



Impacts of river modifications and restoration options

Dr Marc Naura

The River Restoration Centre (UK)





The River Restoration Centre (RRC)

Working to restore and enhance our rivers

Not-for-profit, not a consultancy.

Independent, impartial, specialist for river restoration expert advice and information since 1994

- Expert impartial advice and assessment.
- Training and guidance material.
- Knowledge & evidence - collate, sift and share best practice.

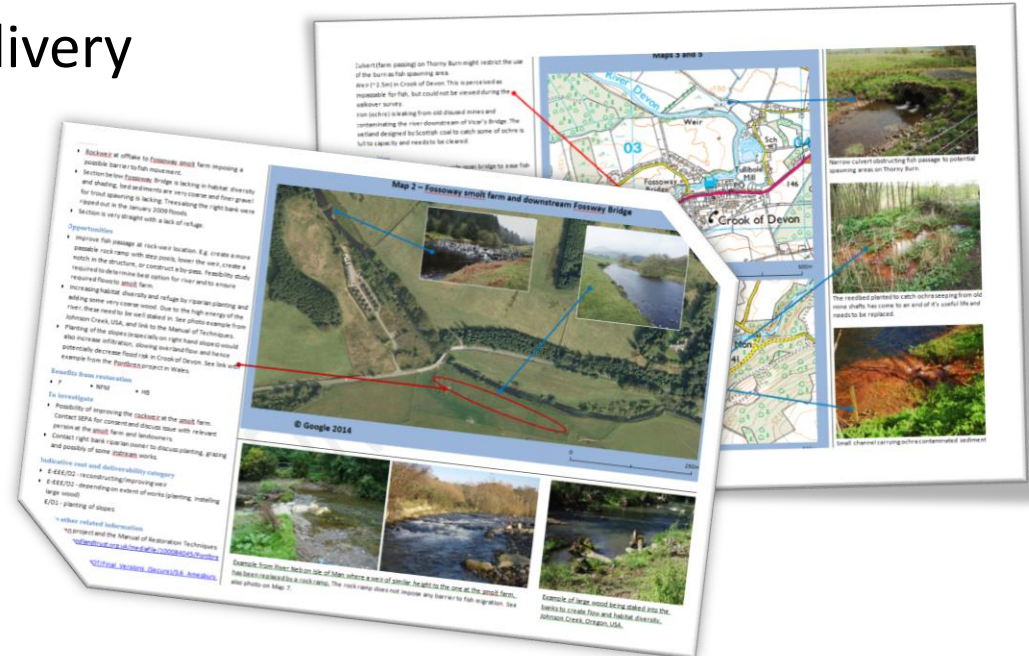
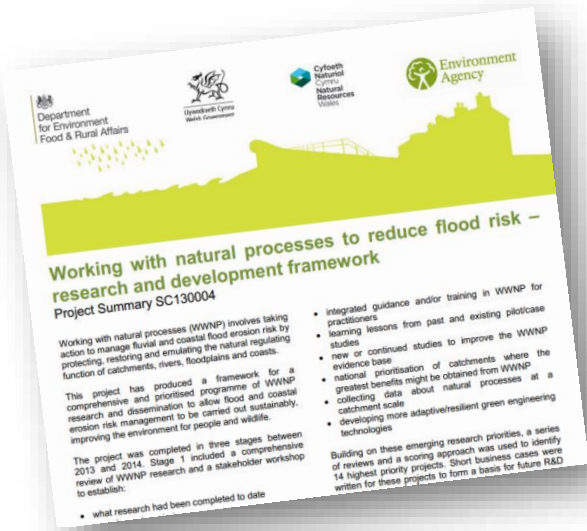


Advice and Assessment



- Independent advice
 - Assessment of technical designs & success
 - Walkover surveys & scoping reports
 - Supporting projects/programmes

- National Advisors
 - Policy, strategy & delivery



Training and Guidance



- Promotion

- Annual Conference, Training, Workshops, Site visits...



- Guidance

- Manual of River Restoration Techniques
- Practical Monitoring Guidance (PRAGMO)



Knowledge Exchange



the River Restoration Centre
Working to restore and enhance our rivers

Search

the Centre Membership River Restoration Communications Conference Advice Training Guidance

Before **After**

River Medlock

Vivamus auctor. Praesent pellentesque. Sed semper. Mauris pretium viverra orci. Vestibulum ante ipsum primis in faucibus orci luctus et ultrices posuere cubilia Curae; Nulla facilis. Duis nec augue at ante viverra placerat. Pellentesque orci libero, accumsan at, tincidunt vel, porttitor eget, erat.

Latest Bulletin
Issue 39 - April 2014
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UK Map & RiverWiki

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Upcoming Events
Reviving the waters: a conference on stream restoration
22-24 Sep 2014 - Lyckeåsele in Lappland, Sweden
Identifying, Planning and Undertaking River Restoration

