

## Enhancement or just good design? A collaborative approach to river and wetland restoration

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# Who am I?



- Born in York (north-east), live in Exmouth (south-west), based in the CH2M Exeter office
- Honours degree in Applied Biology, specialising in ecology
- 22 years professional experience in river and wetland ecology, management and restoration of rivers and floodplain habitats, and habitat creation.



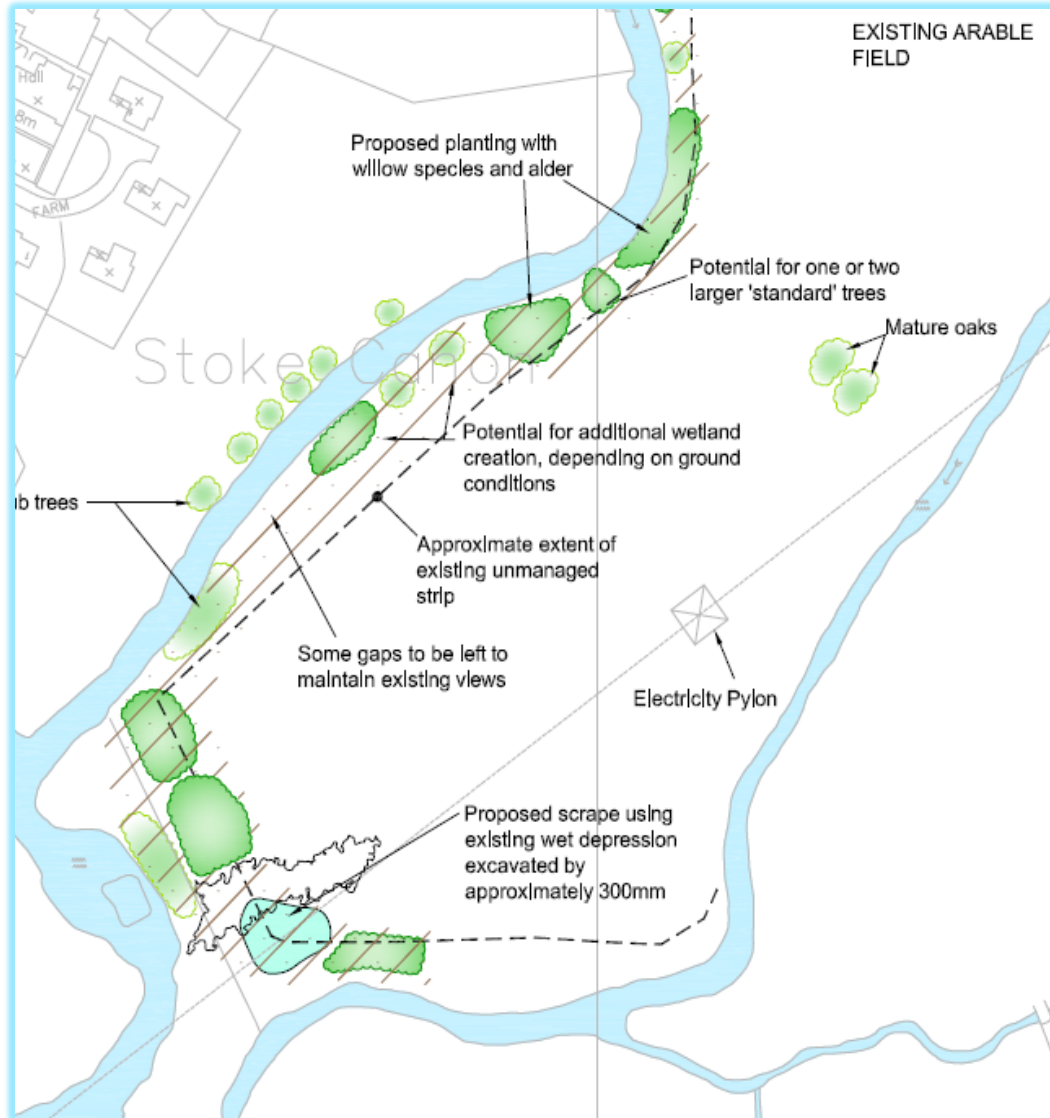
# UK flood risk management schemes - past and present



