Farming to Protect our Water Resources

Summary of UK farm trials: 2010–2018

Wensum Alliance

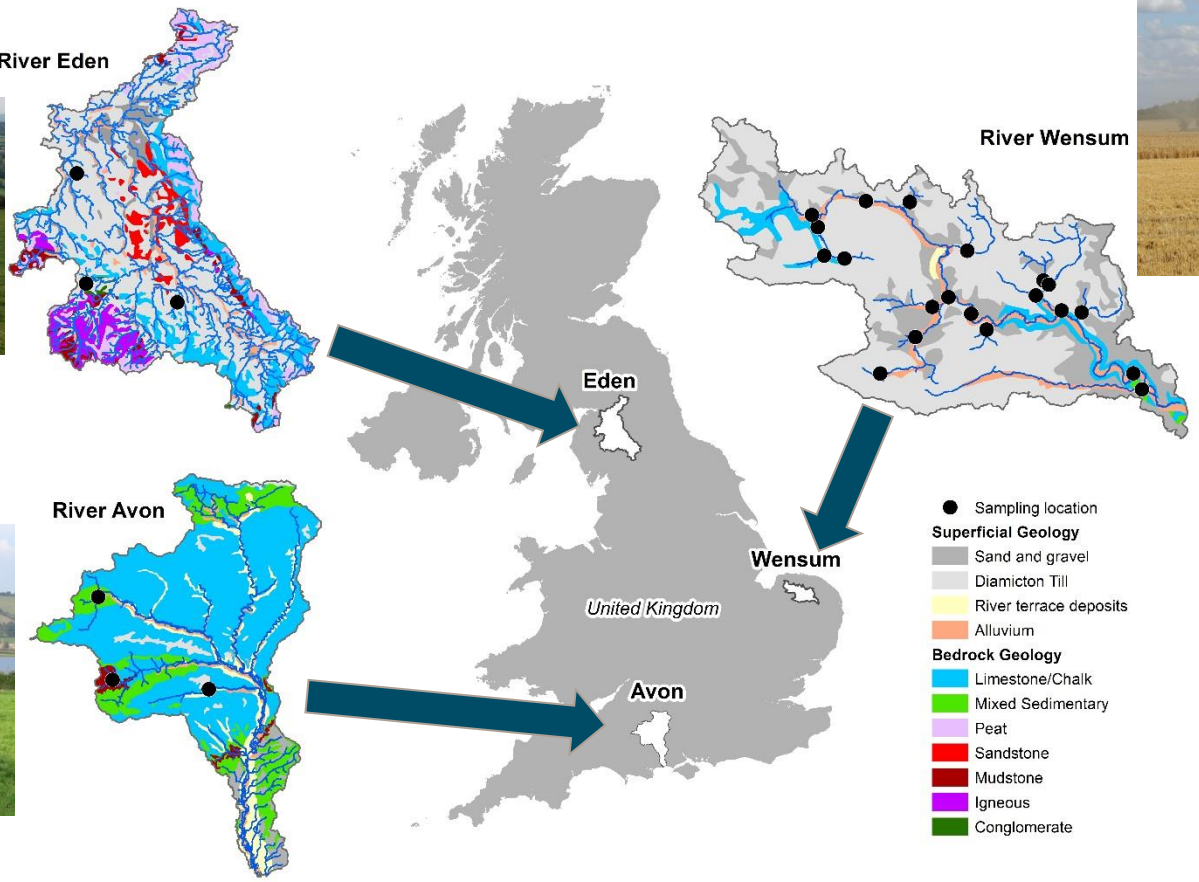
University of East Anglia

Department for Environment Food & Rural Affairs

SALLE FARMS Co.

Catchment Science Research

Demonstration Test Catchments (DTCs)