Latest Blog Posts

- Information

- Website, Bulletin, RRC Inventory, River Wiki

Photo and video gallery

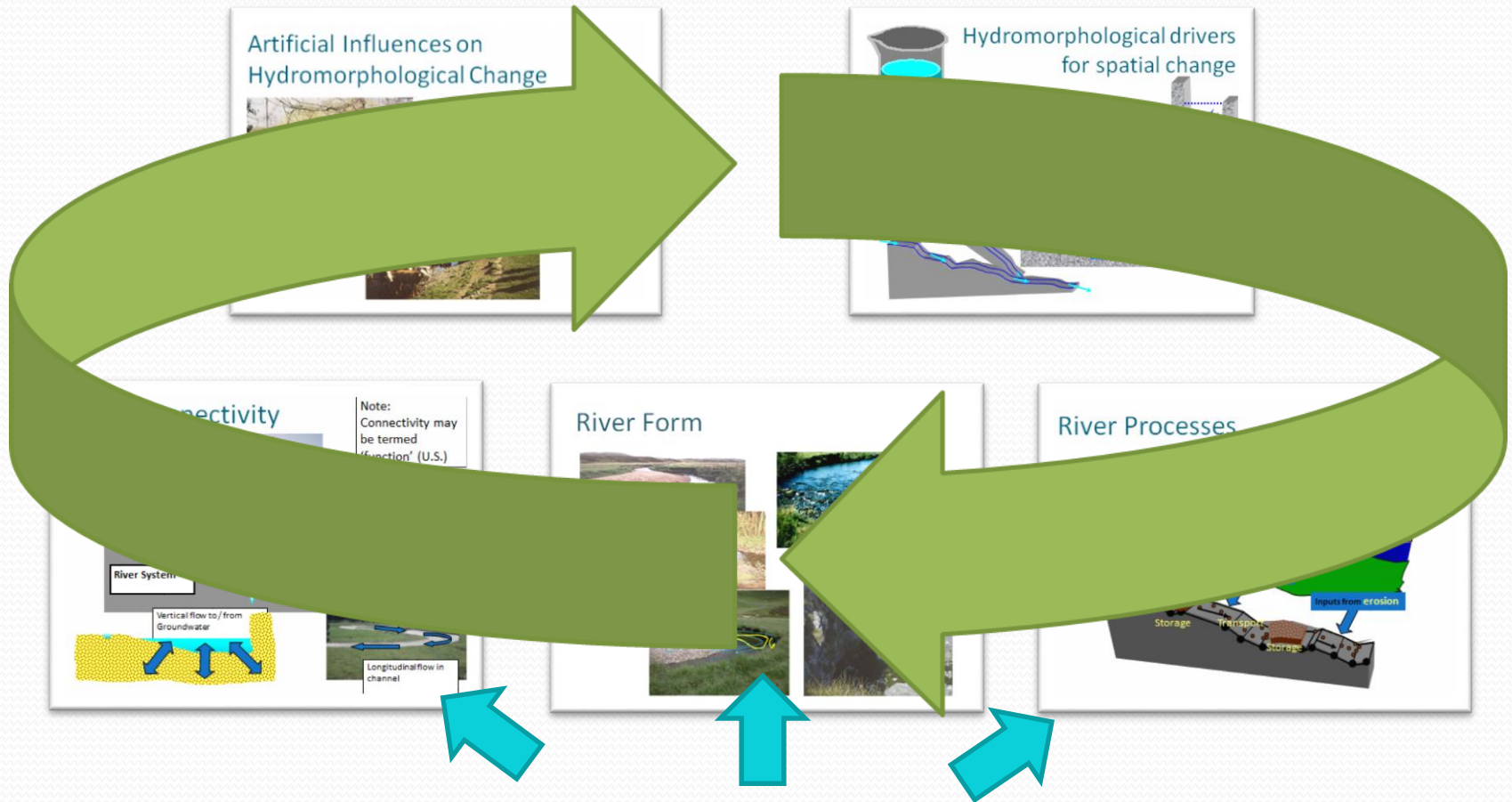
Manual of River Restoration Techniques and the Monitoring Guide

Impact on what?

Hydromorphology can be defined as the study of ***'the physical habitat constituted by the flow regime (hydrology and hydraulics) and the physical template (fluvial geomorphology)'*** (Orr et al 2008)



Hydromorphology & River Restoration



'The physical habitat constituted by the flow regime (hydrology and hydraulics) and the physical template (fluvial geomorphology)'



Artificial Influences on Hydromorphological Change

Human impacts (modification / maintenance)

