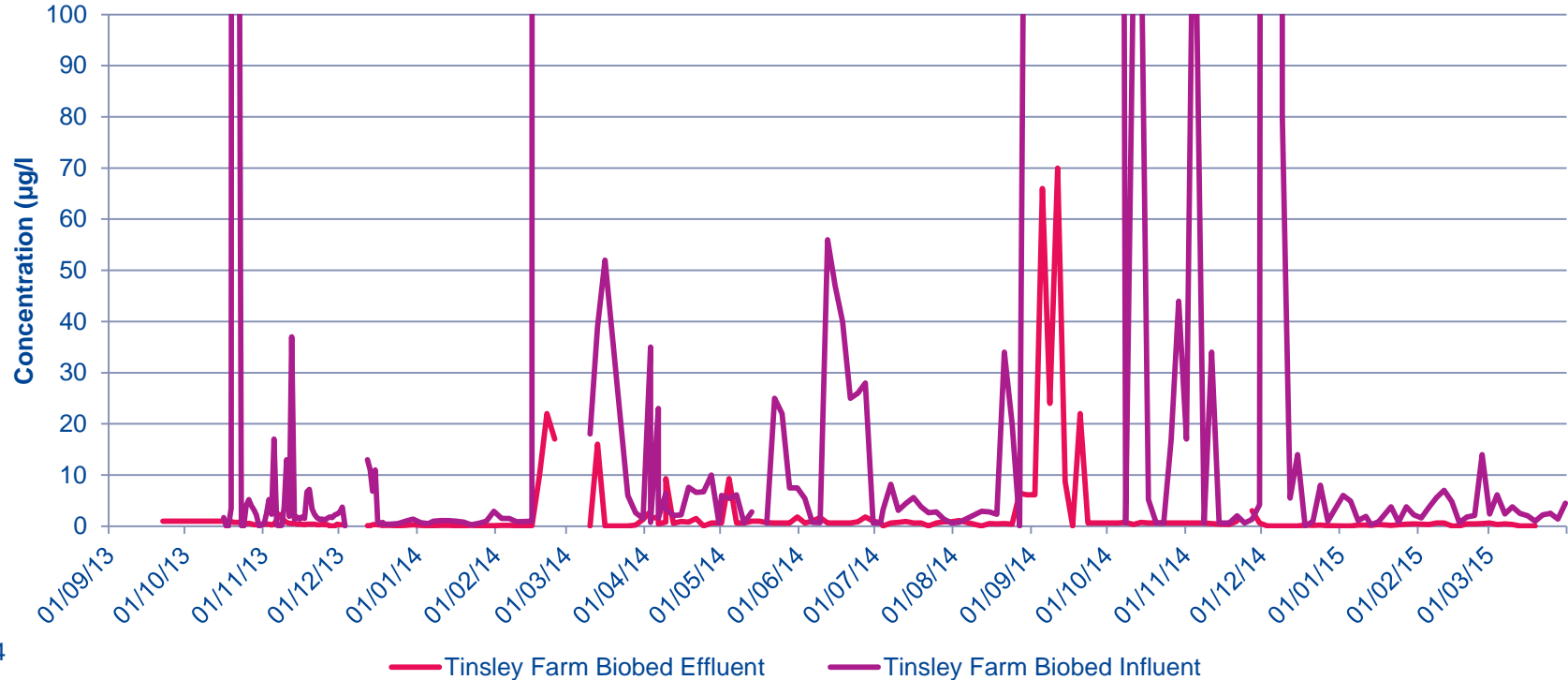




## SAMPLING RESULTS

### METALDEHYDE

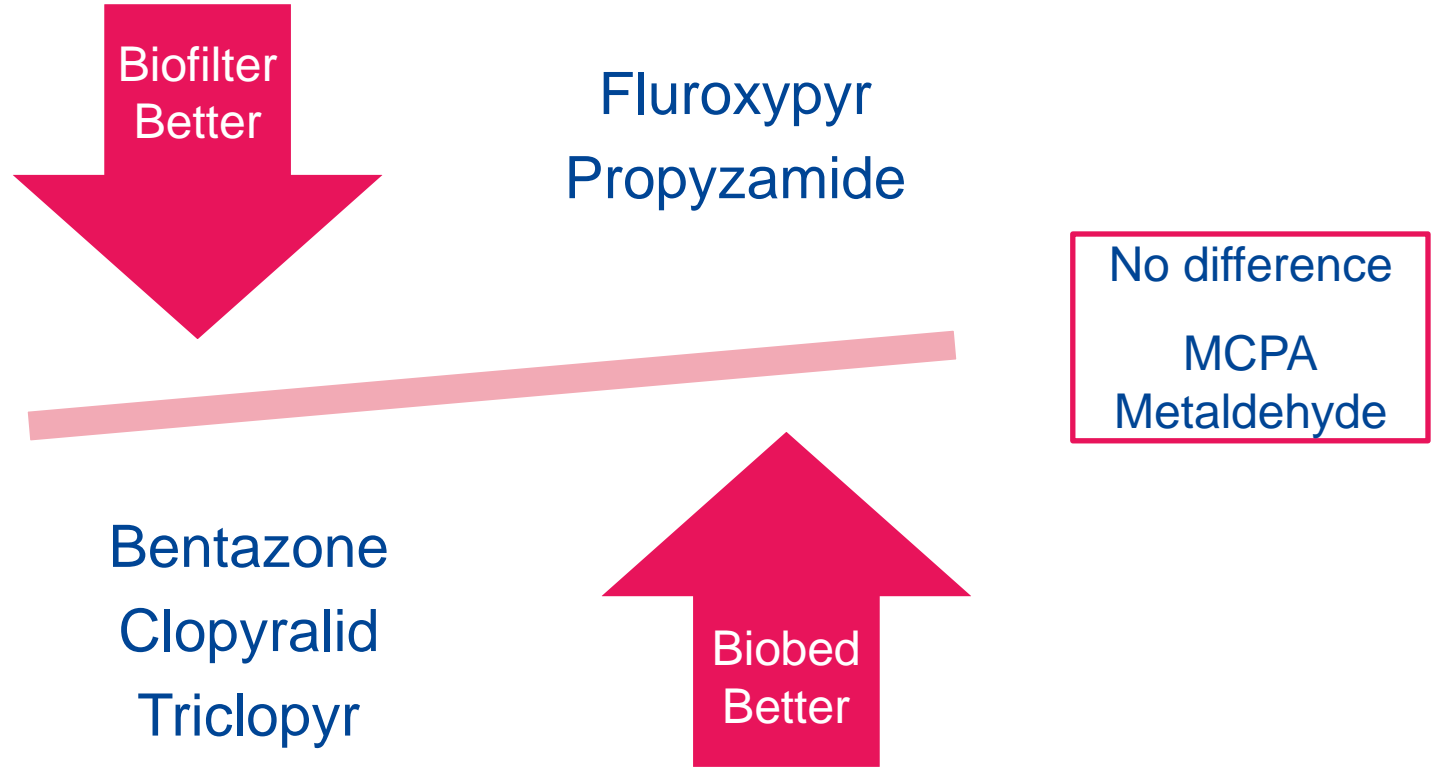
- **99.97%** removal overall
- Largest high peak concentration was 1,100,000 $\mu\text{g/l}$ . However, maximum concentration in the effluent was 70 $\mu\text{g/l}$ .



## SAMPLING RESULTS

### BIOBEDS VS BIOFILTER

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# **ON-FARM BEST PRACTICE RECOMMENDATIONS**

## ON-FARM BEST PRACTICE RECOMMENDATIONS

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- Wash the sprayer and associated equipment in the field wherever possible, away from watercourses and land drains.
- Keep the concrete sprayer filling area pad as clean from mud as possible.



## ON-FARM BEST PRACTICE RECOMMENDATIONS

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- Avoid overloading the biobed or biofilter with large volumes of water at any one time. Where this is necessary, aim to regulate the flow to allow small volumes at a time, for example include a timer linked to the pump in the influent tank.
