



North Devon Estuary Project



The application of agricultural wetlands to improve water quality and benefit biodiversity



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Introduction

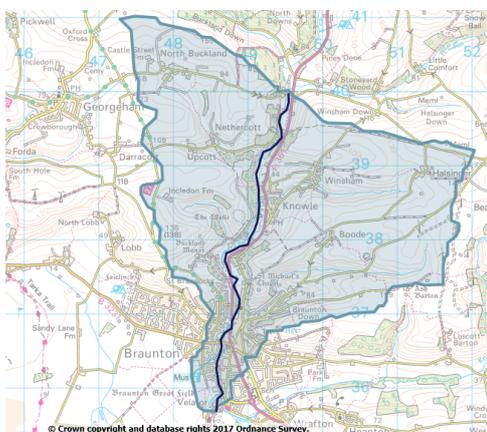
The aim of the of the North Devon Estuary Project's second year was to improve water quality within chosen catchments and entering the estuary by delivering rural Sustainable Drainage Systems (rSDUs) in targeted farms. Resources were focused on areas that had the highest impact on water quality based on:

- Water Framework Directive (WFD) water quality assessment data
- The highest cattle density per ha
- The greatest risk of FIOs entering the estuary based on The Shellfish Action Plan, (2014)
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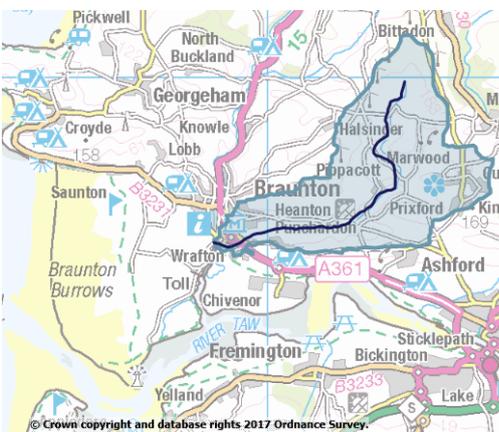
The focus area chosen is part of the North Devon and Taw streams and includes the catchments of the Upper Caen, Lower Caen, Knowl Water, Bradwell Stream, and the Bradford Water (See Table 1 for catchment size and WFD status)