Impact on process



Impact on process



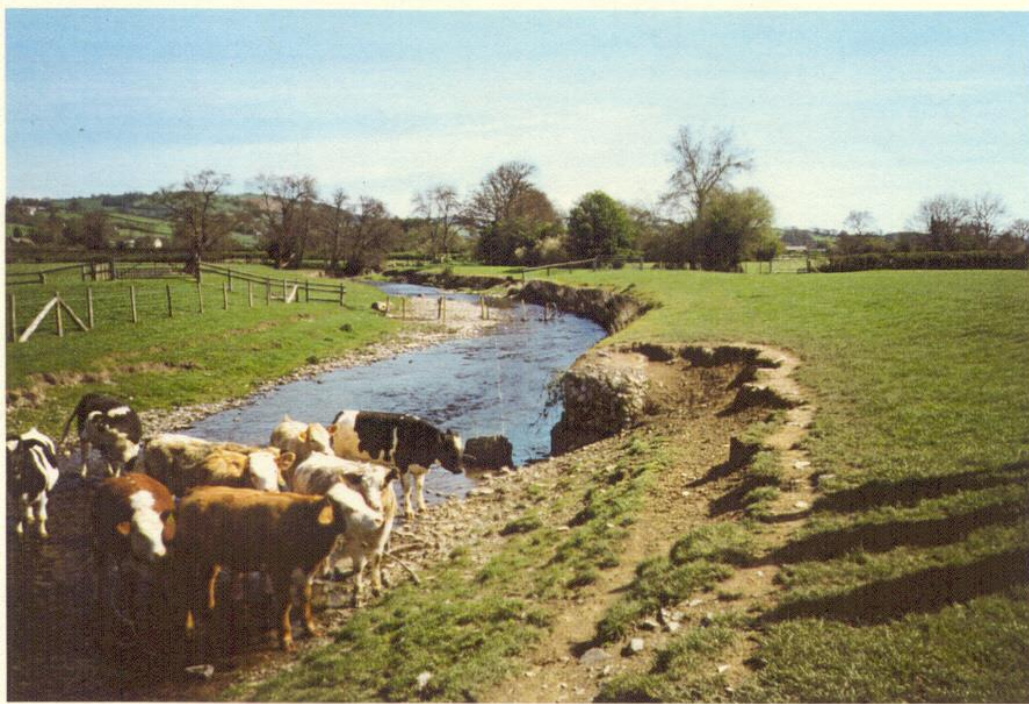
Impact on process and river energy



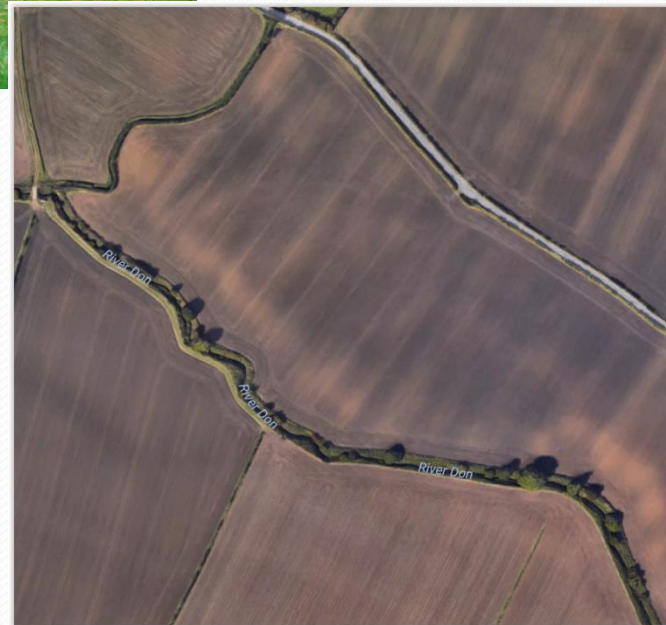
Impact on stream energy



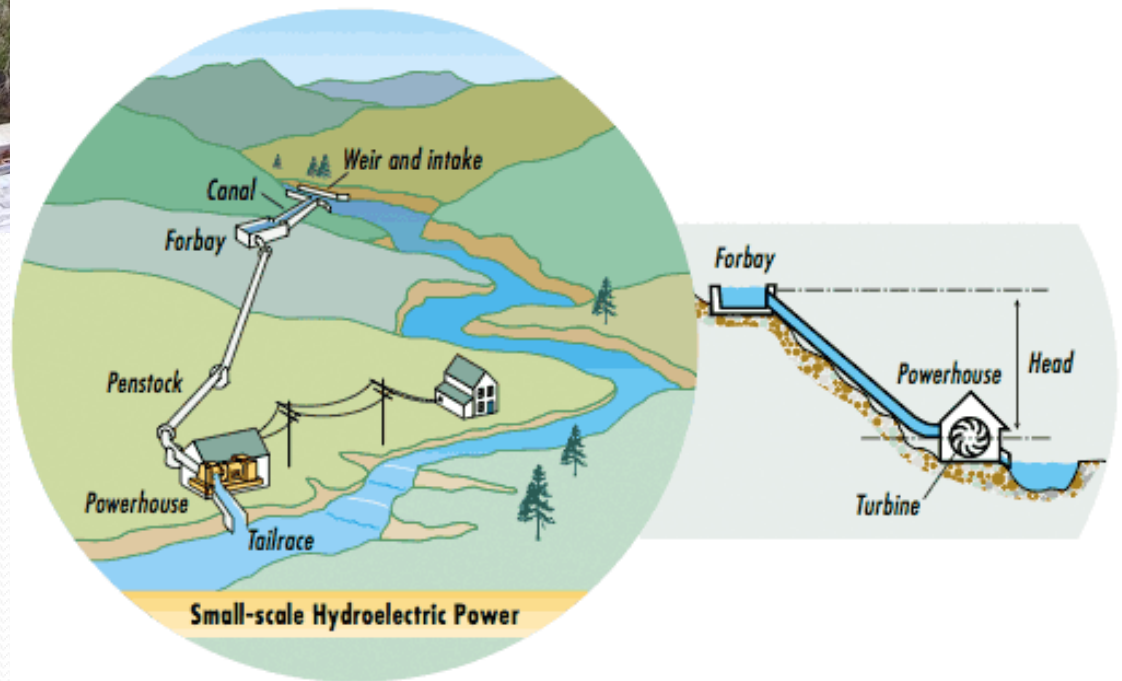
Removal of bank vegetation impact



Change in land-use and runoff



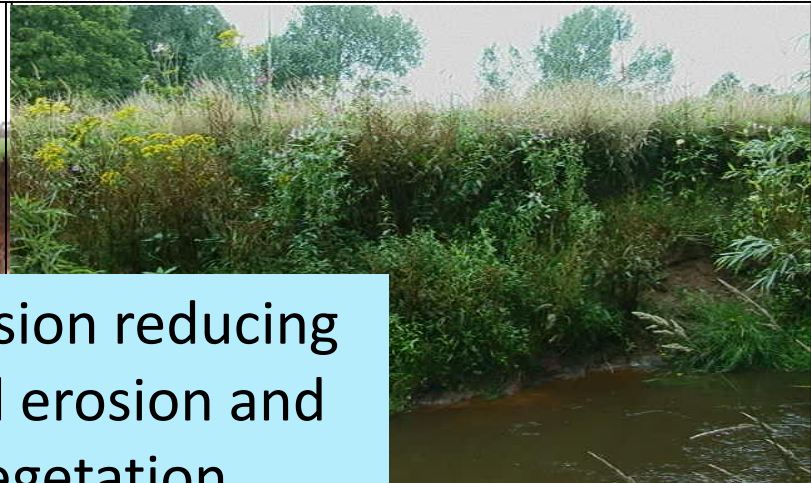
Impact on connectivity



Human impacts can positively effect geomorphology and habitats too



Stock exclusion reducing accelerated erosion and restoring vegetation



Restoring channel geometry and energy profiles

Restoring forms

Burn works for A9 build

Protected bed & banks

Long term??

Fish barrier/trap

Management issue



