ARCADIS Design & Consultancy for natural and built assets

THE ROLE OF FLOOD MODELLING IN RESILIENT DESIGN

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Content

- What is flood modelling?
- How can it be used to support development?
- Trans Pennine example

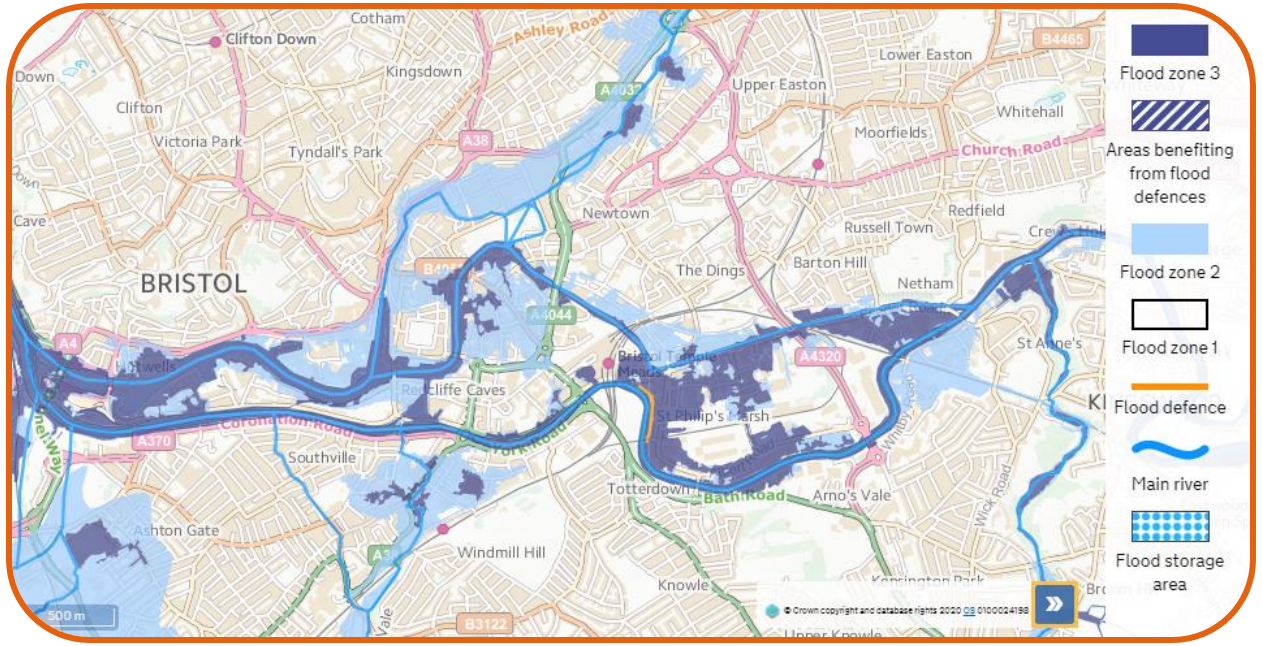
Note: The works presented here are based on the Arcadis design of 2018, the design has since progressed and the scheme currently being consulted on is different to the solution presented here.

What is flood modelling?

- Simulating where water would go in the event of flooding from various sources (river / sea / surface water / reservoir)

- Varying level of detail – catchment wide to site specific

- Outputs seen in the Environment Agency's Flood Map for Planning (i.e. Flood Zones 2 and 3)



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How can it be used to support development?