Smooth lines, concrete, trapezoidal banks, uniform channel

‘Green concrete’, no variation in profile, heavily maintained

# Missed opportunities



## Stoke Canon, Devon

- Enhancements planned, but not fully integrated early in design
- Collaboration with landowners not started early enough in process
- 'Too difficult' box, so plans scrapped

# Missed opportunities



## Perranporth, Cornwall

- Some minor enhancements done (a few scrapes)
- But, not integrated into scheme design
- Missed opportunities for a more innovative, multi-beneficial scheme

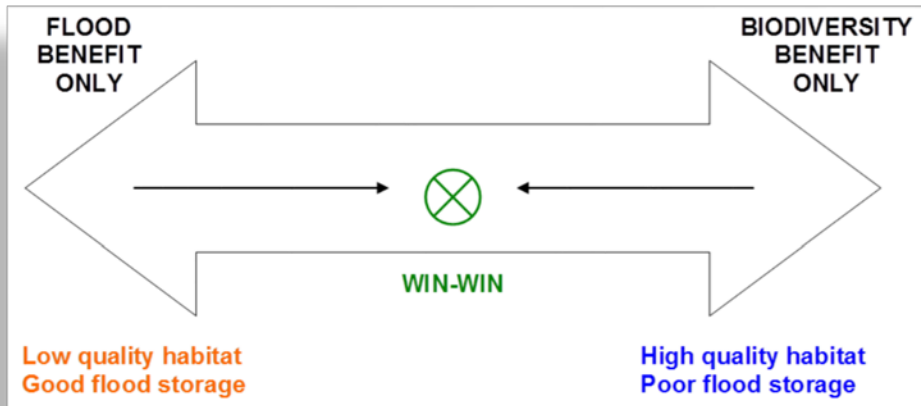
# Lots of opportunity!

## Lower Woodsford – river & floodplain restoration

- Lowered embankment and revetment removed
- Created a wetland mosaic
- Restored ditch to reduce drainage function
- Planted 20,000 trees (many planted by local school children)
- Deflector embankment protecting high voltage pylon
- Farm Manager asking about the 'next' project



## UK government steer on flood risk management funding



- Should not be used to fund stand-alone environmental schemes.
- Take a more integrated approach.
- Focus on multiple benefits, as well as primary aim of reducing flood risk
- Increase in natural flood management where appropriate ('Slowing the Flow')



**Integrated schemes:** creates a better place and maximises environmental outcomes for people and wildlife, respecting landscape character, aesthetics, recreation, navigation and heritage

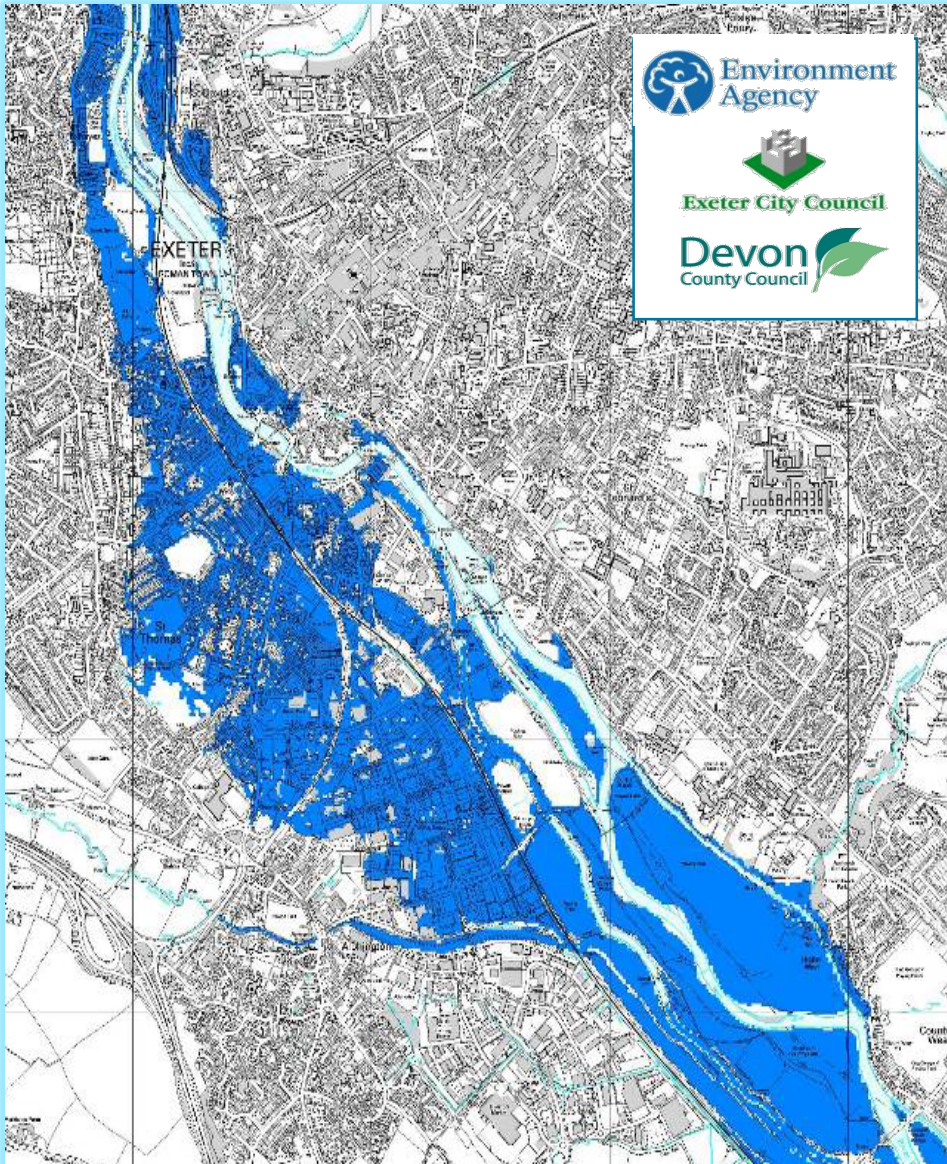
## How do we take this forward?

