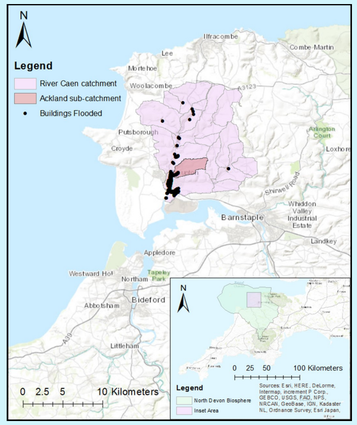
Natural Flood Management at Higher Boode Farm, Braunton

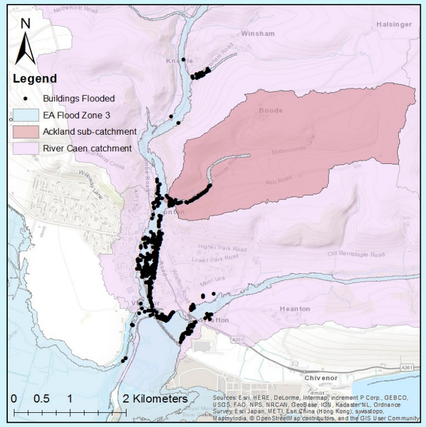
Introduction

Natural Flood Management (NFM) strategies work with environmental and natural processes, through an ecosystem based approach, to increase flood resilience of communities downstream. The NFM project for the Acland catchment is part of a wider management plan to reduce downstream flooding within the North Devon Biosphere. The project was funded by the Environment Agency, Natural England and Devon County Council.



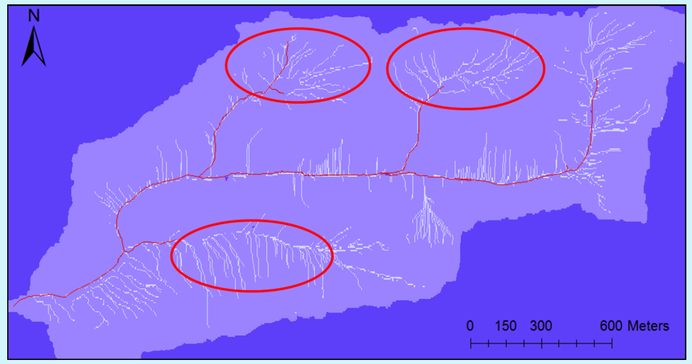
Study Area

Over the last 50 years Braunton has experienced 12 episodes of flooding effecting 8000 residences and various business enterprises. Therefore the project area chosen was the Acland stream, a 2km^2 sub-catchment of the River Caen which runs through Higher Boode Farm. This size of catchment assured accurate monitoring, as outside influencing variables were limited. The Acland soil type, 541j Denbigh 1, consists primarily of clay loamy soils which lead to a slower than average infiltration rate. A combination of soil type and steep valley sides naturally encourage high runoff and therefore flow rate. Before the NFM interventions were established, river monitoring (✖)and a rain gauge (●) were installed.



Desktop Studies

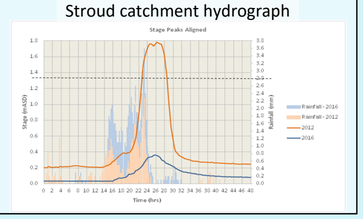
Using the software SAGA and the Overland Flow tool, the map below was produced. As a result of this study, three areas were identified to contribute the most runoff into the Acland catchment. Due to time restrictions, only the Northern two areas were able to be focused upon and have NFM interventions developed accordingly.



How do log dams act as an NFM intervention?

Log dams act as physical instream barriers to high river flows, causing flood waters to leave the channel and breach on to the floodplain. When these events occur waters are slowed down as roughness has increased and therefore have the opportunity to infiltrate into the floodplain. As these waters are infiltrated into the floodplain, this increases the time taken for these potential flood waters to reach downstream communities, thus reducing the flood peak and associated devastation. This intervention also improves water quality; when river flow is reduced, sediment in the water column is able to be released and deposited. The dams were installed by a local contractor, see below.