This report uses three case studies to illustrate project achievements

Catchment maps



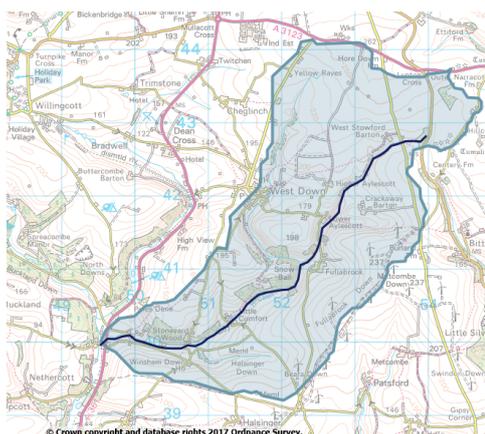
Lower Caen catchment



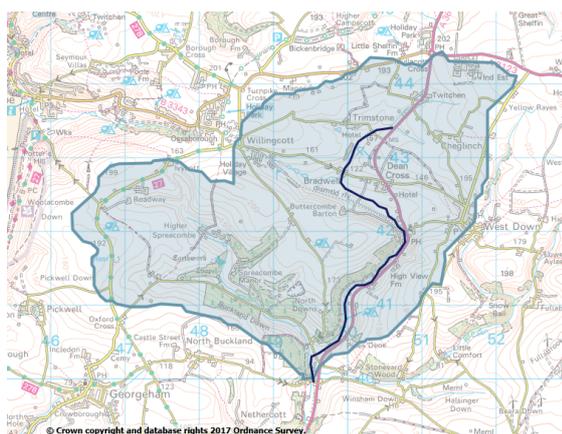
Knowl Water catchment



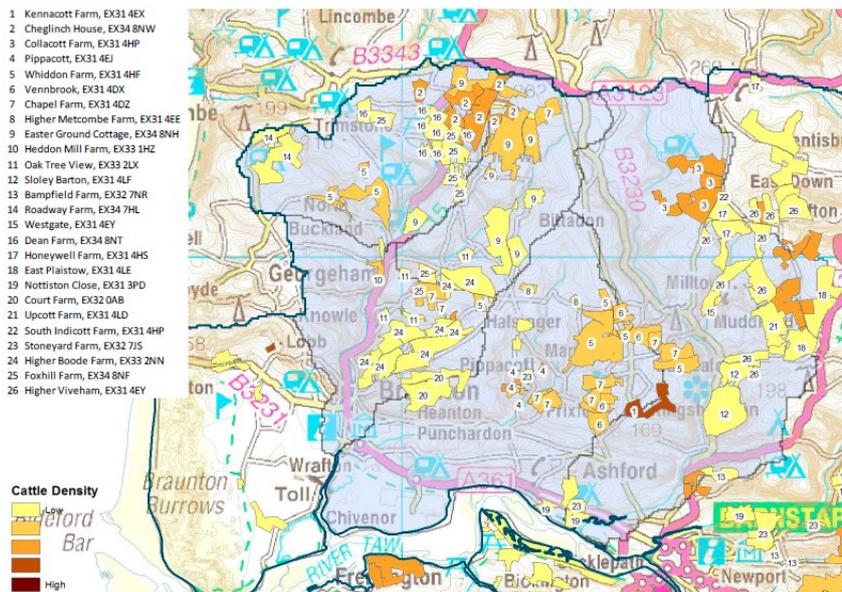
Bradford Water catchment



Upper Caen catchment



Bradwell Stream catchment



Map of the target project area including the farms with the highest cattle density

Table 1: Target areas, WFD status and catchment size

Catchment	WFD 2015	Catchment area km ²
Bradford Water	Poor	32.214
Knowl Water	Moderate	18.791
Upper Caen	Good	11.559
Lower Caen	Moderate	12.59
Bradwell Stream	Moderate	15
Total		90.15

Changes from Year 1

- We focussed a smaller area which concentrated the efforts, and will therefore be easier to monitor and should bring about more definable results
- We targeted the farms with the highest cattle density, increasing value for money by focussing on potentially high risk pollution sources
- We reduced mail outs, as they had a low uptake in the previous year. Letters introducing the project were sent to the high cattle density farms and were followed up with a visit in person. This achieved a much higher success rate.
- We had successful results from the previous year, which meant the we could confidently discuss with farmers real local examples.
- We repeated workshops which were successful in the first year , fine tuning them for best results.

The project also worked with a new partner; the Wildfowl and Wetlands Trust (WWT), who created most of the wetland designs for the larger farms. WWT Consulting have many years' experience working on rural Sustainable Drainage Systems (rSUDS) and were able to provide us with detailed designs and drawings which contractors have found easy to work with.