- Think more laterally and be creative.
- Seek synergies and multiple benefits for the best possible outcomes.
- Consider how to work more effectively with natural processes.
- Adopt the Ecosystem Approach to recognise *all* benefits and consider them during options appraisal.





# Exeter Flood Defence Scheme



## Overview of scheme

- Environment Agency, Exeter City Council, Devon County Council & Growth Fund partnership (all contributed to funding).
- CH2M Hill consulting engineers and site supervisors
- Total Cost = £31 million (~ \$43m)
- Initial scheme objectives:
  - Reduce the flood risk to Exeter
  - Minimise environmental impact
  - Maximise habitat 'enhancement' opportunities ???
- Planning and funding approval secured in 2013 - scheme given the green light.



### Go-ahead for flood defences



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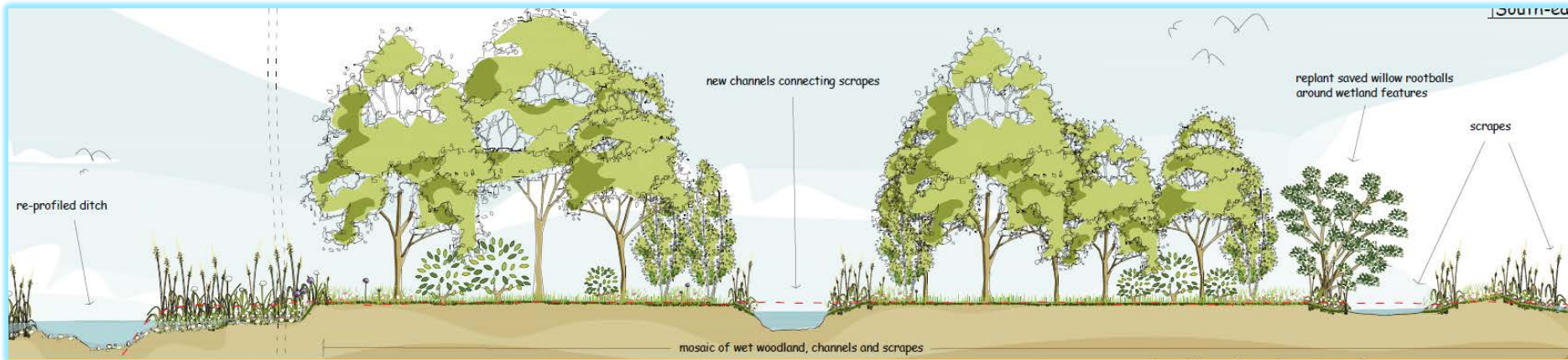
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# The importance of collaborative working