1. Improve understanding of existing conditions

2. Assessing future risk (with development and with climate change)

3. Gain understanding of the impact of the development

4. Evaluate mitigation options

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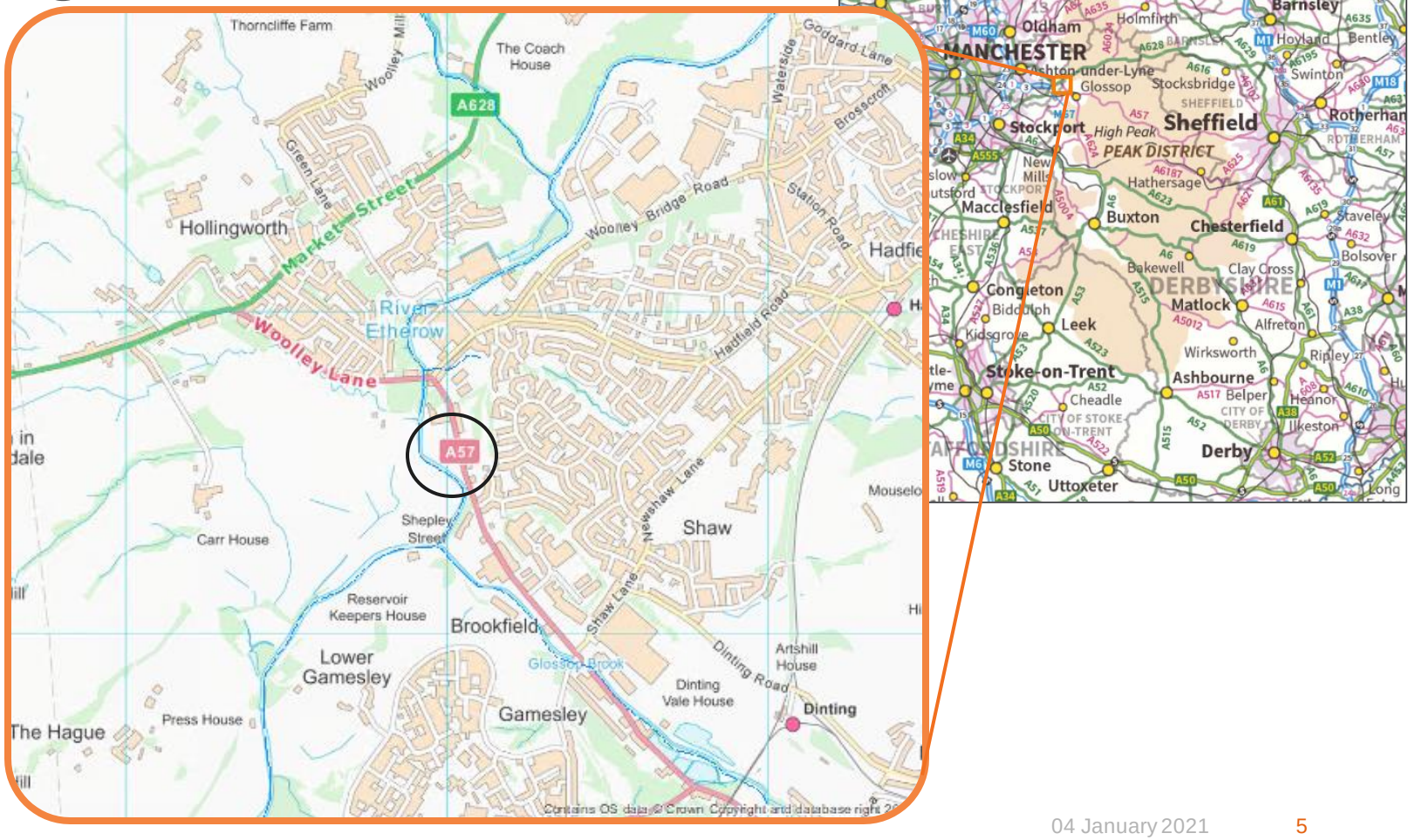
Trans Pennine Upgrade