Case Study 1

Farm type: 600 Dairy, plus 650 followers

Farm size: 400 hectares

Watercourse: Bradwell Stream Catchment

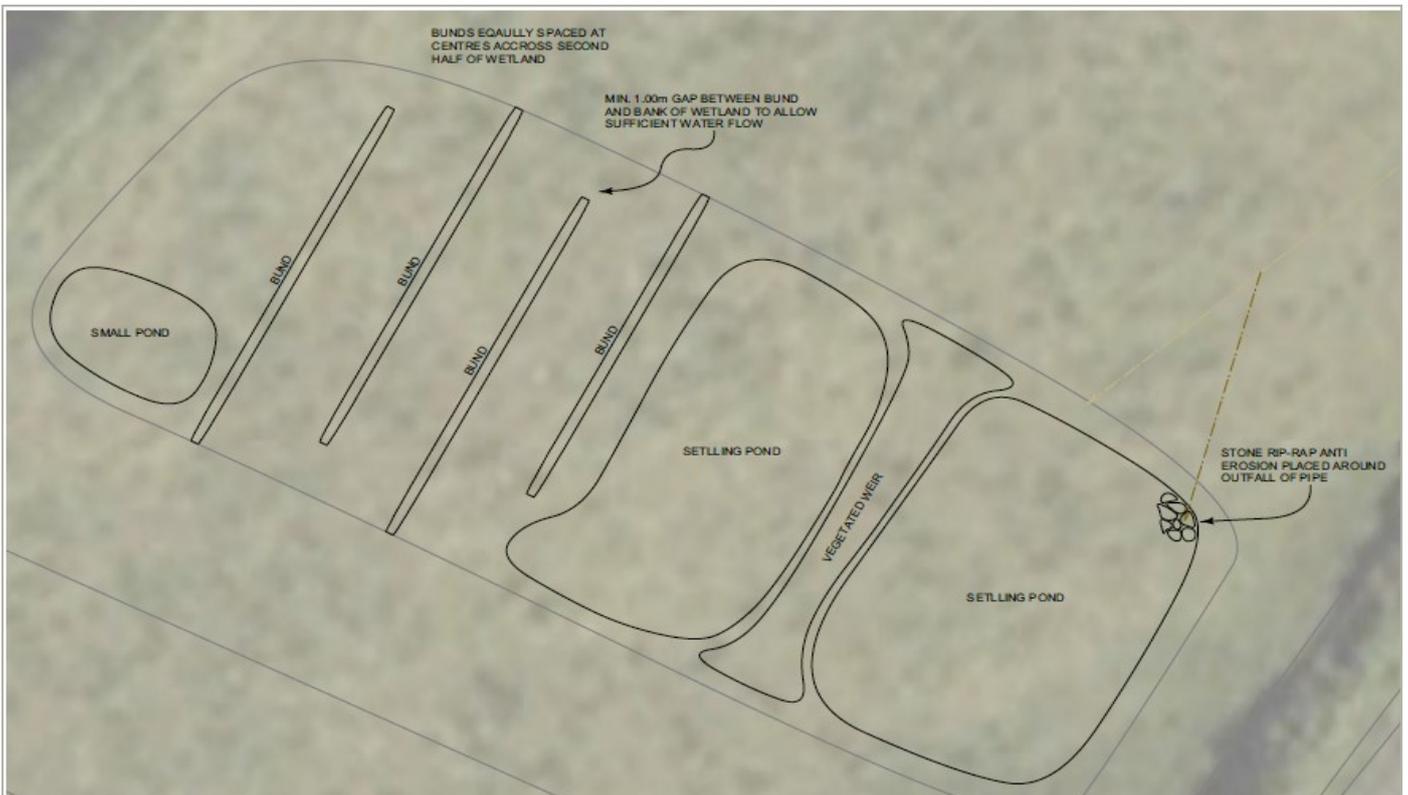


Issues

- No clean and dirty water separation in the yard
- A treatment wetland was in place, but overloaded with nutrients
- Surface water was flowing into the yard, increasing the quantity of fouled water

Design

This farm had a 3-cell treatment wetland system ending in a final polishing channel. A mixture of clean and dirty water was entering the system, overloading it with nutrients. Following advice from the Environment Agency and Catchment Sensitive Farming, appropriate infrastructure was put in place to separate clean and dirty water with only roof, yard and track water now entering the wetland. The first treatment cell was redesigned by WWT to help with sediment removal and reduce nutrient loading. Before the redesign, the cell was emptied fully, removing any heavily loaded sediment.



Plan for treatment cell 1, design by WWT consulting, approx. 50m length



Yellow flag iris bund

The re-design of cell one included two deep sections acting as settling ponds and helping to remove phosphate. There is a weir planted with yellow flag iris between the two deep sections to increase biological and UV activity, both of which improve water quality. The next section is a series of bunds to increase the hydraulic pathway, ending in a deep pond that flows into the next two treatment cells. These cells and the polishing channel have not been altered. They also act to slow the water and reduce nutrient loading even further.

The second part of the project was to decrease the amount of surface water entering the yard from fields above.



Baffle ditch and leaky pond design by WWT



Baffle ditch

The principle aim was to divert water into a baffle ditch system and then into a leaky pond away from the farmyard. The baffle ditch will slow the water down, and the leaky pond will allow the water to gradually drain away.

The improved wetland system is now operational. Monitoring of the inflow and outflow will begin in the near future.