Investment
£12.3 m

Phase 1
2010 – 2014

Phase 2
2014 – 2017

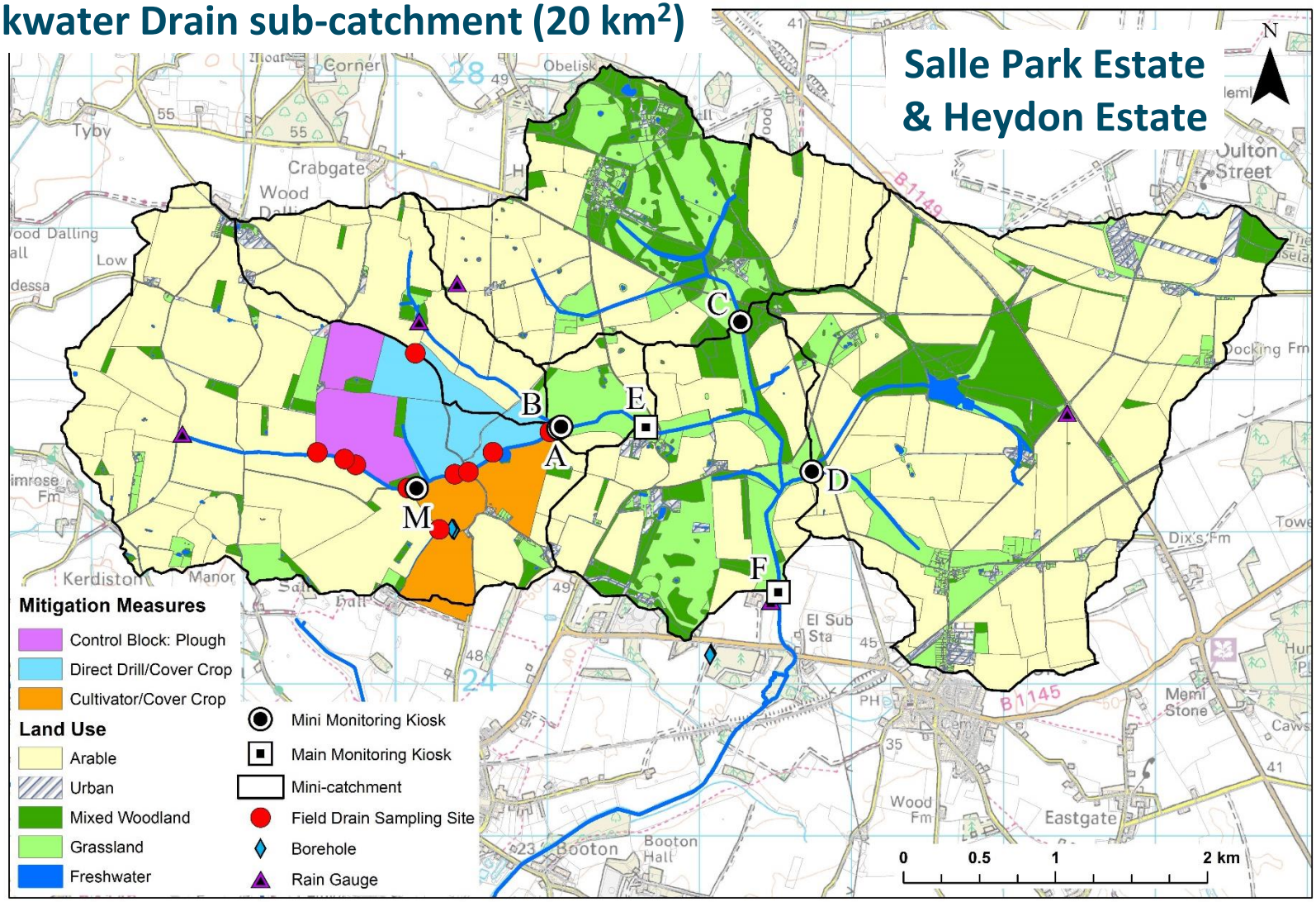
Phase 3
2017 – 2018

The DTC project aims to evaluate the extent to which on-farm mitigation measures can cost-effectively reduce the impacts of water pollution on river ecology while maintaining food production capacity.

Catchment Monitoring Programme