Upstream template



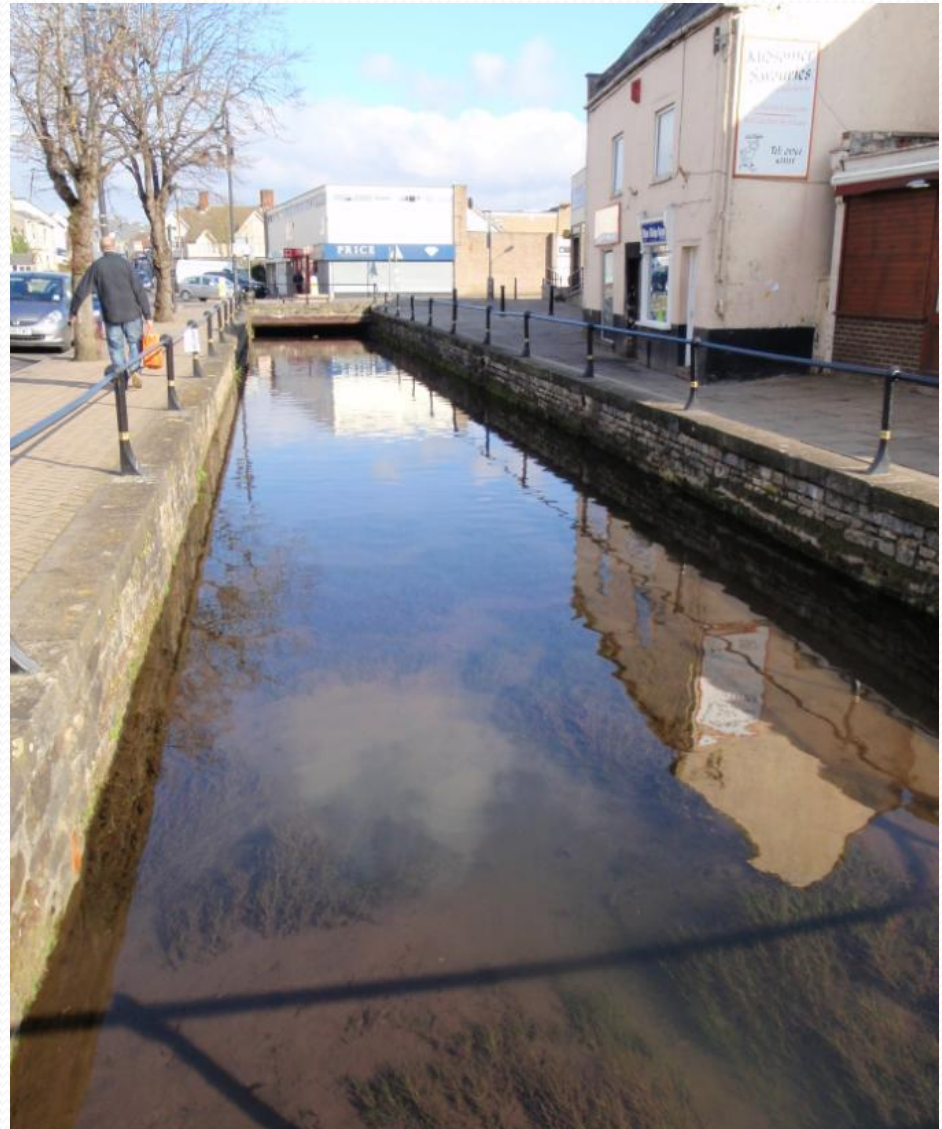
Finished





Midsomer Norton

Town centre eyesore
Maintenance issue
Lack of public
engagement







Restoring connectivity and processes

By removing structures





Restoring processes, forms and connectivity

By re-meandering





D. Revell, Environment Agency,



Simple solutions

Prevent harm

R. Cole, 1995-2015, but grazing pressure



R. Cole, fenced & new channel -1996



Plants growing, channel and banks - 2000



2002



2012



No grazing, stable banks, trees - 2015



Simple solutions

Using green infrastructures

Great Ouse, Water Stratford



SEPTEMBER 2013

In a day!



SEPTEMBER 2013

In a flood!