Leaky pond, to which the baffle ditch leads

Case Study 2



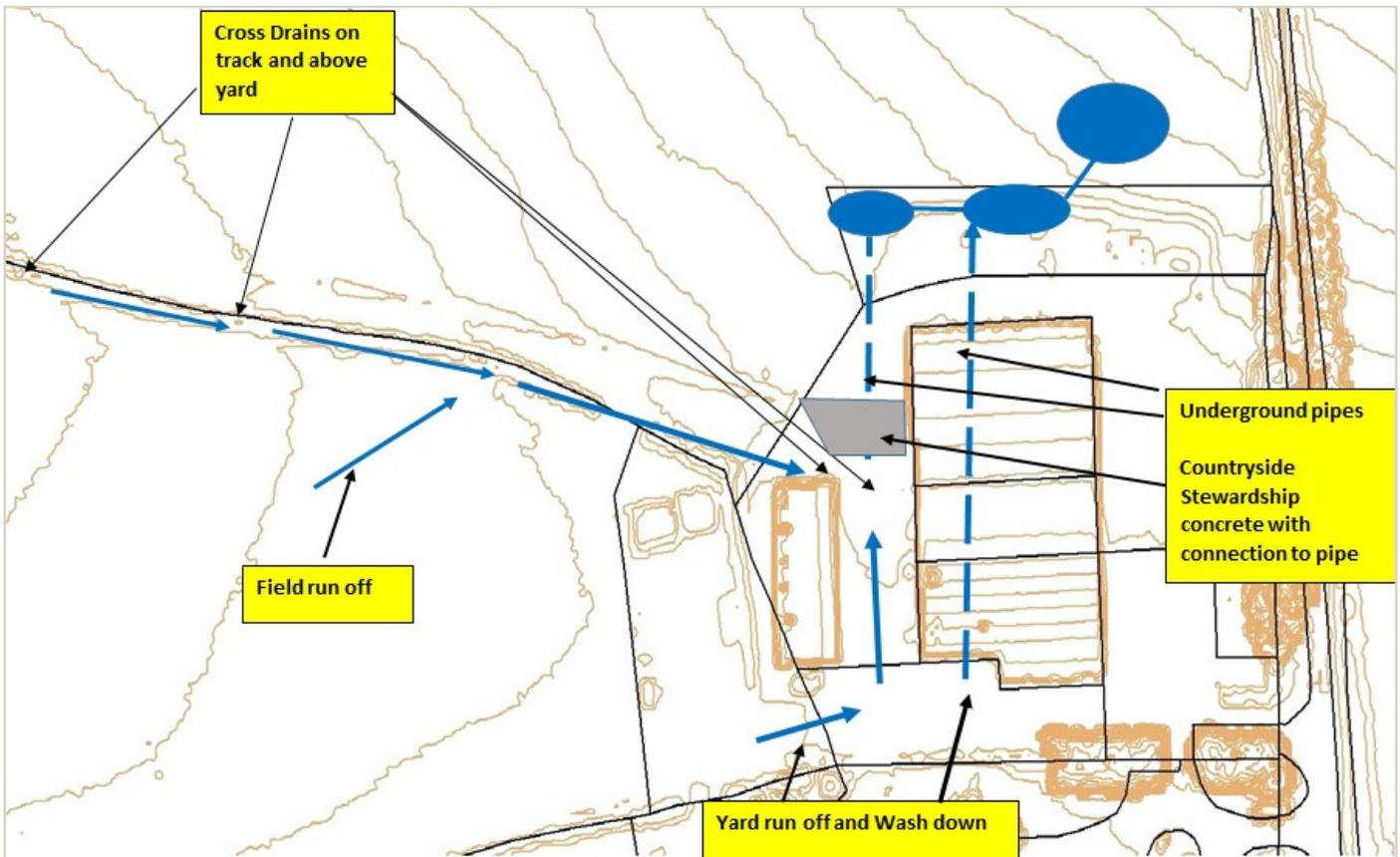
Farm type: 1200 Sheep
Farm size: 200 hectares
Water course: Knowl Catchment

Issues

- Field runoff
- 500m track, runoff entering handling pen and becoming fouled
- No treatment of yard and roof water

Design

The design by Westcountry Rivers Trust aimed to channel water from the track using cross drains connected to soakaways in the field. A final cross drain diverts water from the holding pen, and will channel it into the first of three settlement ponds. Soil compaction advice was given to reduce field runoff. Yard runoff and water from the wash down area are also piped to the settlement ponds. The three ponds allow sediment to settle, reduce nutrient loading, and attenuate water.