Wensum DTC study catchment

Blackwater Drain sub-catchment (20 km^2)



Catchment Monitoring Programme

Riverine monitoring: bankside kiosks

METEOR COMMUNICATIONS
ESSENTIAL MONITORING SOLUTIONS

Catchment Monitoring Programme

Riverine monitoring: bankside kiosks

METEOR COMMUNICATIONS
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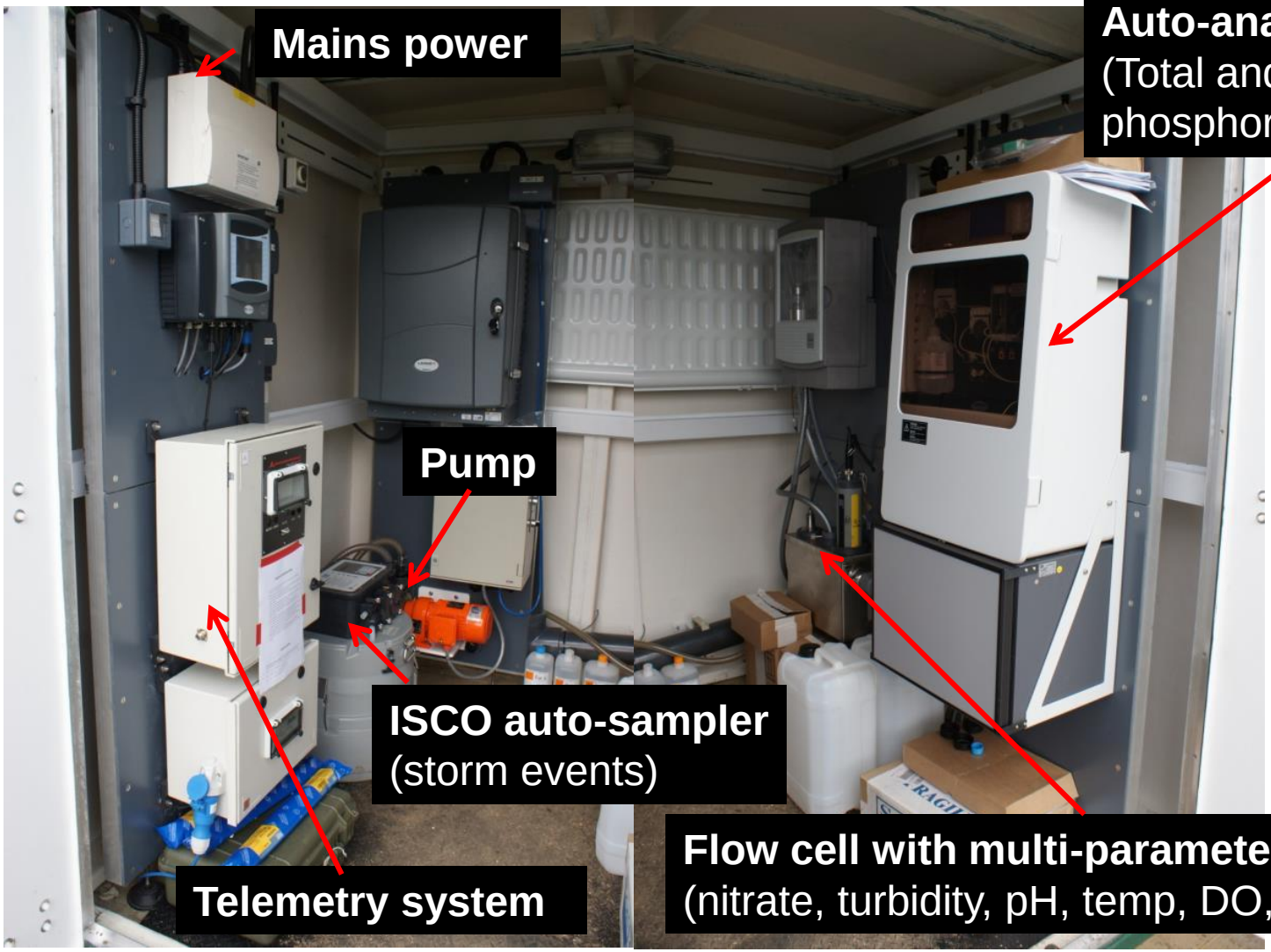