- Numerous environmental constraints.
- Workshops with partners and user groups
- Public and local community exhibitions & presentations
- One-to-one meetings with local residents (contentious issues)

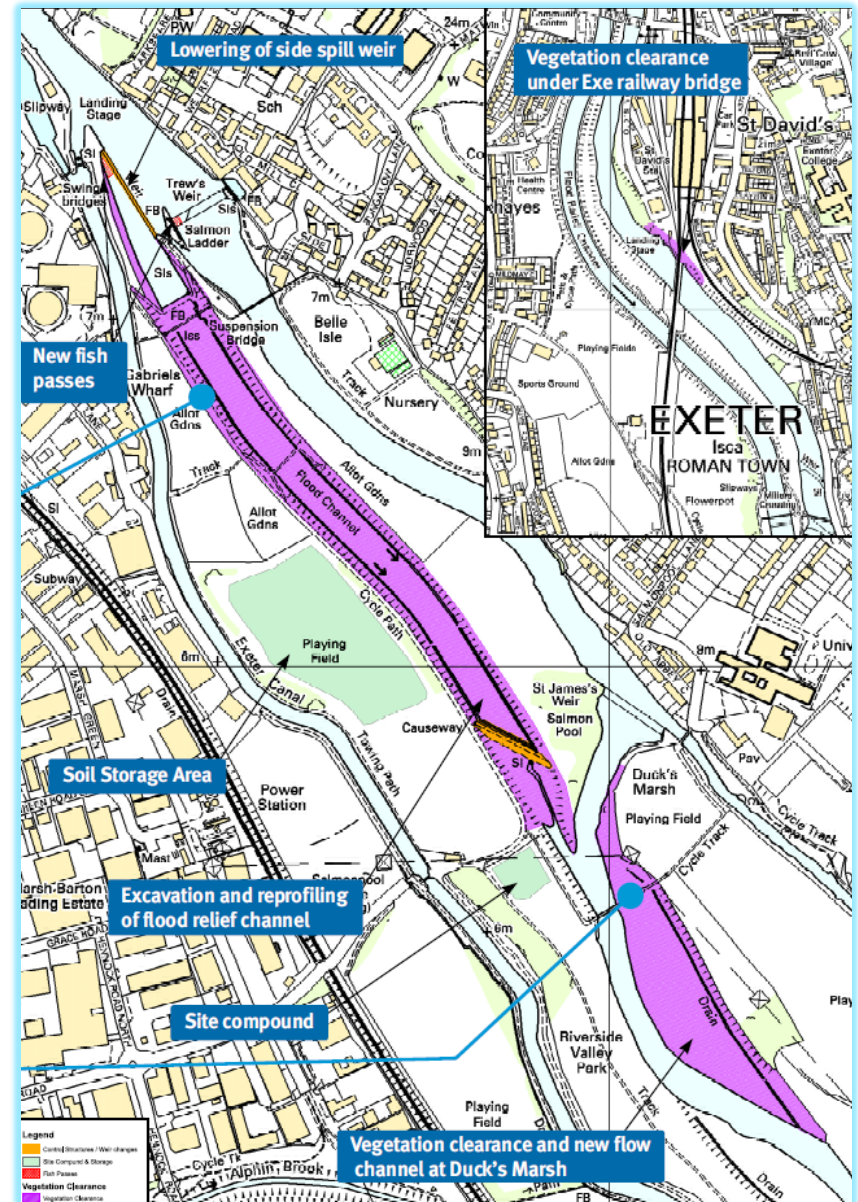
# Exeter FDS - Habitat mitigation (whole scheme)



- Replace lost habitats e.g. lowland meadows, lowland mixed deciduous woodland, wetlands, streams/ditches
- Replacement of trees & hedgerows – to ensure continuity of features
- Use of Exeter and East Devon 'Growth Point' Biodiversity Impact Calculator – to ensure habitat losses & gains correctly calculated

