Case study 10. Padgate Brook River Restoration – part of the Warrington FRM Scheme

Author: Connor McIlwrath

Main driver: flood risk, river restoration, improving floodplain connectivity

Project stage: Constructed 2016

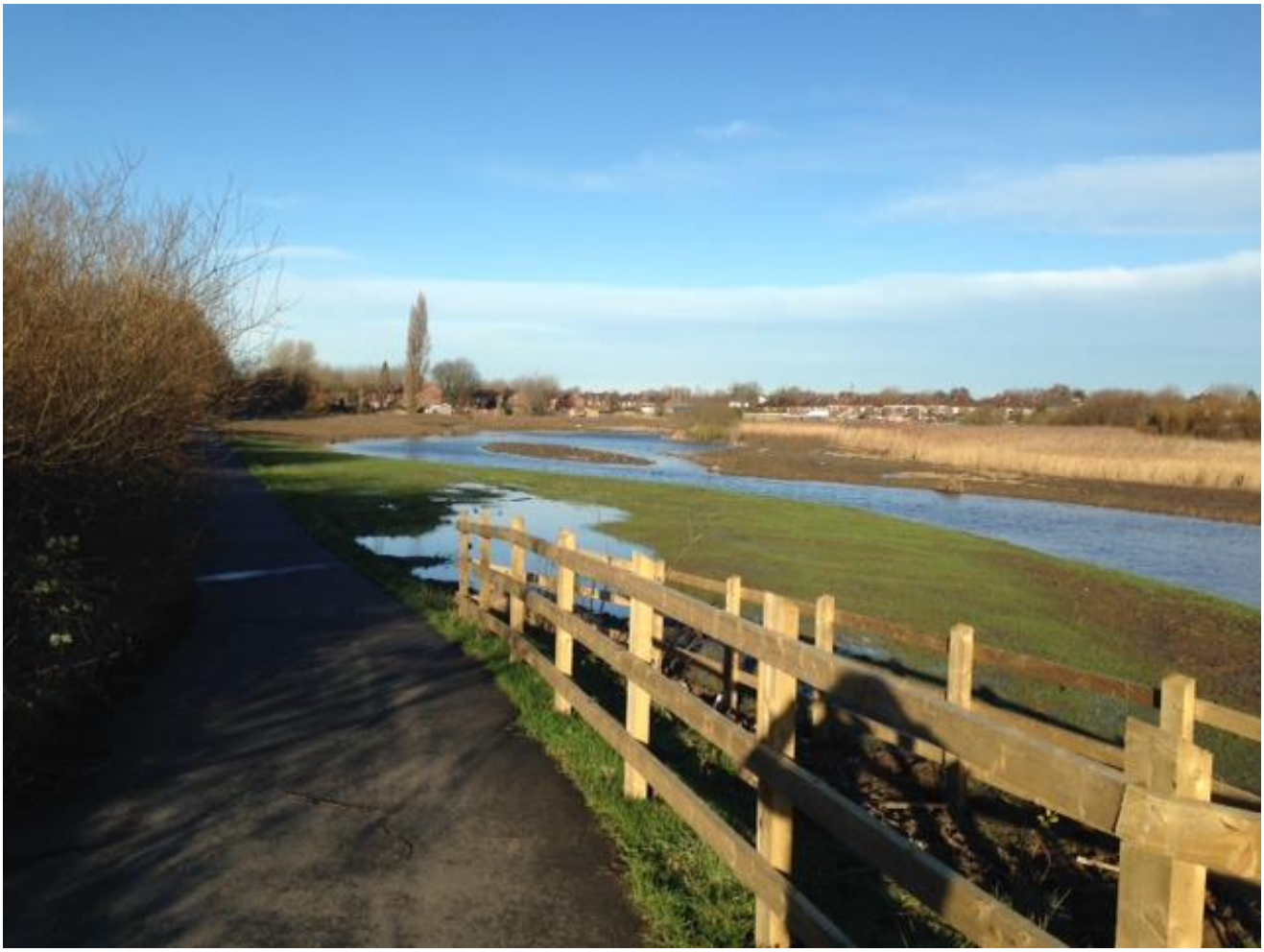


Photo 1: The Twiggeries, 2016 (source: Environment Agency)