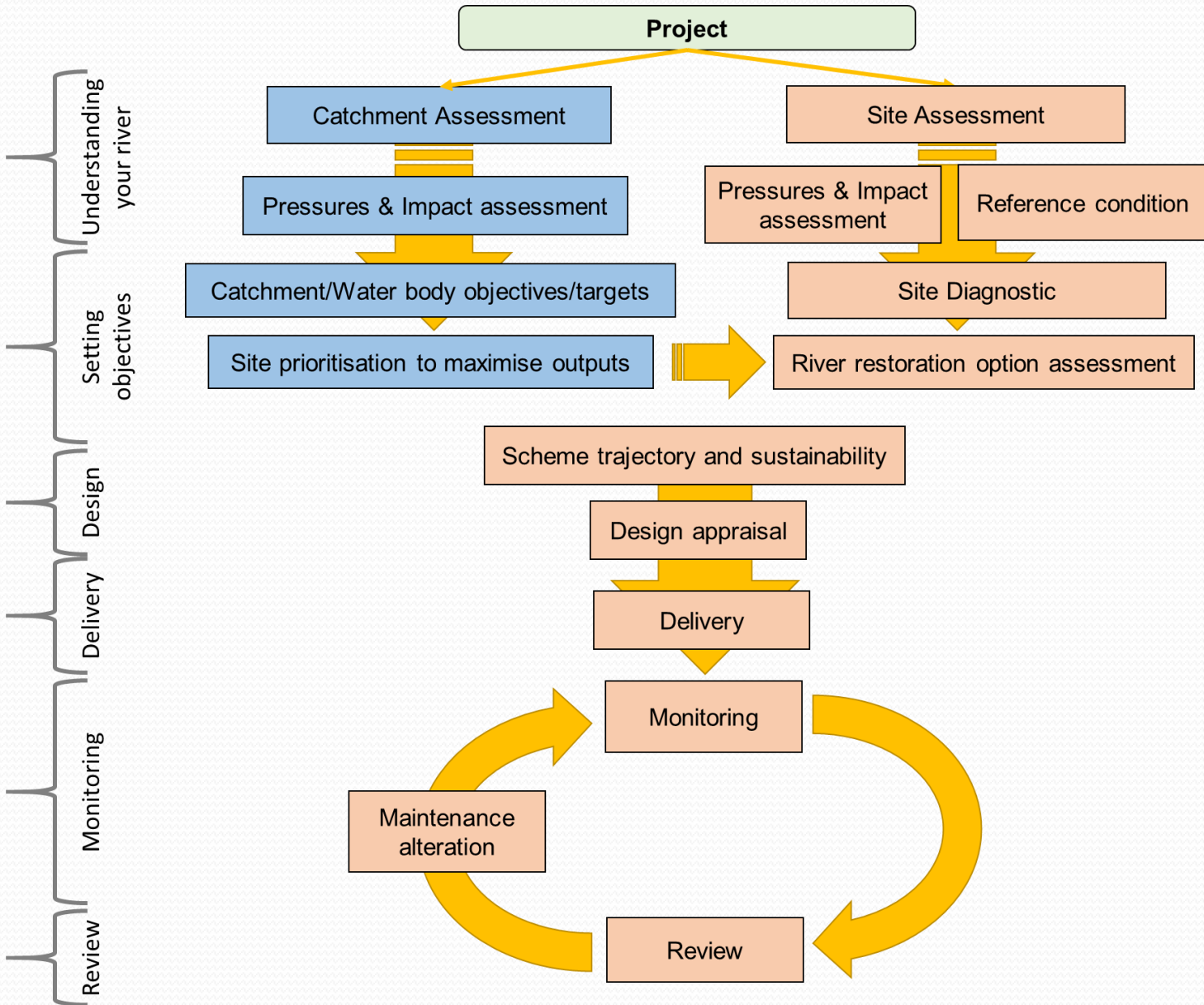
Intact!