A57 – Woolley Bridge Junction

- New A57 junction and bridge
- River Etherow
- Glossop Brook



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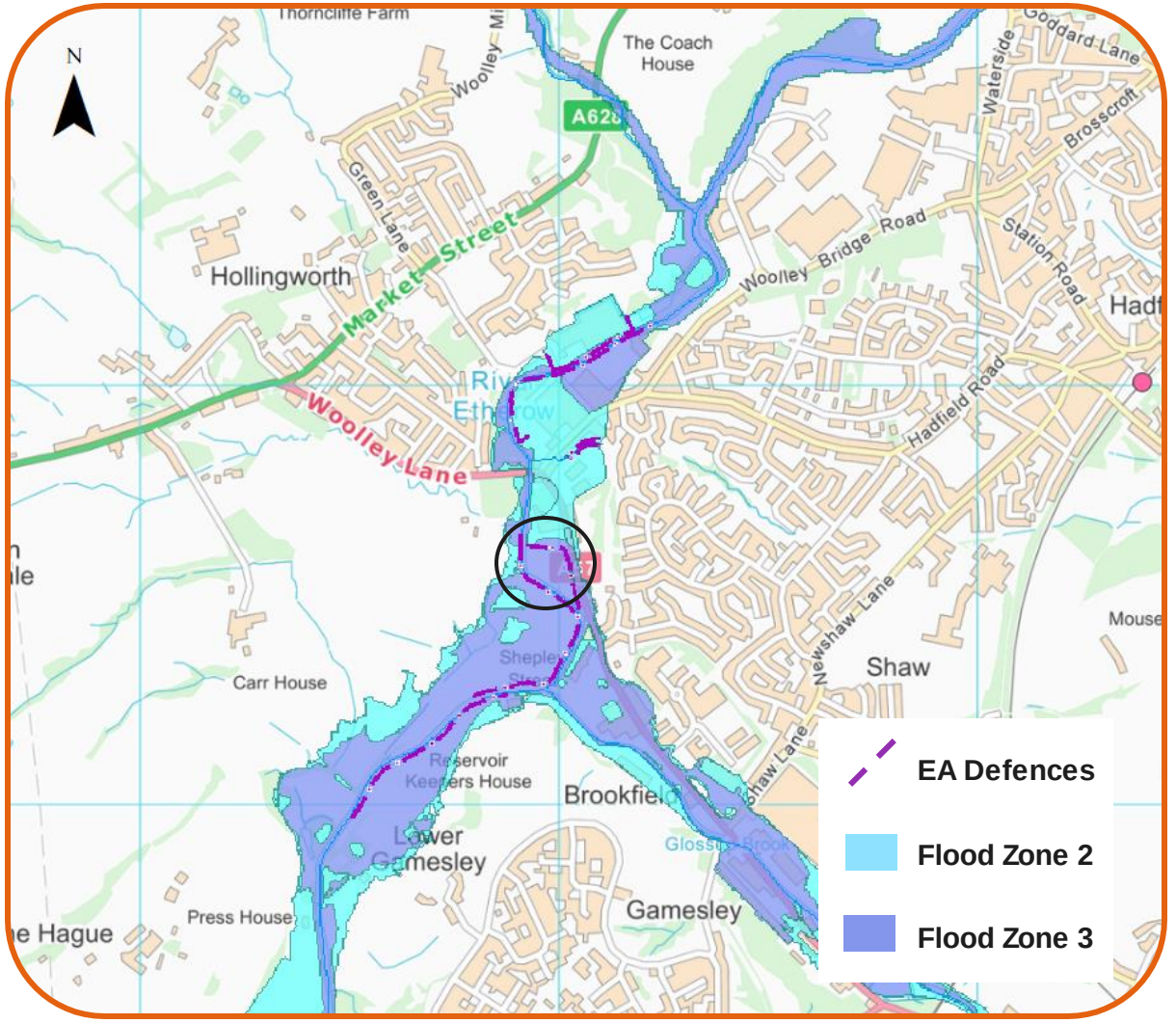
Trans Pennine Upgrade

- New road embankment will extend into Flood Zones 2 and 3
- Flooding in this area recorded on average three times a year
- Existing defences