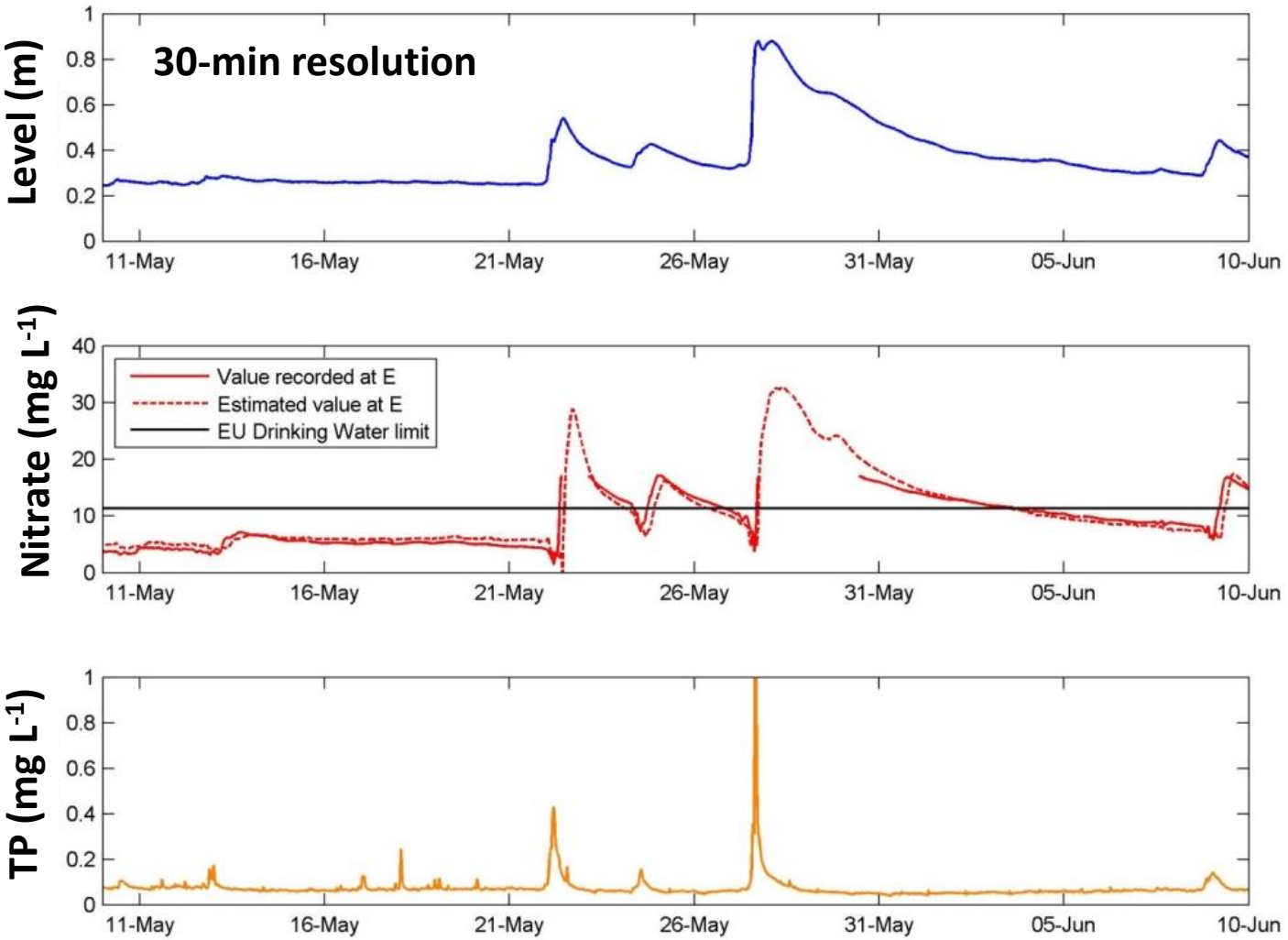
Cost per kiosk

£85k

Catchment Monitoring Programme

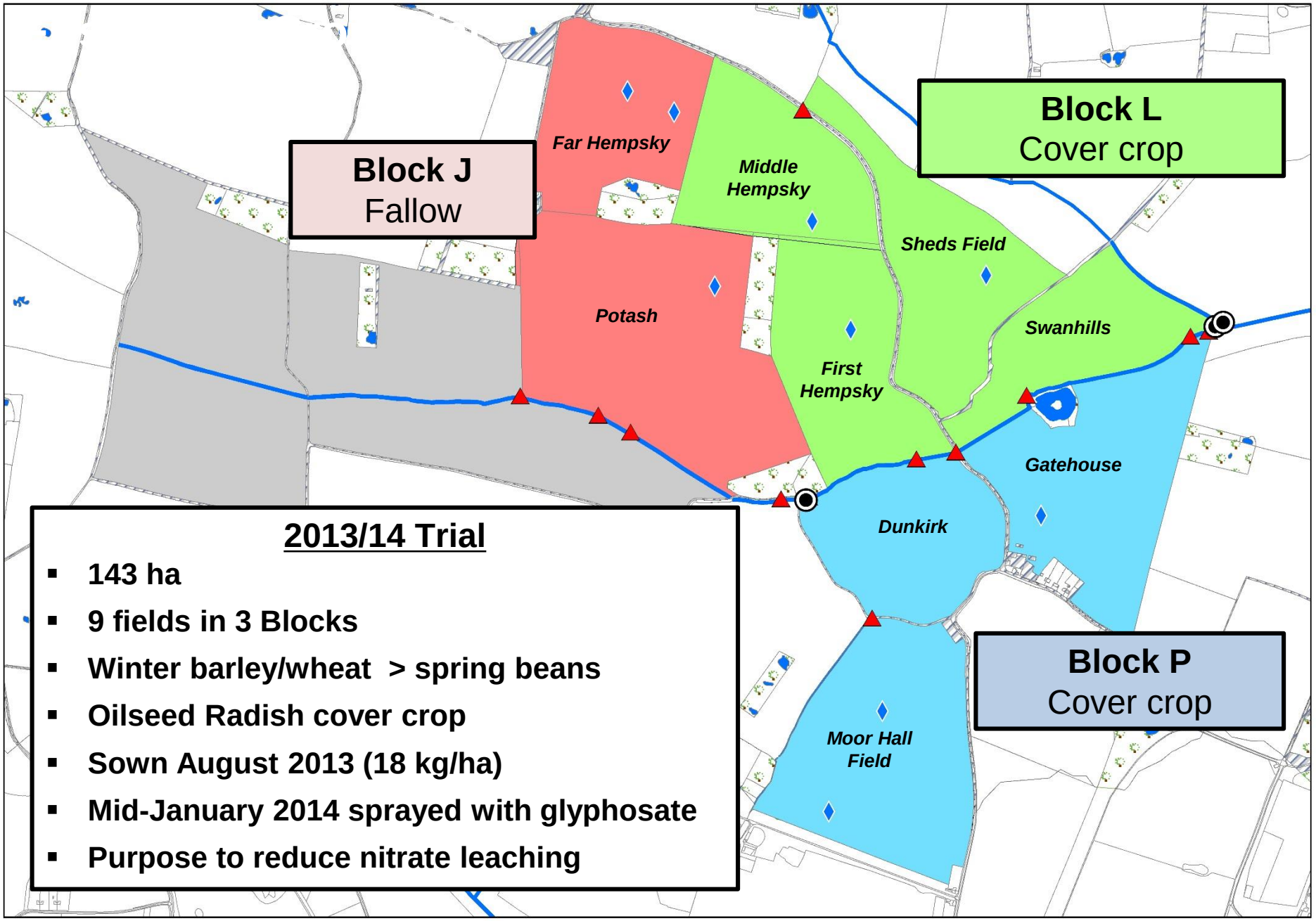
Riverine monitoring: bankside kiosks

METEOR COMMUNICATIONS
ESSENTIAL MONITORING SOLUTIONS



Nutrients | Sediment | Pesticides | Soil

Nutrients: Winter Cover Crops



2013/14 Trial

- 143 ha
- 9 fields in 3 Blocks
- Winter barley/wheat > spring beans
- Oilseed Radish cover crop
- Sown August 2013 (18 kg/ha)
- Mid-January 2014 sprayed with glyphosate
- Purpose to reduce nitrate leaching