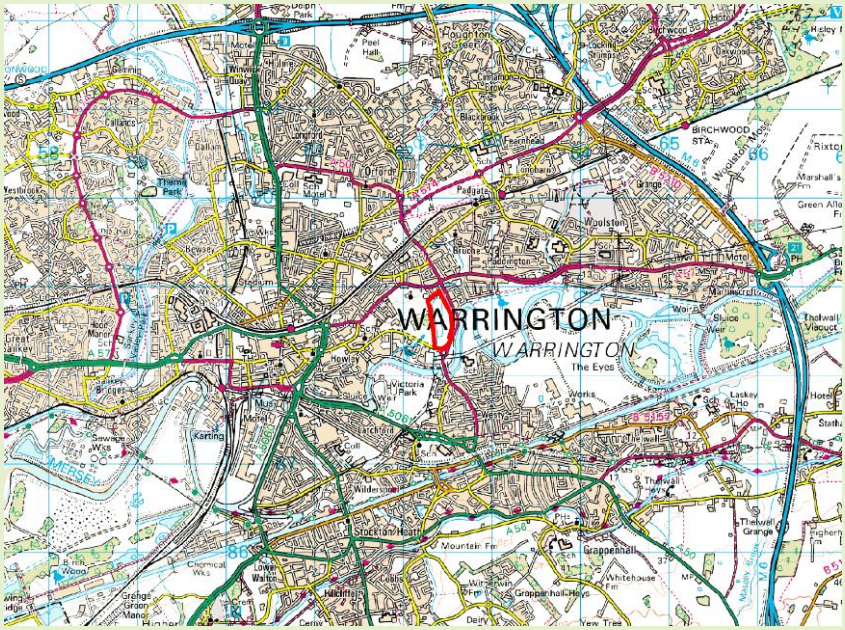
Project summary:

Padgate Brook lies to the east of Warrington town centre (Map 1). It is a small watercourse which feeds into the River Mersey. The brook has been subject to a number of alterations over the years to reduce flood risk. One of the main changes was to straighten and deepen the brook through the Twiggeries and construct flood embankments along both banks. This effectively cut off the brook from the adjacent floodplain (Photo 1 and Appendix 1).

As part of the Warrington Flood Risk Management (FRM) Scheme, Padgate Brook has been restored to a more natural course and the embankment along the left bank has been removed. This has created a more natural river system and allows water to spill onto the floodplain on a regular basis. This approach has improved the level of flood protection for the surrounding properties to a 1 in 100 year level and has restored 5ha of reedbed.

Key facts:

- The scheme has reduced the risk of flooding to over 200 properties.
- The natural approach fits in with the character of the site avoiding the use of heavy engineering in a green space.
- Maintenance requirements have been significantly reduced by creating a self-cleansing channel and using a wildflower mix on the set back embankment.
- Restored 500m of the watercourse and 5ha of reedbed.
- Created a sustainable FRM system.



Map 1: Location of the Twiggeries (source: Easimap)

1. Contact details

Contact details	
Name:	Connor McIlwrath
Lead organisation:	Environment Agency
Partners:	Warrington Borough Council
e-mail address:	connor.mcilwrath@environment-agency.gov.uk

2. Location and catchment description

Catchment summary	
National Grid Reference:	362412, 388613
Town, County, Country:	Warrington, Cheshire, UK
Regional Flood and Coastal Committee (RFCC) region:	North West

Catchment name(s) and size (km^2):	Padgate Brook, 5km^2
River name(s) and typology:	Padgate Brook
Water Framework Directive water body reference:	GB112069061010
Land use, soil type, geology, mean annual rainfall:	Local Nature Reserve, seasonally wet deep silt, tidal flat deposits, mean annual rainfall 907mm

3. Background summary of the catchment

Socioeconomic/historic context

Padgate Brook is a small tributary of the Mersey and is a modified watercourse providing land drainage to a large low-lying urban area to the north and east of Warrington town centre. The Twiggeries was historically used for reed cutting to provide materials for roofing, but this stopped in the early 20th century following the alterations to the watercourse which disconnected the floodplain. The site is well used by the local community for recreation and is designated as a site of importance for nature conservation.