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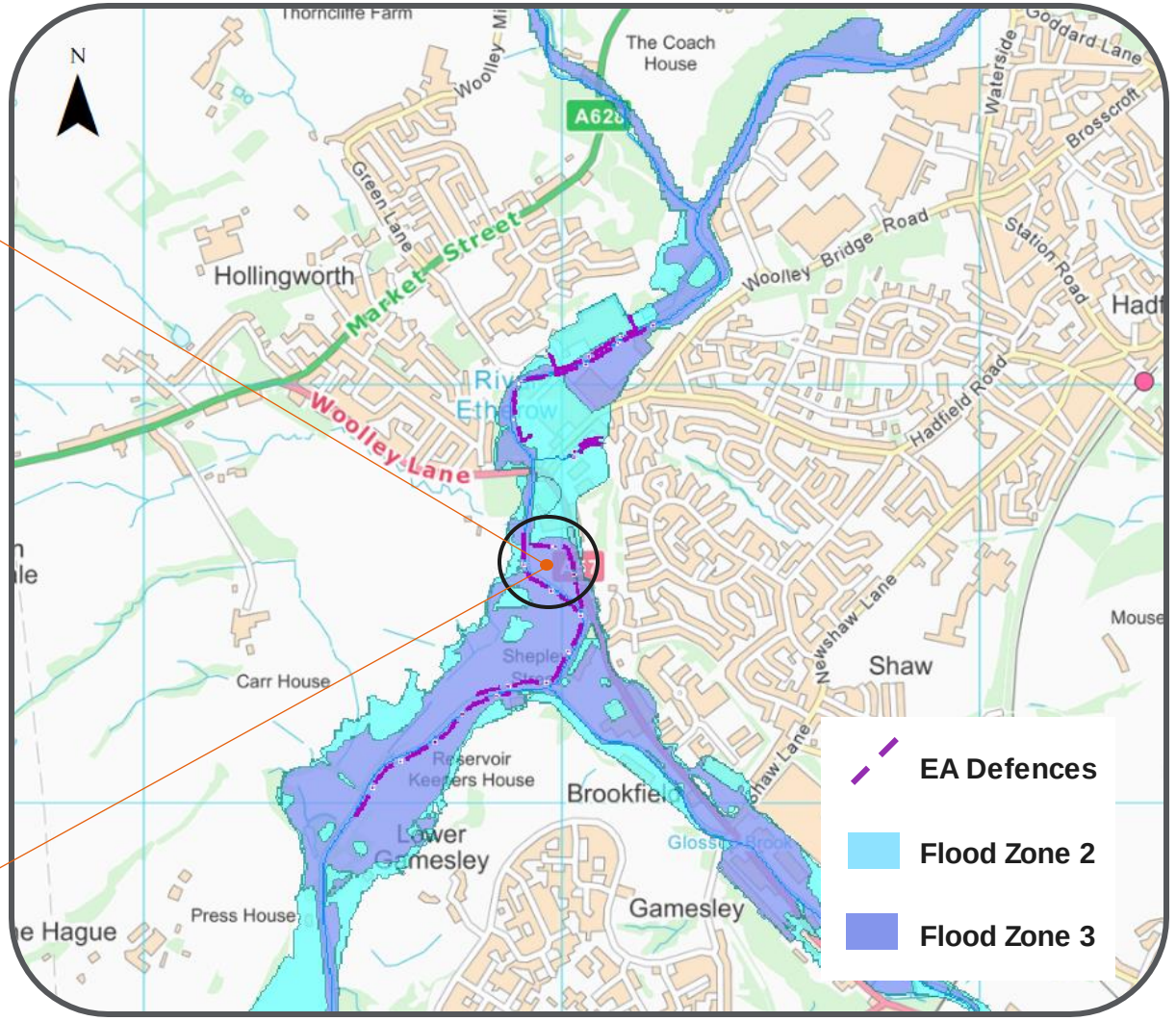
Trans Pennine Upgrade



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Trans Pennine Upgrade
My Role

- Scheme design stage

- Update existing flood model
  - Baseline
  - With Scheme (current risk)
  - With Scheme (future risk)

- Understand requirement for mitigation and test options

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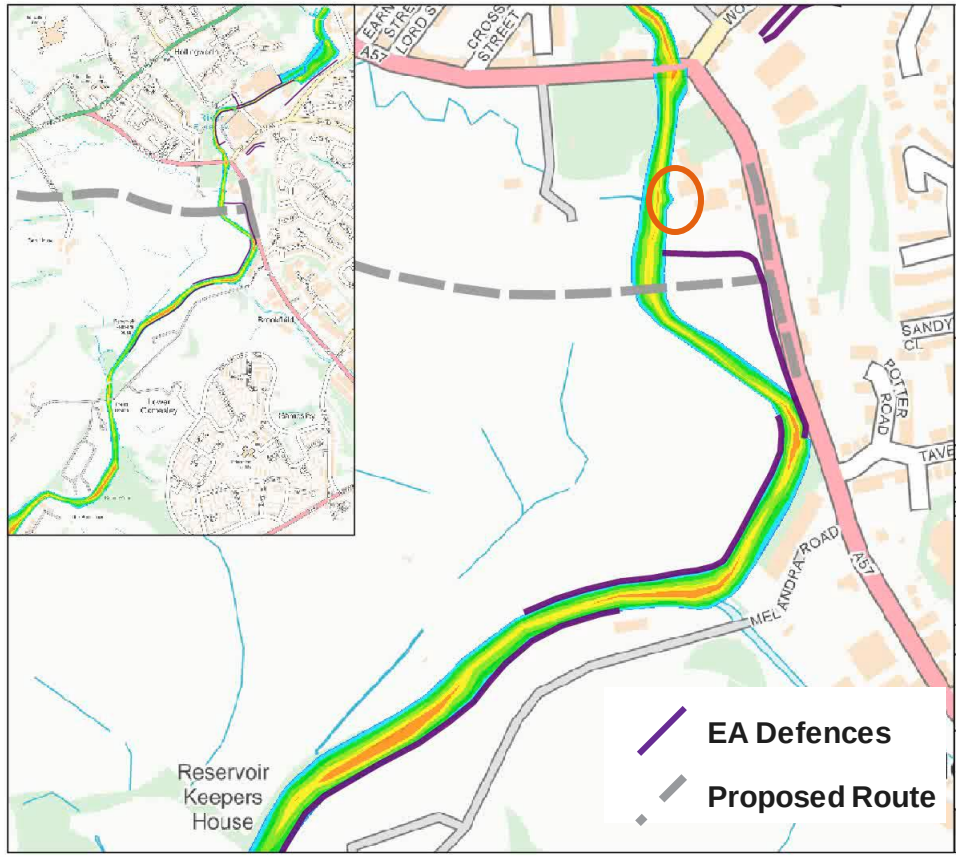
Existing conditions