Winter Cover Crops

Trial 1: November 2013

Block J

Block P

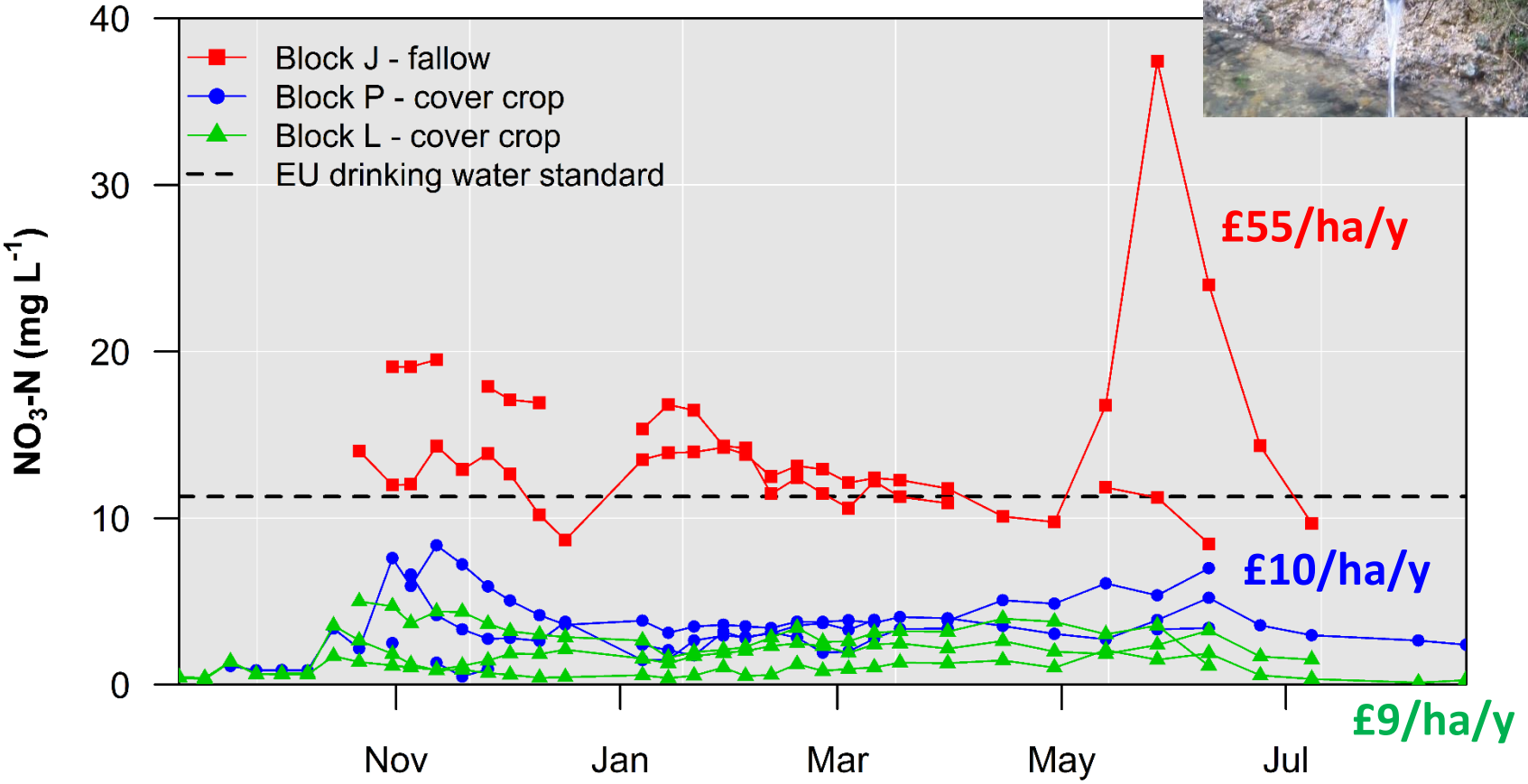
Block L

Winter Cover Crops

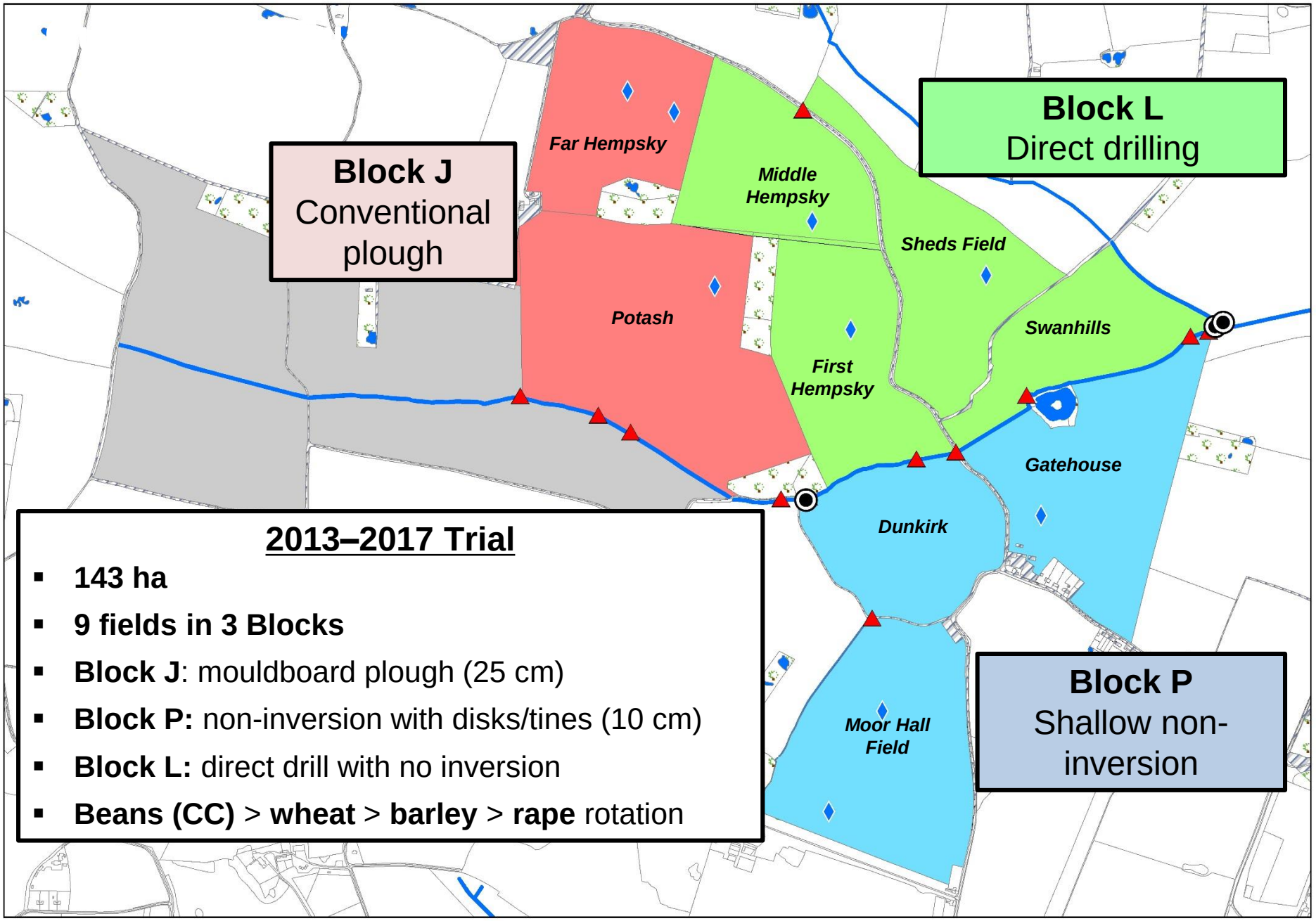
Field Drain Monitoring

P = **75%** reduction in N losses

L = **88%** reduction in N losses



Soil Improvement: Reduced Tillage



2013–2017 Trial

- **143 ha**
- **9 fields in 3 Blocks**
- **Block J**: mouldboard plough (25 cm)
- **Block P:** non-inversion with disks/tines (10 cm)
- **Block L:** direct drill with no inversion
- **Beans (CC)** > **wheat** > **barley** > **rape** rotation

Reduced Tillage

Agricultural Equipment

Cultivation

Block J: mouldboard plough

Block P: TopDown + Carrier (non-inversion)