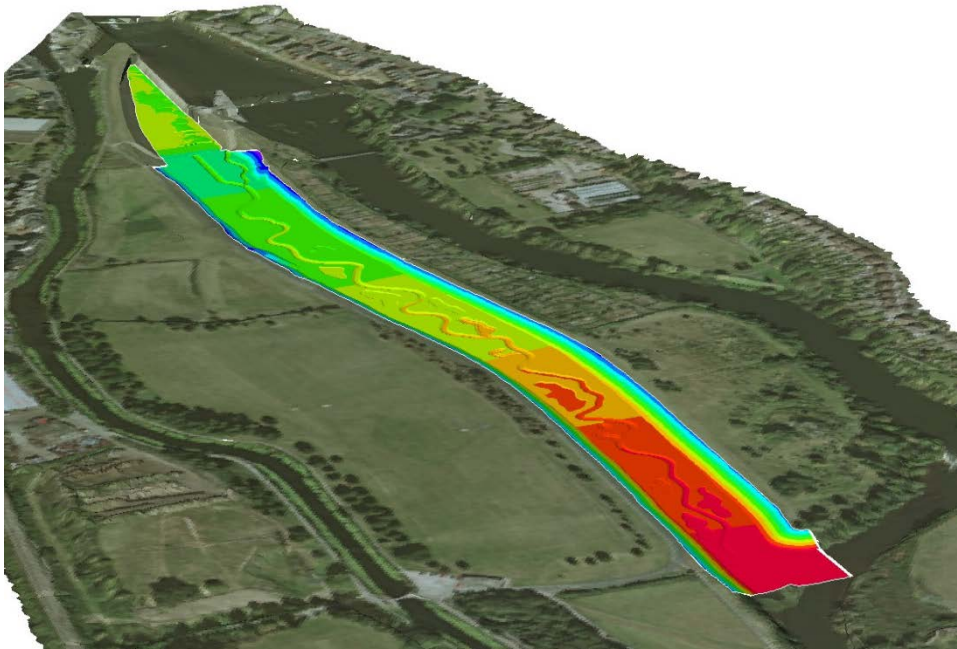
# Exeter FDS Phase 1 – Trews flood relief channel

- Existing flood relief channel
- Multi-functional design in a complex urban setting
- Multi-disciplinary client-consultant team to minimise risk and maximise opportunity.
- Habitat creation and restoration has been a vital part of scheme design
- Benefits included flood risk management, landscape, amenity, habitat, fish passage.



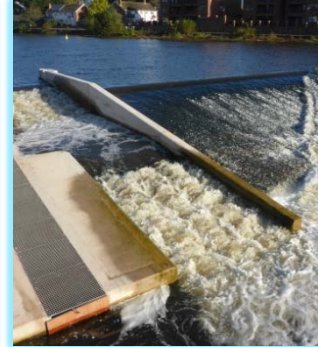
## Exeter FDS Phase 1 – integrated habitat design

- Inclusion of restoration ecologist as part of the design team vital for successful delivery of habitat targets.
- 3D computer modelling
- ‘Stop’ points during construction to allow review