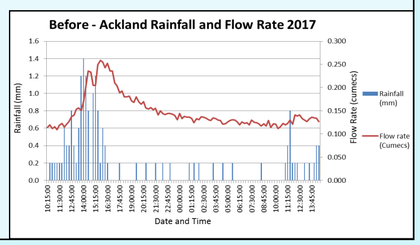
Stroud catchment hydrograph

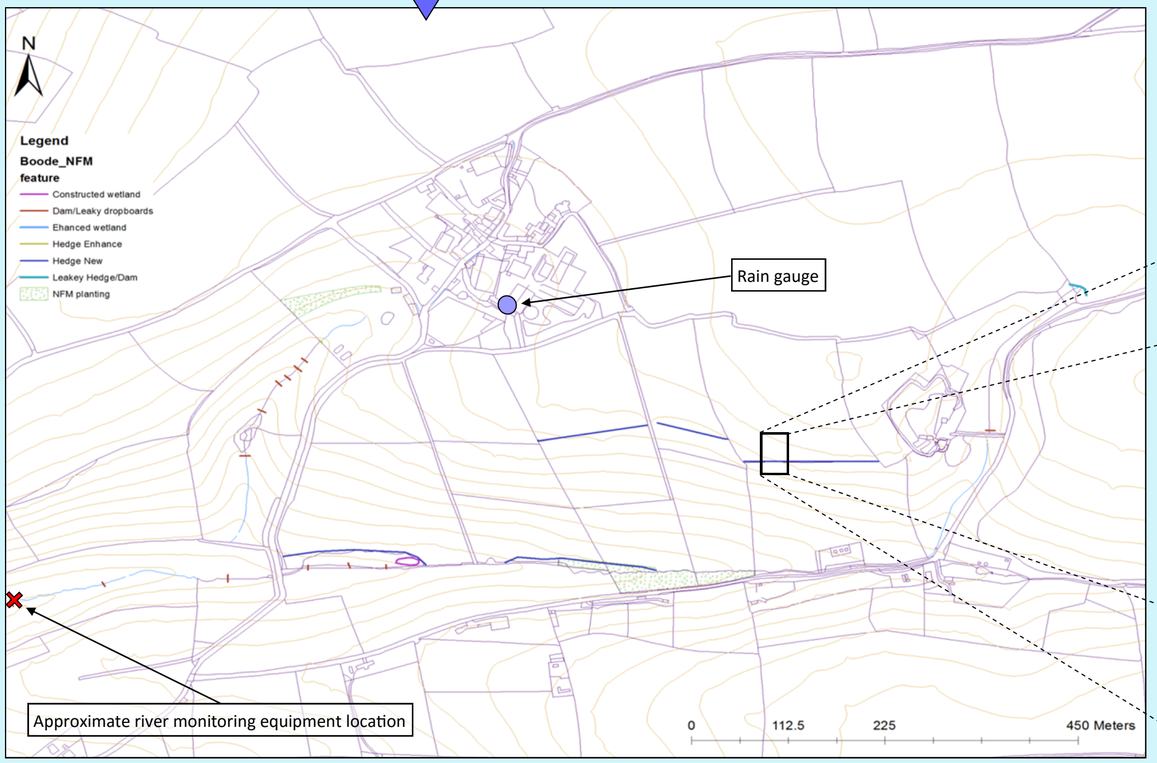


Monitoring

On the 20th January 2017 monitoring sensors and a rain gauge were deployed in the Acland catchment, recording every 15 minutes. The monitoring equipment that was installed consists of an Area Velocity Flow Meter, a CT2X Conductivity, Temperature and Level Sensor and Turbo Turbidity Sensor. A Kalyx tipping bucket rain gauge (1 tip = 0.2mm) was also installed within the farm buildings to quantify the precipitation received within the catchment area. Once this data was downloaded and displayed onto the appropriate software systems, hydrographs could be produced and analysed accordingly.

As the inset graph shows, at the start of the project the Acland catchment was highly responsive. This is reflected in the 30 minute lag time, from when the rain gauge and the stream received the precipitation respectively.





How can hedgerows mitigate flooding?

Hedgerows act as a physical land barrier to runoff accumulation and were designed to withstand a 1 in 100 year rainfall event. The banks featured small baffles and overflow pipes. The baffles reduced the possibility for the bank to act as a conduit for water flow and, in times of heavy rain, improve water quality as small pools behind the baffles facilitate UV penetration and the breakdown of bacteria. The overflow pipes were positioned alongside the baffles thus receiving any excess flows and reducing the likelihood of bank hydraulic failure.

Costs

The breakdown and total costs of the Natural Flood Management project at Higher Boode Farm are outlined in the table below.

Item	Cost	Source
Project Management	£2,500	DCC/EA
Design	£3,000	DCC/EA
River monitoring	£7,000	DCC/EA
Groundworks & hedge banks	£23,400	DCC/EA
Log dam materials and installation	£3,600	DCC/EA
Fencing	£2,000	DCC/EA
Woodland Planting	£20,000	Biodiversity Offset
Post project monitoring and assessment (equipment and report)	£40,000	NE
TOTAL	**£101,500**	

Expected Findings

We have calculated that both the hedgerow and log dam interventions would reduce the flood peak on the hydrograph, which is produced from the catchment monitoring data. In turn, we expect this diminished flood peak to reduce the time taken for flood waters to reach communities downstream, therefore increasing flood resilience within the community.