The cross drain effectively takes water off the track which helps prevent it from becoming fouled. This measure, as well as cross drains on other tracks, are really simple, inexpensive solutions for farmers.

Many farms have issues with track water, but often, it isn't very high on the farmer's priority list. The grant aid provides an incentive to carry out the work with immediate results. Not only does it stop water getting fouled but it improves farm access and provides easier manoeuvring around the farmyard.



The cross drain at the bottom of the track. Water is piped from this into the ponds.

The 3 ponds are designed to;

- Reduce the amount of soil run-off into the nearest watercourse; the Knowl Water
- Provide nutrient attenuation that results in nutrient-rich sediment that can be returned to the fields
- Avoid potential flooding or pollution incidents and subsequent prosecutions

Each pond had a deeper section to allow sediment dropout, and the shallower sections will vegetate over time which is important for wildlife.



One of the ponds mid-construction

The farmer was also given guidance about how to reduce soil compaction and associated field run-off.

The basic advice was to dig soil pits to ascertain the amount of compaction, with further advice on how to alleviate it.

We recognised there was an opportunity for a CSF application, and supported the farmer to find out more.

Case Study 3

Farm type: Rose veal, 200 dairy bullocks, some beef and sheep
Farm size: 10 hectares
Water course: Knowl water



Issues

- No pathway for roof and yard runoff, water pooling on the yard
- Road water entering the yard
- No treatment of lightly fouled yard water

Design

The design by WWT included a raised bump at the entrance of the farm to stop water entering from the road, and a cross drain across the track leading into the wetland ponds. There are 5 ponds of varying depths. The first is 2 metres deep and designed to help sediment to drop out of the water. It is connected to the next via a vegetated weir. The subsequent three ponds are shallower, to again remove sediment, and they all include reeds.



The reeds increase water residency time, allowing UV to break down harmful bacteria.

The cross drain has inspection chambers installed for easy maintenance. Very important on a busy farm.

A baffled swale that follows the hedge line down the field has been included at the end of the ponds. It is fenced to keep livestock out and further increases the capability of the wetland treatment. This measure will also reduce the chance of water pooling in the field, or around the field gateway which are areas that have become heavily poached previously.

As well as the grant-aided work, the farmer has also been given a list of further recommendations that are out-side the scope of this project. These include; guttering the new barns, first flush diverters installed on the rainwater harvest system, and infrastructure work that can be supported by Catchment Sensitive Farming.