In spring



Process



Restoration vision

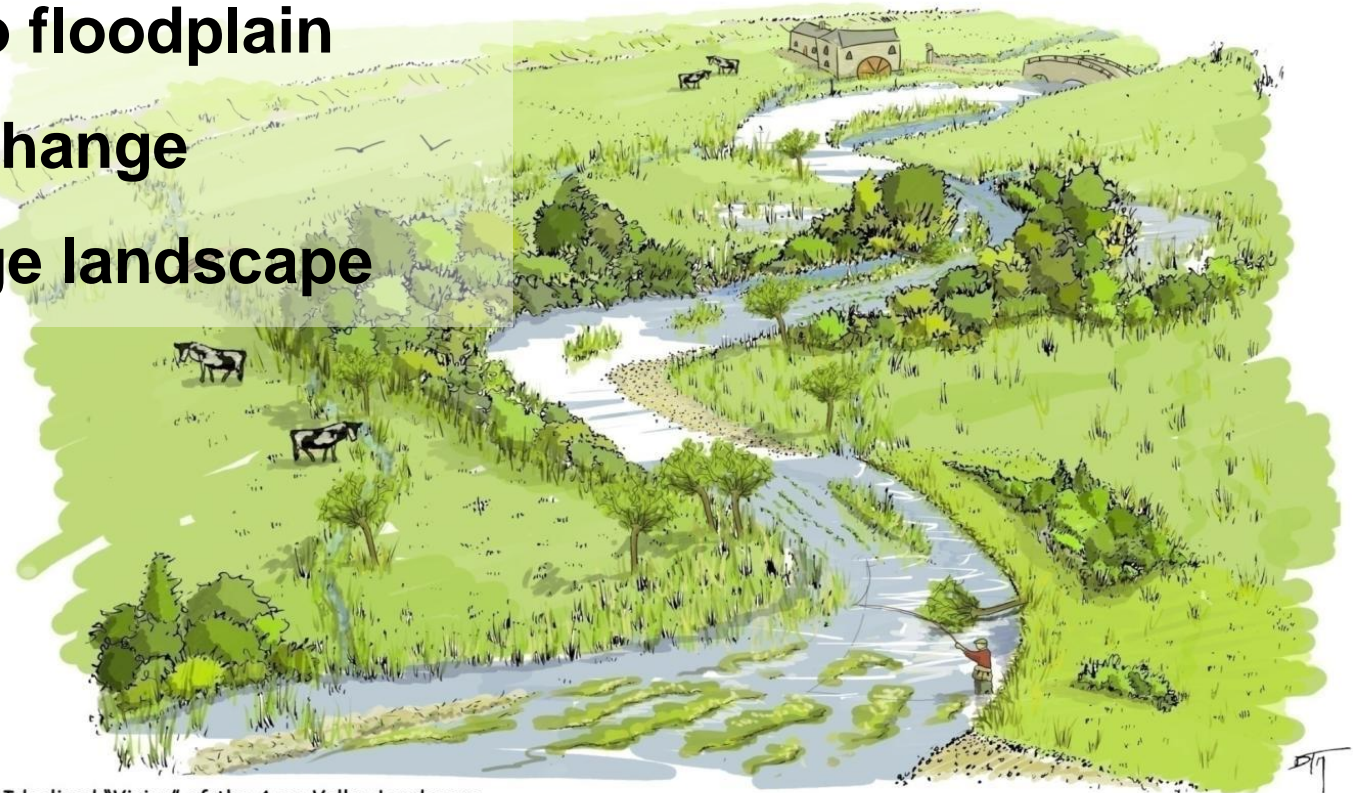
Dynamic

In good ecological condition

Connected to floodplain

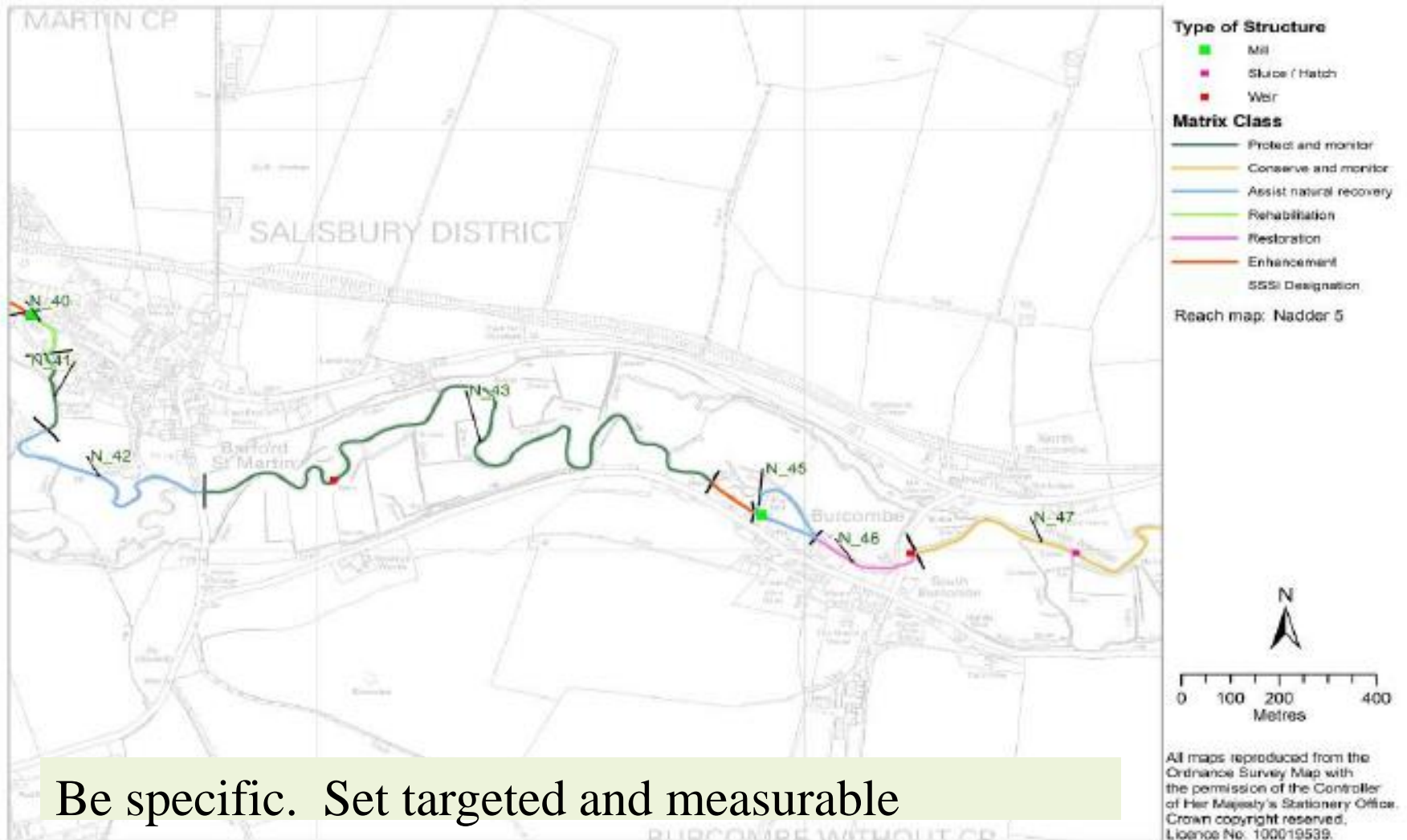
Resilient to change

Set in heritage landscape



Idealised "Vision" of the Avon Valley Landscape
Note: not all features will be found on all river types.