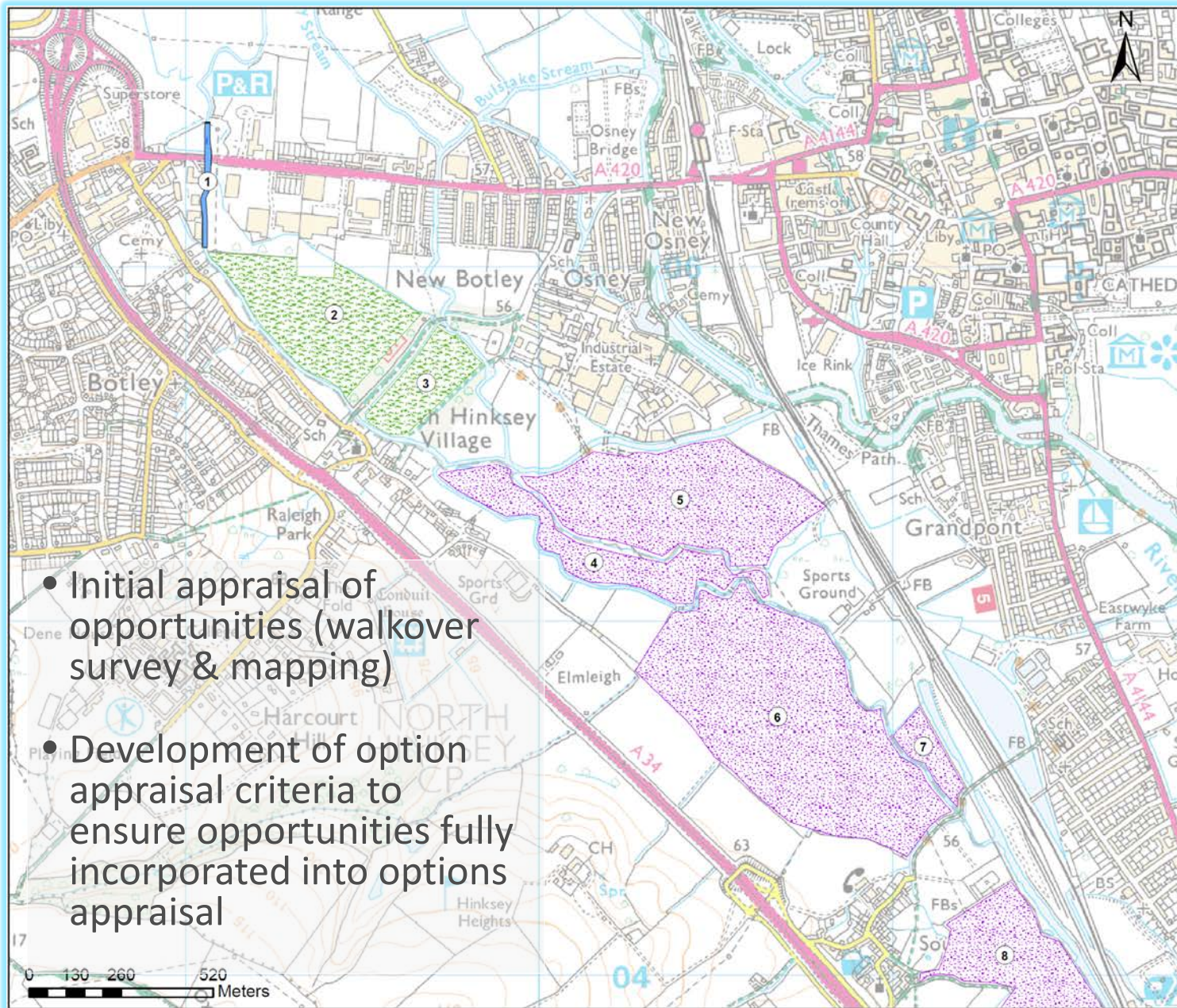


## Exeter FDS Phase 1 - Integrated habitat design

- Modifications to existing side spill inlet weir structure.
- Construction of two fish, eel and lamprey passes.
- 7 hectare (17acre) flood relief channel – improved flood conveyance and capacity
- Mosaic of wetland habitats
- Ecological design support during construction.



# Oxford Flood Alleviation Scheme



## Legend

### Biodiversity opportunities

- Existing habitat**
-  Community woodland
  -  Improved pasture
  -  Meadow
  -  River

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### Notes

This Plan provides an initial assessment of biodiversity opportunities. It incorporates opportunities highlighted in the Oxford Flood Risk Management Strategy and further ideas have been developed based on an initial walkover with Environment Agency specialists (June 2015) and using results of Extended Phase 1 Habitat Survey (June 2015).

The Plan is to be read in conjunction with Technical Note D1 (Biodiversity Opportunities and Design Principles) and is intended to provide an initial overview for discussion.

<b>For review and discussion</b>					
Rev.	By	Date	Reason	Date	Signature

Environment Agency  
 Flood Alleviation  
 Oxford Flood Alleviation Scheme  
 Phase 1  
 Biodiversity Opportunities

02/04/2015  
 Oxford Flood Alleviation Scheme  
 Phase 1  
 Biodiversity Opportunities

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Project:  
 Oxford Flood Alleviation Scheme

Drawing:  
 Biodiversity opportunities  
 - preliminary locations.