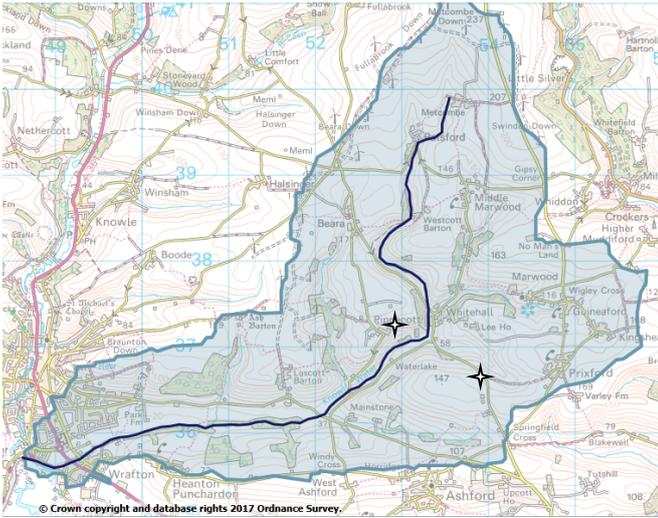


Track cross drain in construction, designed to take heavy machinery

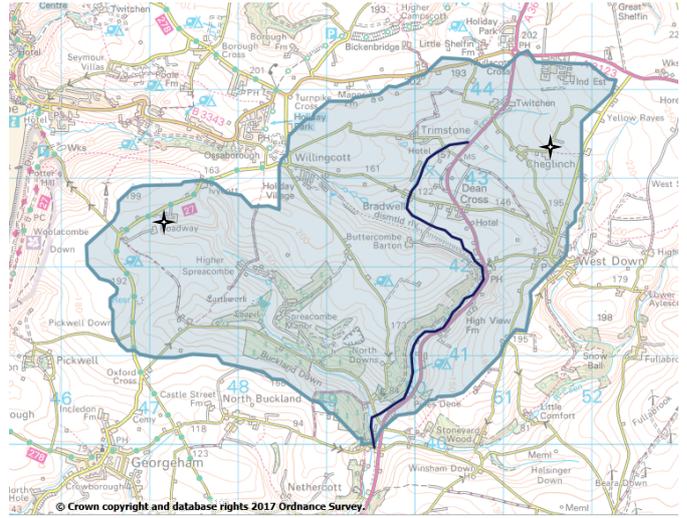


The 5 ponds mid-construction. Getting the levels right was a feat in itself.