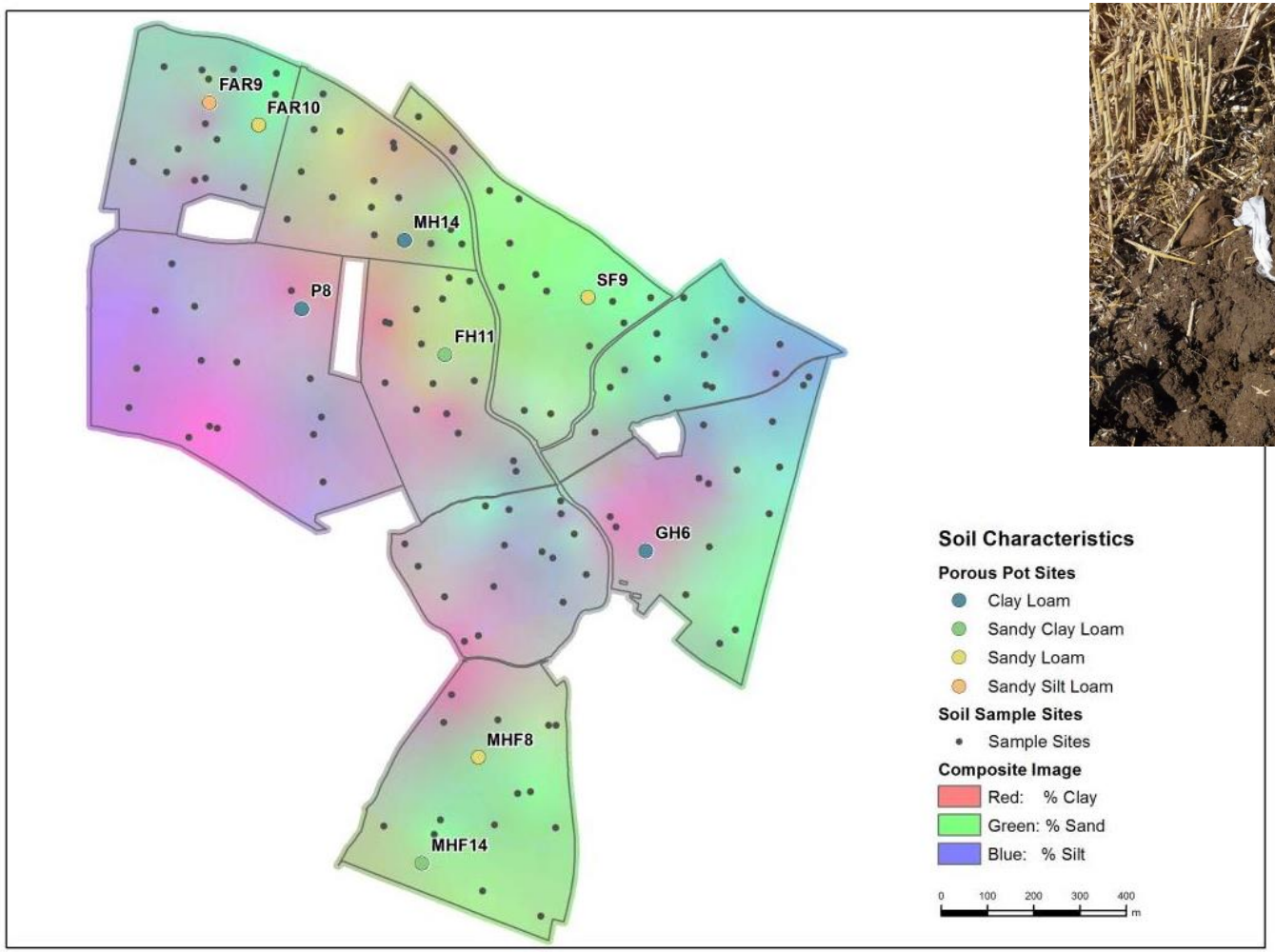
Sowing

Blocks J + P: Rapid drill

Block L: Seed Hawk direct drill

Reduced Tillage

Soil assessments

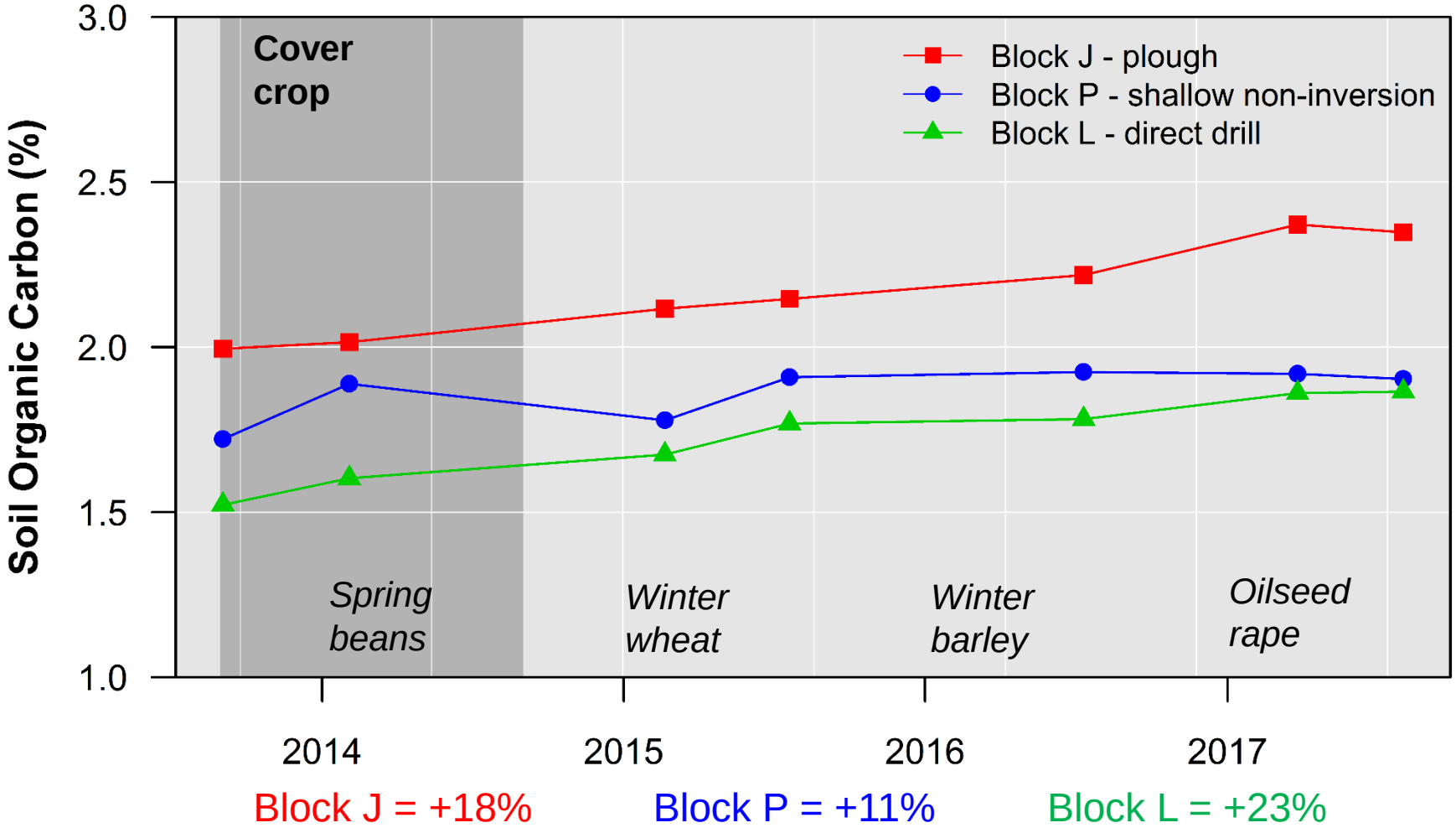


- Soil texture
- Soil structure
- Infiltration rate
- Bulk density
- SMN
- P, K, Mg indices
- OC content
- Soil biology

