Case study 18. Tutta Beck

Author: Ben Lamb

Main driver: Flood risk management

Project stage: Modelling and design completed, funding to implement recommendations (2016 to 2017)

Photo 1: Tutta Beck (source: Sim Reaney on Twitter)

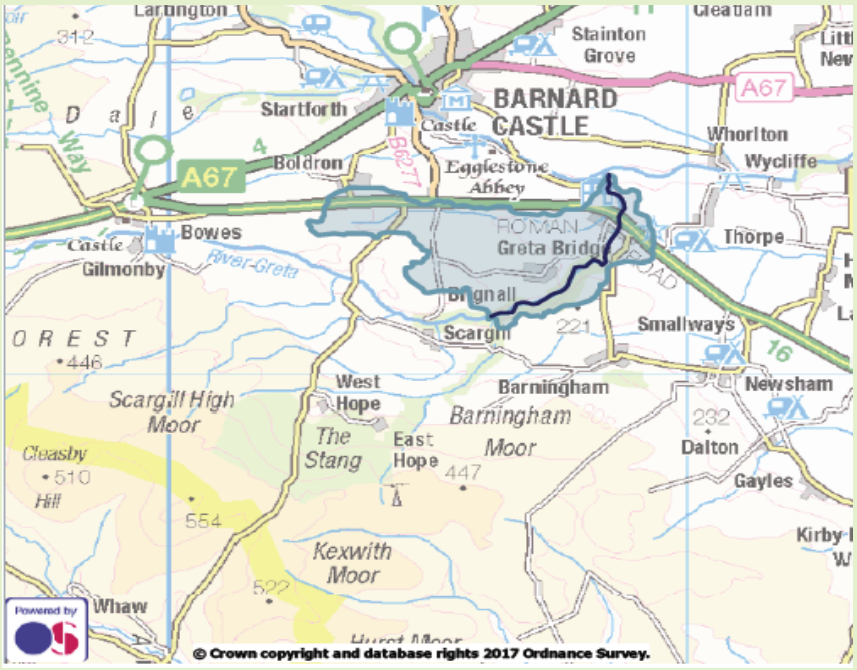
Project summary:

Three properties in the village of Greta Bridge, south of Barnard Castle on Teesside (Map 1), are subject to flooding from Tutta Beck (Photo 1), a tributary of the River Greta which is itself a tributary of the River Tees. The last flood in 2012 resulted in allocation of Local Levy funding and design for a 'hard measure' to be installed. However, the village is in a building conservation area and has significant archaeological heritage, and the proposed flood fence was not supported by local residents.

The Tees Rivers Trust identified a Heritage Lottery funding opportunity to support a MSc research project at Durham University to model Natural Flood Management (NFM) measures in the catchment. This has now been completed and a business case to put NFM measures in place is being made by Durham County Council. Work to install measures is expected to begin in spring 2017.

Key facts:

In 2012, properties at Greta Bridge were flooded in April, June, July September and November.



Map 1: Location of Tutta Beck (source: Ordnance Survey)

1. Contact details

Contact details	
Name:	Ben Lamb
Lead organisation:	Tees Rivers Trust
Partners:	Rokeby Estate, Estate Farmers, Durham University, Durham County Council
e-mail address:	benlamb@teesriverstrust.org

2. Location and catchment description

Catchment summary	
National Grid Reference:	408449,513341
Town, County, Country:	County Durham, UK
Regional Flood and Coastal Committee (RFCC) region:	Northumbria
Catchment name(s) and size (km²):	Tutta Beck, 7.6km^2
River name(s) and typology:	Tutta Beck Active meandering channel with pool riffle
Water Framework Directive water body reference:	Tributary of GB103025072130

Land use, soil type, geology, mean annual rainfall:	Mixed arable and livestock Medium sandy/clay loams overlying limestone Mean annual rainfall: 819mm

3. Background summary of the catchment

Socioeconomic/historic context

Greta Bridge is situated on the old route of the A66 cross Pennine highway. It has a long history and was once a garrison marching camp for Roman troops. The catchment falls into the ownership of the Rokeby Estate and all of the farms are tenanted. The catchment remained largely unchanged until the 1840s and the introduction of improved agricultural methods. Much of the land was then drained, and the channel of the beck straightened and impounded at a number of sites – the purpose of the latter being to create flight ponds for the estate and water for farm holdings.