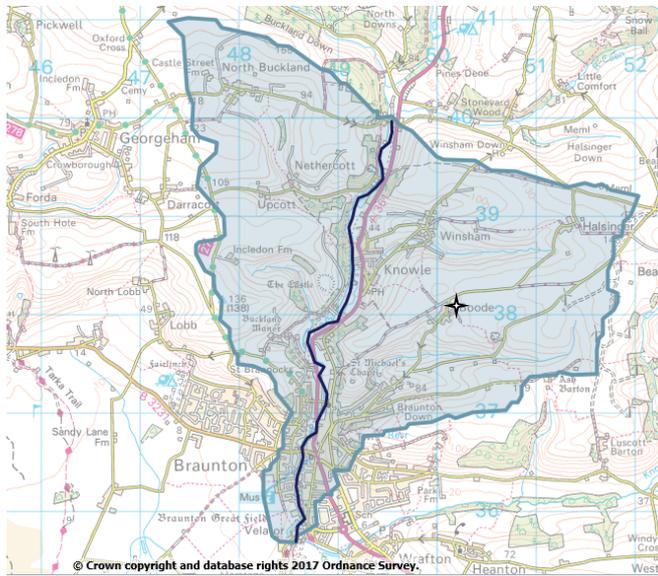
Catchment map farm locations



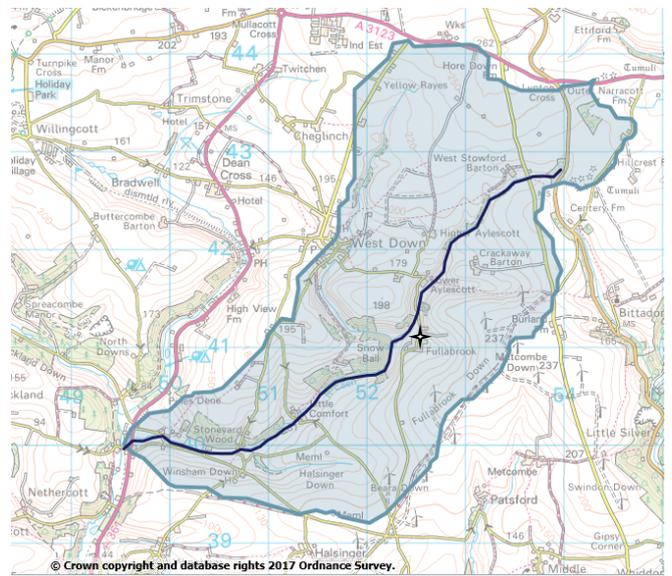
Knowl Water catchment with 2 projects



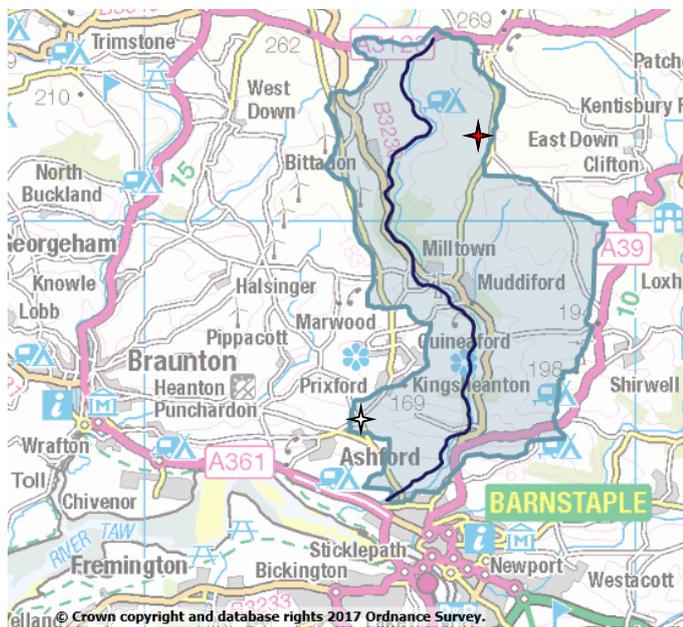
Bradwell Stream catchment with 2 projects



Lower Caen catchment with 1 project

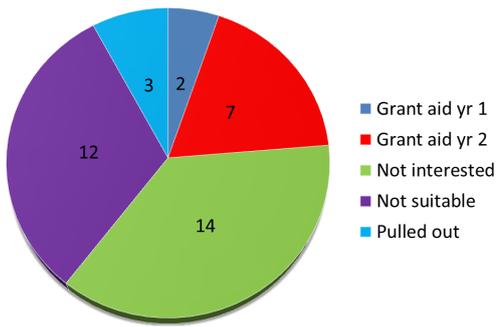


Upper Caen catchment with 1 project



Bradford Water catchment with 1 project. The red star shows where an infrastructure report was given

Summary of project achievements



Outcomes from engagement with the 38 farms contacted in year 2 of the Project

The second year of the project built on the achievements of the first. We worked with more farms, bigger farms and created larger wetlands.

Overall, the project engaged with 38 farms in the focus area including all of the top 26 at-risk farms identified in the project area.

Grant aid for rSUDS was given to 7 farms across the 5 catchments. (see chart opposite). One farm from the previous year was successful with a mid-tier application and 3 further farms are seeking to apply in the current year.

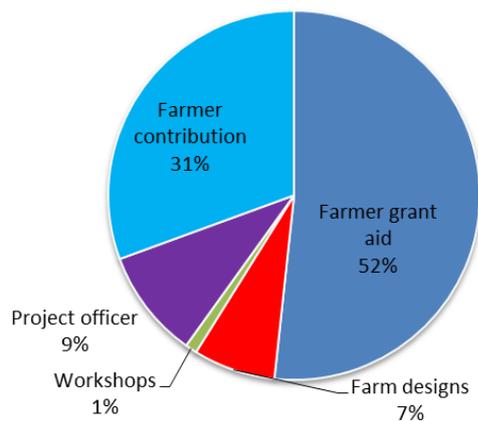
The project has helped arrange a CSF infrastructure report by Creedy Associates to a high risk polluting farm which was out of scope of the North Devon Estuary Project due to the complexity of issues.

The project has promoted other areas of funding, workshops and best practice where suitable, and has built up a good relationship with the farming community in the target area.

Expenditure

Farmer contribution is based on how much the farmer put into their project, but it excludes other improvements not co-funded by the project. For example, case study 1 dug up their yard and re-laid the clean and dirty water pipes to ensure only the appropriate water enters the wetland cells.

Another farmer funded additional guttering and drainage in the farm yard which ends the wetland treatment cells.