Flood risk problem(s)

The main risk is fluvial flooding but there is also a risk of tidal flooding from the Mersey.

Other environmental problems

There are biodiversity issues due to significant infestations of Japanese knotweed and Himalayan balsam. The adjacent reedbed had dried up and started to change to woodland. Alterations to the brook had created a man-made appearance.

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

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

The project is part of a large FRM scheme. A number of options were therefore considered and the design was subject to modelling to identify the optimum solution.

What was the design rationale?

Removing the embankment along the left bank would enable the site to flood and store water. This provides protection from events along Padgate Brook as well as backing up from the Mersey. As part of the scheme, it was possible to justify restoring the river and create a self-cleansing system which would avoid the need for routine maintenance.

Project summary	
Area of catchment (km^2) or length of river benefitting from the project:	500m of river restored
Types of measures/interventions used (Working with Natural Processes and traditional):	Setting back flood embankment along the left bank Reconnecting floodplain River restoration

Numbers of measures/interventions used (Working with Natural Processes and traditional):	
Standard of protection for project as a whole:	1 in 100 years
Estimated number of properties protected:	Part of Phase 3A of the scheme, which protects 226 properties

How effective has the project been?

The project was completed in December 2015, since when the floodplain has been inundated on a number of occasions following heavy rainfall. The self-cleansing channel has been achieved with a number of pools adjacent to the main channel to help trap sediment. There have been no major flood events since the works were completed.

5. Project construction

How were individual measures constructed?

The first task was to construct the new embankment along the edge of the site, which is 200m away from the brook. The new channel was then excavated and connections made into existing channel. The existing embankment was demolished and the material used to infill the existing channel.

How long were measures designed to last?

The scheme has a design life of 100 years.

Were there any landowner or legal requirements which needed consideration?

The site is owned by Warrington Borough Council, which is one of the key project partners. A steering group was set up at the start of the scheme to guide the works in the Twiggeries; this helped to smooth the approvals process.

6. Funding

Funding summary for Working with Natural Processes (WWNP)/Natural Flood Management (NFM) measures	
Year project was undertaken/completed	2015
How was the project funded:	FCRM Grant in Aid and contribution from Warrington Borough Council
Total cash cost of project (£))	Phase 3A cost £5 million
Overall cost and cost breakdown for WWNP/NFM measures (£))	Works in the Twiggeries cost £250,000
WWNP/NFM costs as a % of overall project costs)	5% of overall budget
Unit breakdown of costs for WWNP/NFM measures:	

Cost–benefit ratio (and timescale in years over which it has been estimated):	The cost–benefit ratio for the overall scheme is 18.

7. Wider benefits

What wider benefits has the project achieved?

- Water quality and quantity
- Habitat and river restoration
- Climate change adaptation
- Improved access to green space
- Aesthetic value

How much habitat has been created, improved or restored?

- 5ha of water-dependent habitat created or improved to meet Water Framework Directive requirements
- 500m of watercourse restored

8. Maintenance, monitoring and adaptive management

Are maintenance activities planned?

A maintenance management plan has been drafted. Responsibility for maintenance lies with the Environment Agency and Warrington Borough Council.

Is the project being monitored?

No formal arrangements are in place, but the site has been subject to a post construction ecological status survey.

Has adaptive management been needed?

No

9. Lessons learnt

What was learnt and how could it be applied elsewhere?

- Importance of early engagement with important partners to discuss opportunities and agree maintenance responsibilities
- Working closely with in-house specialists (for example, biodiversity, geomorphology and fisheries) from the Environment Agency
- Training opportunity for the Area geomorphology specialist(s) to get involved in the delivery phase

These lessons learnt will be taken forward and used on the next phase, which consists of de-culverting a section of Padgate Brook and creating a meandering route through green space.

10. Bibliography

Not applicable

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.

Appendix 1: Twiggeries landscape reinstatement (source: Jacobs, Halcrow and Axis)