Aim: to assess the physical, chemical and biological condition of the soils

Reduced Tillage

Soil Chemistry: organic carbon



Block J = +18%

Block P = +11%

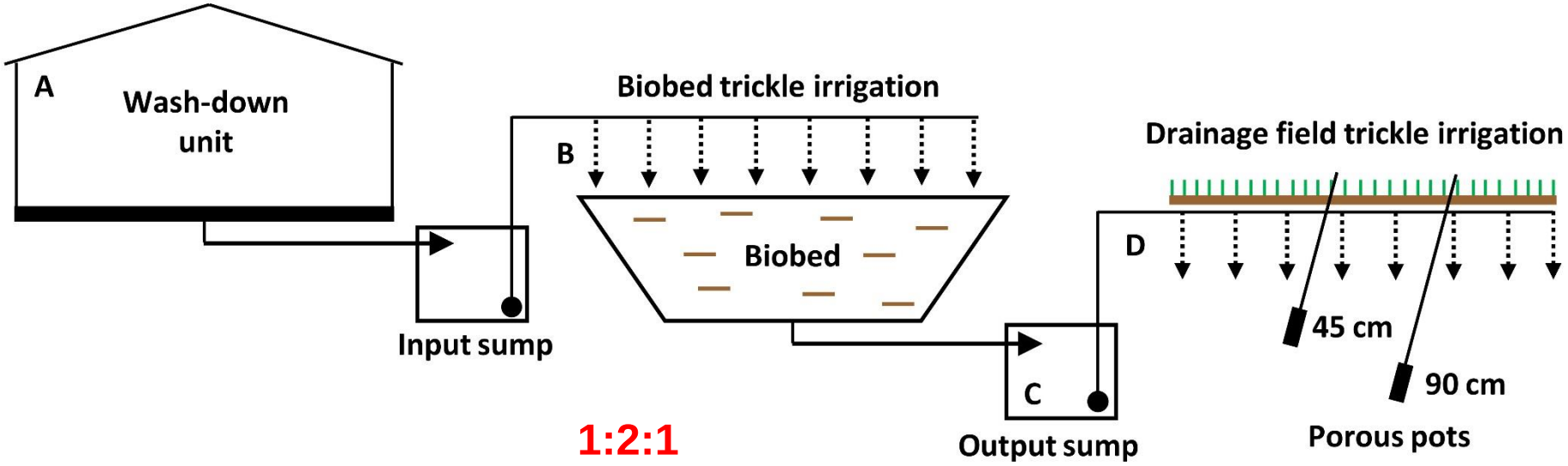
Block L = +23%

Pesticides: Biobed

Manor Farm Biobed

Experimental Design

Stage 1 **Stage 2** **Stage 3**



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Compost : straw : topsoil

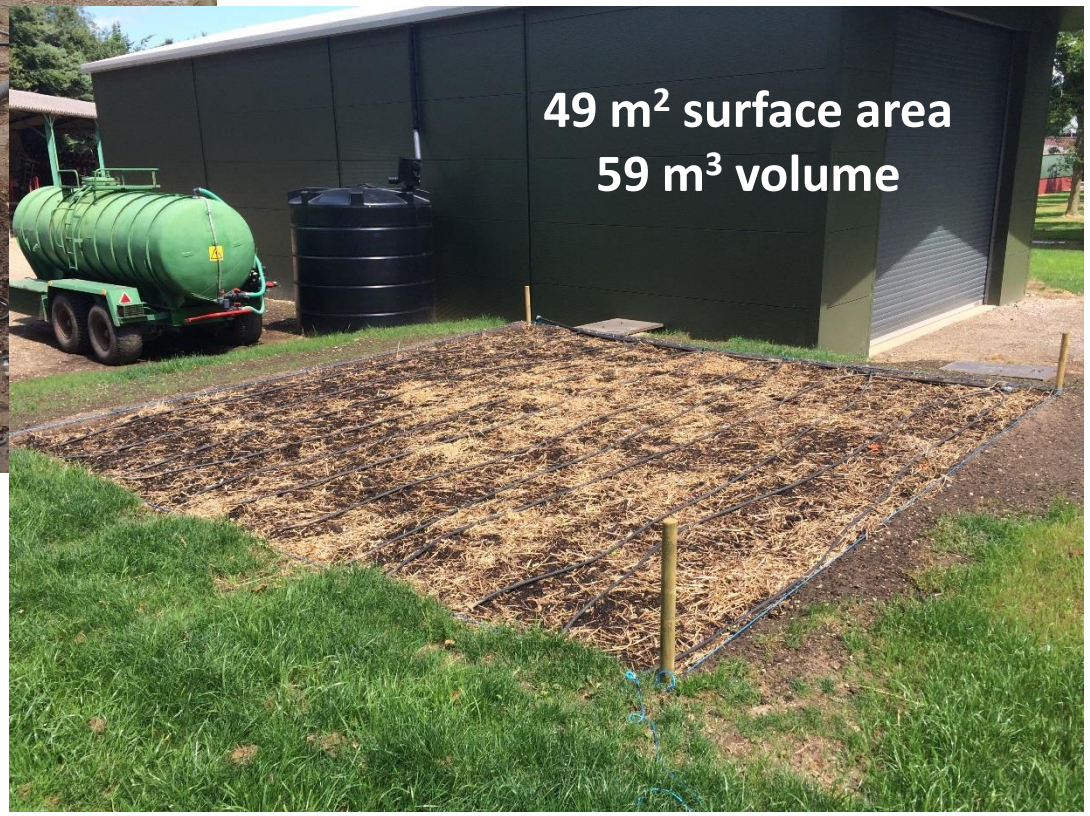
Constructed in 2013 with Catchment Sensitive Farming (CSF) funding