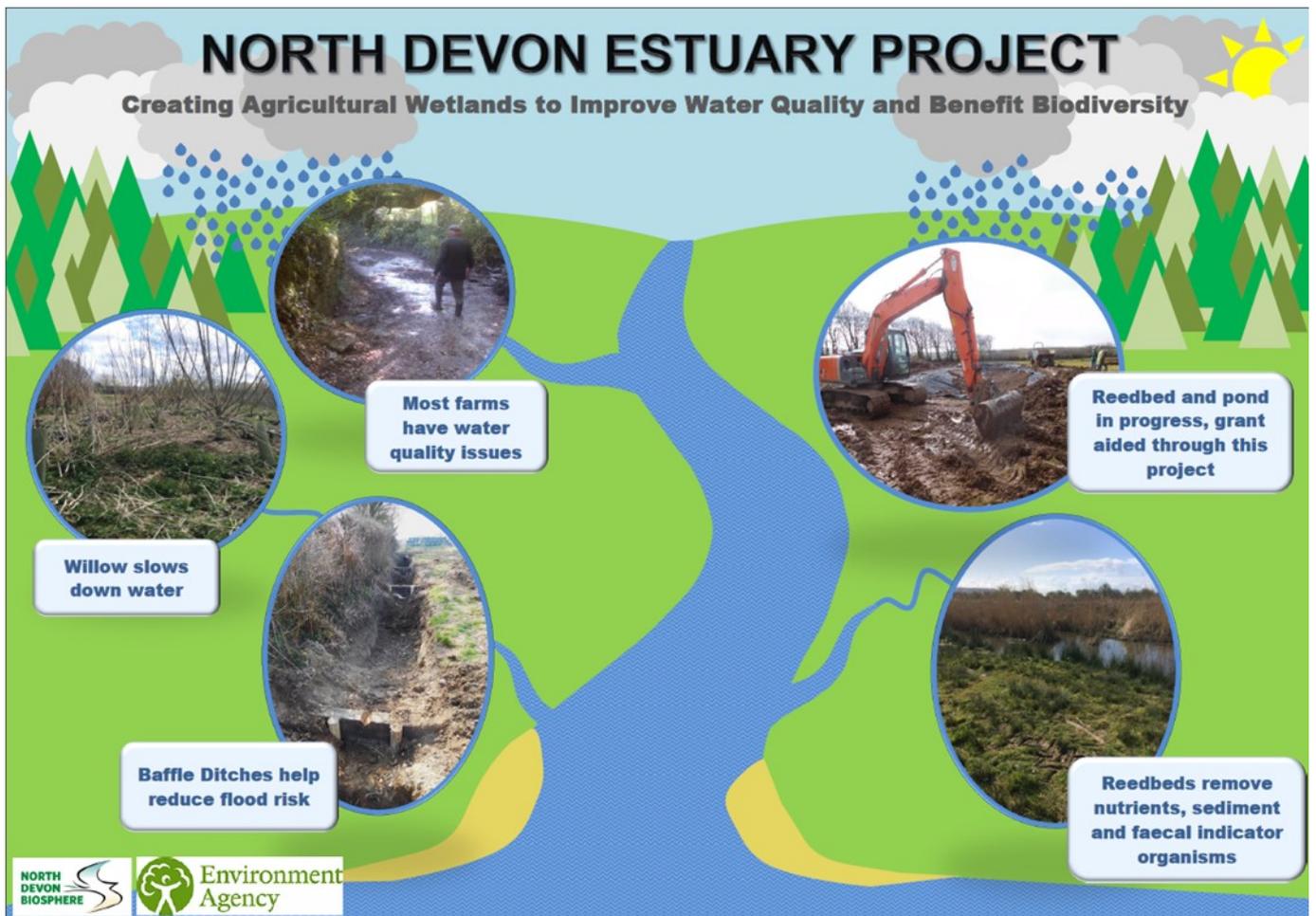
Expenditure break down (%)

Conclusions

The use of a Project Officer to develop a close relationship between the farmer and the project was essential to the scheme's success.

The use of the great expertise of the Wildfowl and Wetland Trust was invaluable because more in-depth plans could be supplied and this greater level of detail was much appreciated by the farmers, whether they were organising contractors or carrying out the work themselves.

The success of the project very much depended on the willing involvement of many of the high-risk farmers in the focus area. But none of these farmers would have carried out the improvements without the help, guidance and funding of the Estuary Project.



The North Devon Biosphere would like to thank the Environment Agency for providing the funds to enable this project to happen, the Wildfowl and Wetlands Trust and of course, the farmers that helped make all the on-the-ground improvements possible.

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<http://www.northdevonbiosphere.org.uk/estuary-project.html>