In the 1980s there was a marked shift away from dairy cattle to arable production. The majority of the arable land is rotated with winter wheat, oilseed rape and barley. Clover leys make up the improved grassland and rough grazing can be found in the upper reaches of the catchment. Woodland is scattered along the length of the beck. Margins are mostly well maintained and cover crops are in place at many sites owing to the large commercial shoot across the estate.

Flood risk problem(s)

The A66 is an increasingly busy route and has been upgraded to dual carriageway for most of its length. It is understood that this, coupled with the reopening of a limestone quarry in the headwaters of the beck, have coincided with increased flood risk. However, this has not been substantiated by research and modelling.

Flooding occurs at 3 properties in the village and, in 2012, these were flooded on 5 separate occasions through the year.

Other environmental problems

The beck is not classified as a water body under the Water Framework Directive. However, electrofishing and invertebrate surveys carried out by the Tees Rivers Trust have identified that neither fish nor riverfly are at optimum levels for this watercourse. The substrates are heavily sedimented and algal growth proliferates during summer months.

4. Defining the problem(s) and developing the solution

What evidence is there to define the flood risk problem(s) and solution(s)

Flooding occurs periodically at 3 properties in Greta Bridge. SCIMAP and CRUM4 modelling has identified priority areas to address with NFM measures. The sensitivity surrounding the character of the landscape and the village played an important role in looking at NFM as an alternative solution to a traditional hard defence solution.

What was the design rationale?

Given that an engineered solution was not feasible at this site, the rationale for this project was to:

- develop an innovative approach to managing catchment hydrology
- use risk mapping to target hydrological simulations
- provide outputs that satisfy funding regulations

- give long-term advice on land management to mitigate flood risk supporting farming and rural economy
- increase resilience across the catchment

Project summary	
Area of catchment (km^2) or length of river benefitting from the project:	7.6km^2
Types of measures/interventions used (Working with Natural Processes and traditional):	None used yet but will include: • large woody debris • wet woodland • use of existing tracks to divert water into woods • flood storage pond
Numbers of measures/interventions used (Working with Natural Processes and traditional):	Not yet known
Standard of protection for project as a whole:	To be confirmed once final scheme agreed
Estimated number of properties protected:	3

How effective has the project been?

Monitoring to determine its effectiveness will be put in place once measures have been installed in April 2017.

5. Project construction

How were individual measures constructed?

To be confirmed after installation

How long were measures designed to last?

5–25 years

Were there any landowner or legal requirements which needed consideration?

- Landowner consent
- Planning permission

6. Funding

Funding summary for Working with Natural Processes (WWNP)/Natural Flood Management (NFM) measures	
Year project was undertaken/completed:	MSc funded 2015 Implementation funded for 2016 to 2017

How was the project funded:	MSc through Heritage Lottery Project funding with the Heart of Teesdale Landscape Partnership Physical measures to be funded through Local Levy
Total cash cost of project (£):	£75,000
Overall cost and cost breakdown for WWNP/NFM measures (£):	To be confirmed after installation
WWNP/NFM costs as a % of overall project costs:	~70%
Unit breakdown of costs for WWNP/NFM measures:	To be confirmed after installation
Cost–benefit ratio (and timescale in years over which it has been estimated):	To be confirmed after installation

7. Wider benefits

What wider benefits has the project achieved?

To be confirmed – NFM measures to be installed in spring 2017

How much habitat has been created, improved or restored?

To be confirmed but an 8km length of Tutta Beck is projected to be improved

8. Maintenance, monitoring and adaptive management

Are maintenance activities planned?

Yes – to be confirmed once known

Is the project being monitored?

Yes – to be confirmed once known

Has adaptive management been needed?

Not yet known – measures yet to be installed

9. Lessons learnt

To be confirmed

10. Bibliography

REANEY, S., 2016. *Tutta Beck Natural Flood Risk Management project* [online]. Durham: Durham University. Available from: https://community.dur.ac.uk/sim.reaney/?p=589 [Accessed 10 April 2017].

TEES RIVER TRUST, 2016. Tutta Beck – reducing flood risk through soft engineering [online]. Available from: http://www.heartofteesdale.net/B3 Tutta Beck measures.pdf [Accessed 10 April 2017].

Project background

This case study relates to project SC150005 'Working with Natural Flood Management: Evidence Directory'. It was commissioned by Defra and the Environment Agency's Joint Flood and Coastal Erosion Risk Management Research and Development Programme.