Manor Farm Biobed

Stage 1: wash-down facility

Manor Farm Biobed

Stage 2: biobed and sumps



Manor Farm Biobed

Stage 3: drainage field

Manor Farm Biobed

Pesticide removal efficiency

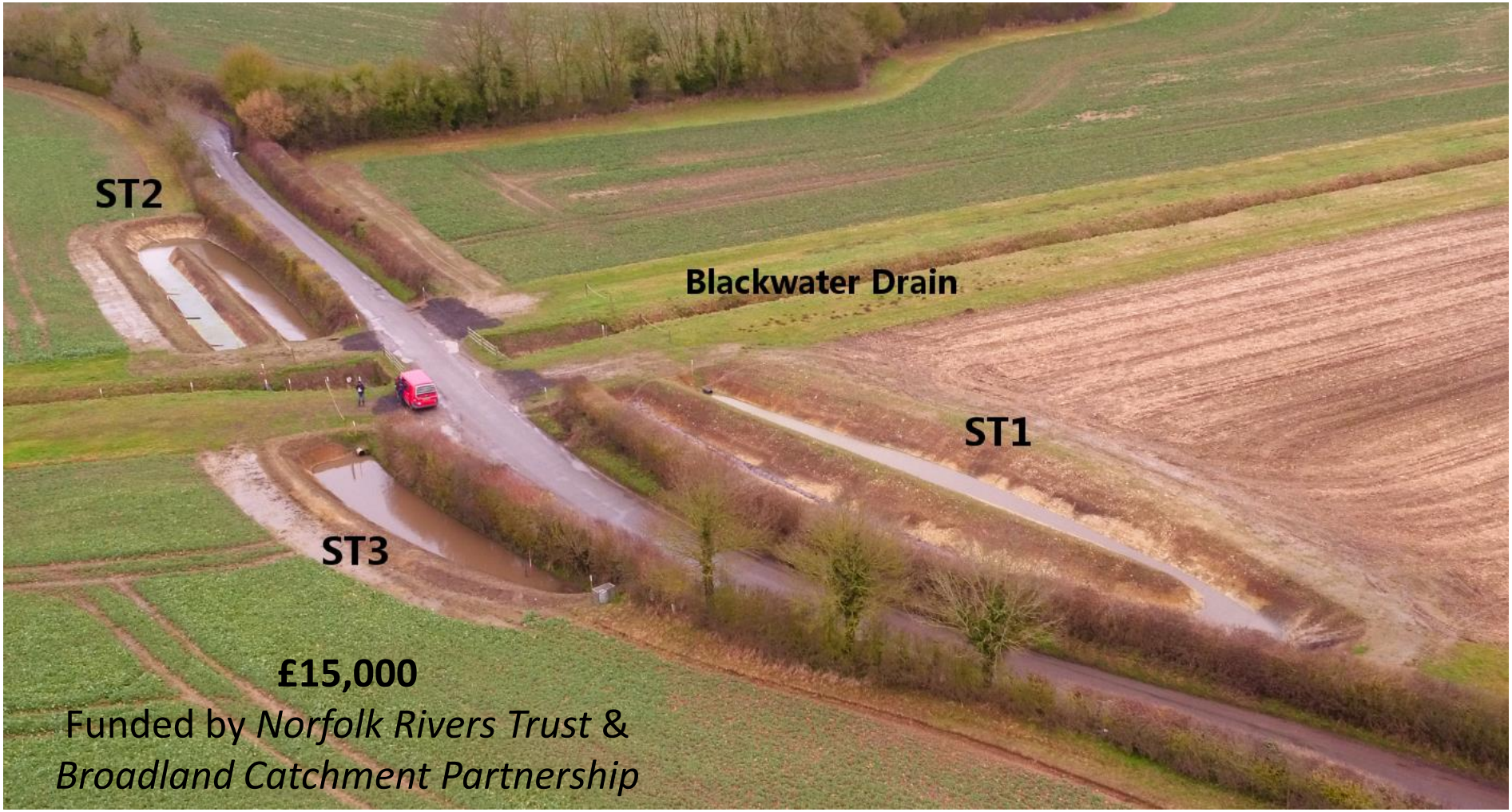
Pesticide	Biobed Sump Mean Concentration (µg L^{-1})			Porous Pot Mean Concentration (µg L^{-1})			
	Input	Output	Efficiency (%)	45 cm	Efficiency (%)	90 cm	Efficiency (%)
Propyzamide	2551.3	60.0	**97.6**	-	**-**	-	**-**
Chloridazon	2547.7	81.9	**96.8**	-	**-**	-	**-**
Triclopyr	958.5	32.8	**96.6**	1.2	**96.3**	2.5	**92.4**
Ethofumesate	26935.1	980.9	**96.4**	-	**-**	-	**-**
Chlorotoluron	150.4	6.9	**95.4**	-	**-**	-	**-**
Bromoxynil	167.3	11.3	**93.2**	1.1	**90.3**	1.6	**85.8**
2,4-D	2944.9	213.7	**92.7**	2.2	**99.0**	6.5	**97.0**
Mecoprop	803.7	112.7	**86.0**	3.0	**97.3**	6.6	**94.1**
MCPA	30.4	4.8	**84.2**	1.1	**77.1**	1.6	**66.7**
Fluroxypyr	1162.0	224.6	**80.7**	9.3	**95.9**	16.0	**92.9**
Dicamba	223.5	43.8	**80.4**	9.1	**79.2**	13.9	**68.3**
Carbetamide	15.3	3.0	**80.4**	-	**-**	-	**-**
Clopyralid	1025.5	238.1	**76.8**	5.5	**97.7**	16.2	**93.2**
Metsulfuron-methyl	32.9	8.1	**75.4**	-	**-**	-	**-**
Metazachlor	5561.0	1754.9	**68.4**	-	**-**	-	**-**

Sediment: Silt traps

Roadside Silt Traps

Installation

Constructed October 2016



£15,000

Funded by *Norfolk Rivers Trust* &
Broadland Catchment Partnership

Roadside Silt Traps

Sediment retention

Silt trap 3 (2016 – 2017)

Sediment retained:	**7,253 kg**
Damage cost:	**£392**
TP retained:	**11.6 kg**
Damage cost:	**£148**
Total mitigated damage cost:	**£540**
Trap cost:	**£2500**
Payback time:	**4-5 years**

River sediment load downstream

2011-2016 average: **15 t y^{-1}**

2016/17: **6.3 t y^{-1}**

Damage costs per tonne

TP: £12,790
N: £430
Sed: £54

Further info: wensumalliance.org.uk

Acknowledgements

Kevin Hiscock, Andrew Lovett, Richard Cooper, Gilla Sünnenberg, Steve Dugdale, Trudie Dockerty, Emilie Vrain

Poul Hovesen, James Beamish, Lister Noble