From vision to specific detail



Be specific. Set targeted and measurable objectives (use SMART)

Outline reach options

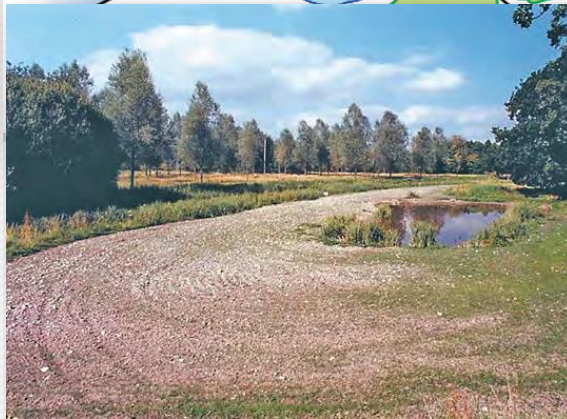
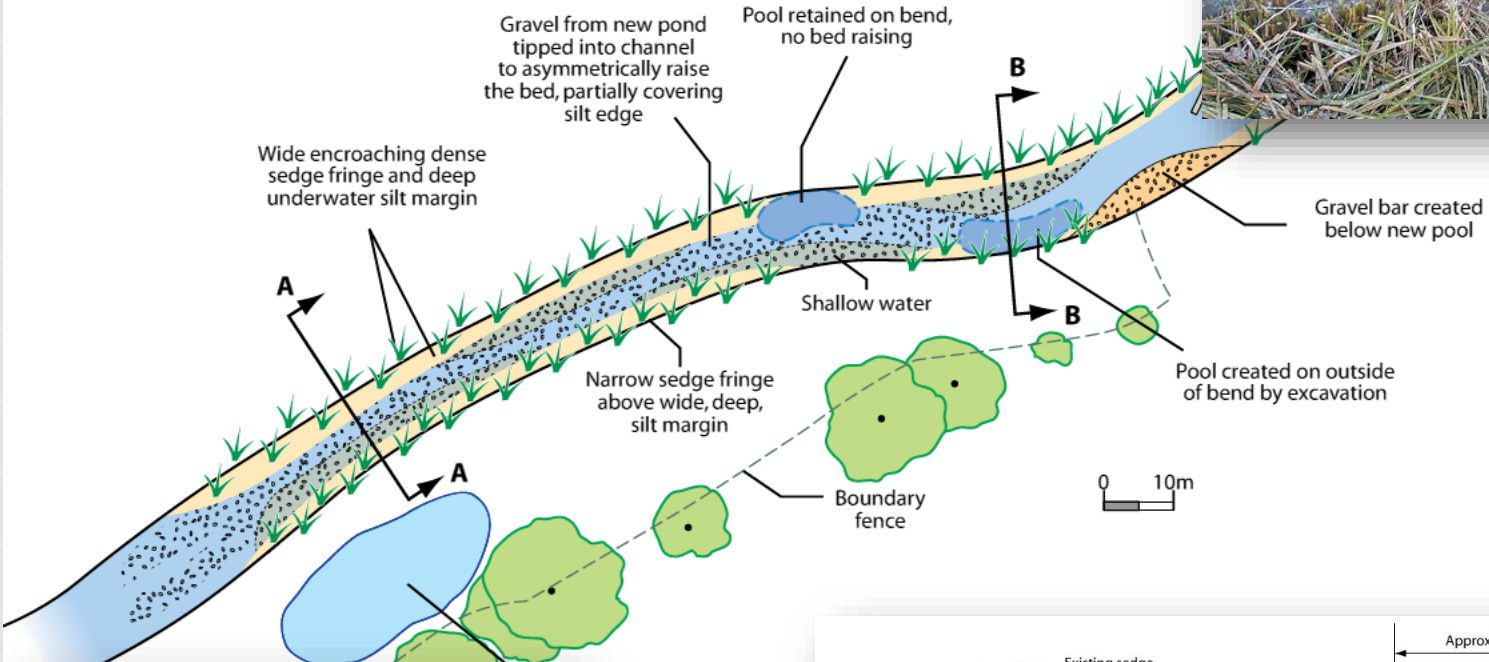
LENGTH – 210m

COST – £12,000 – £14,000 FOR CONSTRUCTION AND REINSTATEMENT WORKS ONLY*

* The cost of £14,000 did not cover design, surveys, administration and consents.

The work was carried out by an experienced local river keeper and not a commercial contractor.