- Manage the levels of influent to the biofilter during particularly cold temperatures to ensure effective removal through the biomix.





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# **CATCHMENT EFFECTS**



## **CATCHMENT EFFECTS**

### **ON-FARM CONSTRUCTION**

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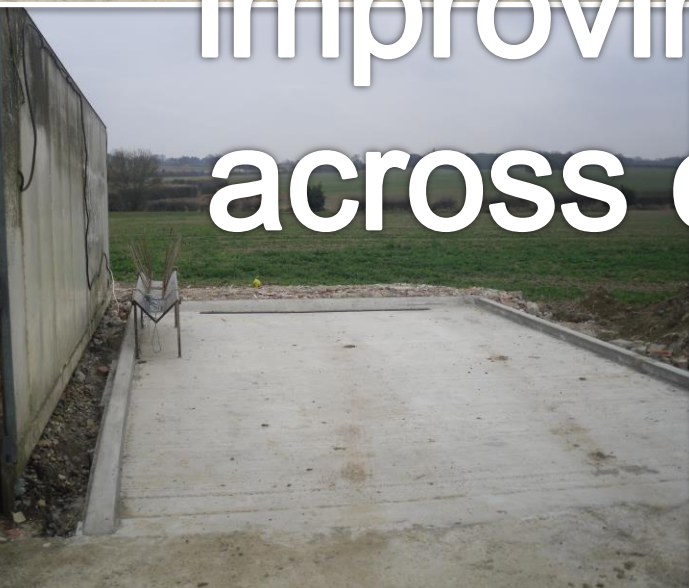
- Biobeds and biofilters installed on farms across Essex & Suffolk Water catchments

Item	Total number installed with CSF grant funding in the Chelmer, Blackwater, Stour, Waveney and Bure catchments
Lined biobed with loading/wash down area	17
Lined biobed only	7
Biofilter	25
Pesticide sprayer loading and wash down area	60
Roofing of pesticide loading and wash down area	50





**Biobeds and biofilters  
improving water quality  
across our catchments**



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# THANK YOU

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