Drawn By:	JG	Date:	27/07/2015
Checked By:	DM	Date:	27/07/2015
Approved By:		Date:	27/07/2015

Drawing no.:  
 Plan 1(a) - north reach

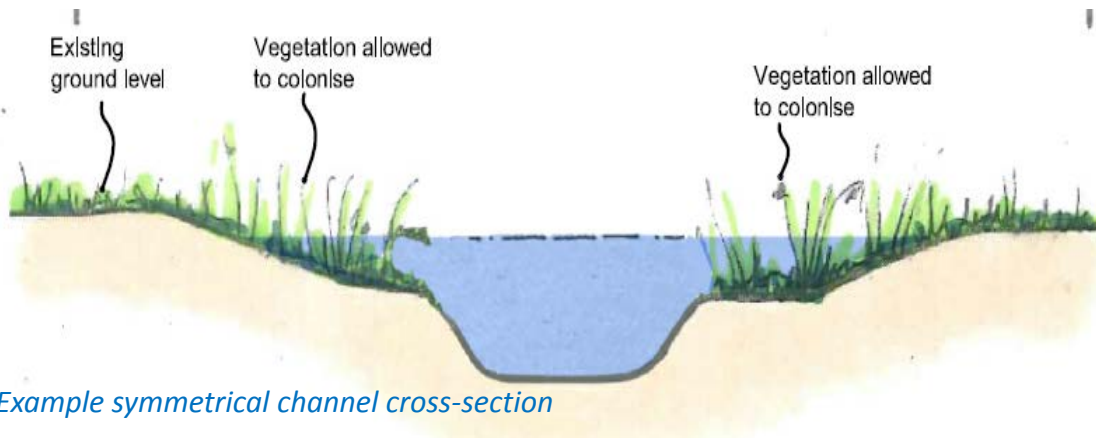
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- Initial appraisal of opportunities (walkover survey & mapping)
- Development of option appraisal criteria to ensure opportunities fully incorporated into options appraisal

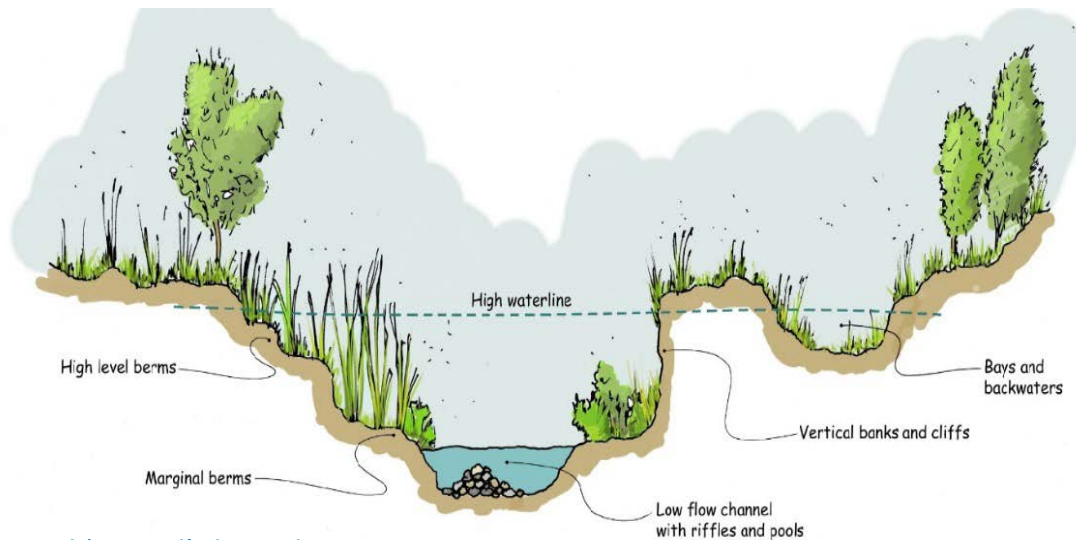
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# Oxford Flood Alleviation Scheme



*Example symmetrical channel cross-section*



*Typical 'natural' channel cross-section*

## Design principles agreed with partners:

- Maximise variation in bank and channel profile
- Incorporate wetland features where possible.
- Drain connected features towards the main channel to avoid fish entrapment
- Plant with native, locally characteristic species that will flatten during floods
- Allow flexibility in designs

## Top tips for integrating habitat restoration into scheme design ...

- ✓ **Get the right team in-place.**
- ✓ **Develop and agree ecological designs principles and concepts**
- ✓ **Use local knowledge and involve ecological expertise**
- ✓ **Form partnerships**
- ✓ **Make sure an ecologist is fully integrated into the detailed design team**
- ✓ **Communicate the concept that ‘change is okay’**

Thank you for listening!

Have a safe journey home