ins
river shallow
above b



Pond created when chalk flints dug for channel

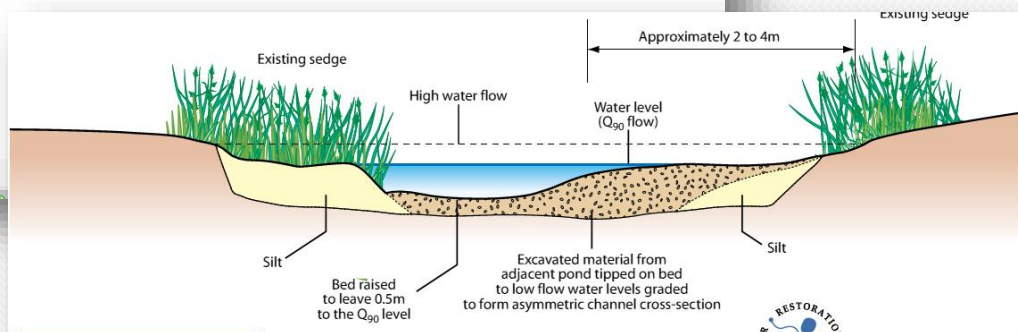


Figure 5.5.2
SECTION A THROUGH RAISED BED AND MARGINAL SHOAL



Guidebook of Applied Fluvial Geomorphology



Photo Courtesy of the Northern Echo

David A. Sear, Malcolm D. Newson, and Colin R. Thorne

Resources

Newson, M.D. & Thorne, C.R. (2004) Guidebook of Applied Geomorphology, Defra/EA Report FD1914, 253pp.

An electronic (.pdf) version of this book is available on the Defra website .

Knighton, D. (1998) Fluvial forms and processes. A new perspective. Arnold.

Kondolf, G.M., Piégay, H. (2003) Tools in fluvial Geomorphology, Wiley.

Green Infrastructure approaches

Green measures



Green - Grey measures



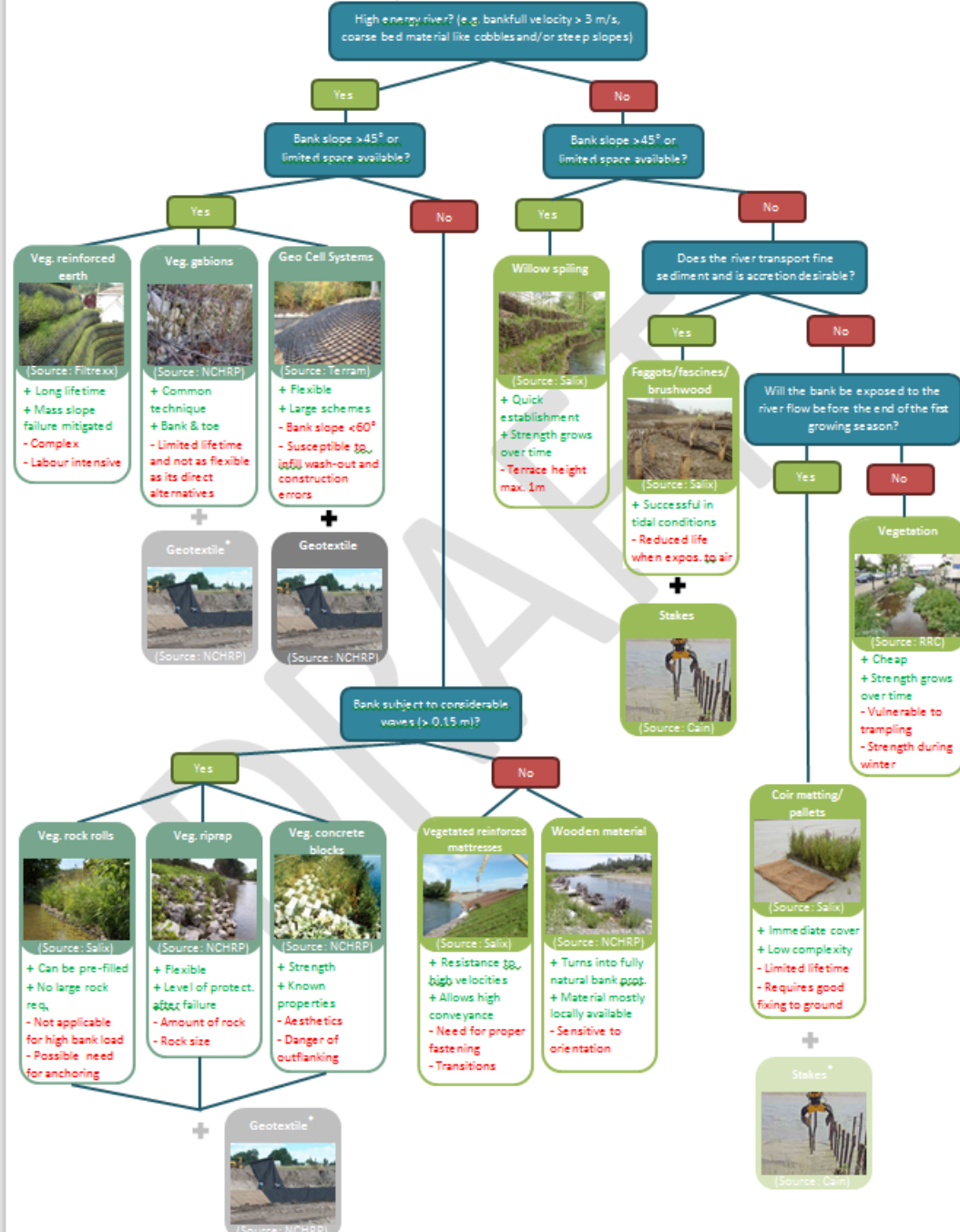
Grey measures



Associated River Management Techniques



Flowchart 1: Selection of bank protection



Ne



River Restoration and Biodiversity

Nature-Based Solutions for Restoring the Rivers of the UK and Republic of Ireland

Stephen Addy, Susan Cooksley, Nikki Dodd, Kerry Waylen, Jenni Stockan, Anja Byg and Kirsty Holstead



GIWP



River Restoration

A strategic approach to planning and management

Part of a series on strategic water management



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