- Flooding occurs at proposed development site
- Flooding bypasses the defence on the left bank
- Low spot on left bank

Improve understanding of existing conditions

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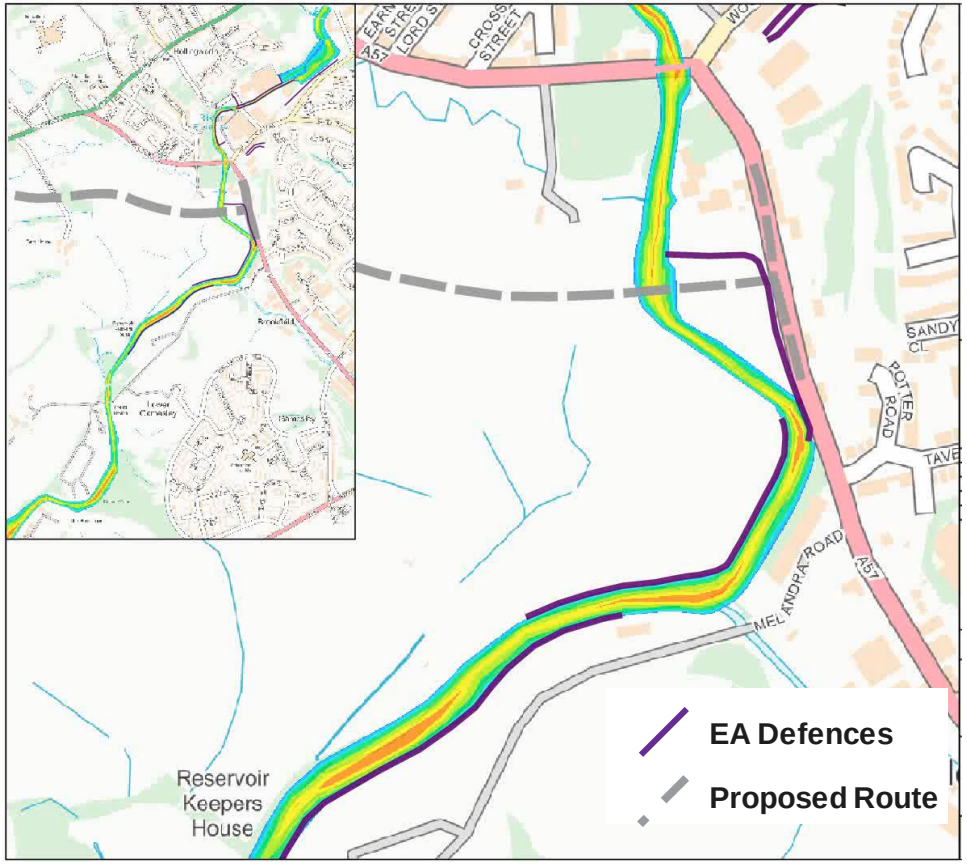
With-Scheme



- New road is elevated above the floodplain
- Freeboard between bridge soffit and river level
- New embankment blocks existing flow routes
- Existing defence is still bypassed

Gain understanding of the impact of the development

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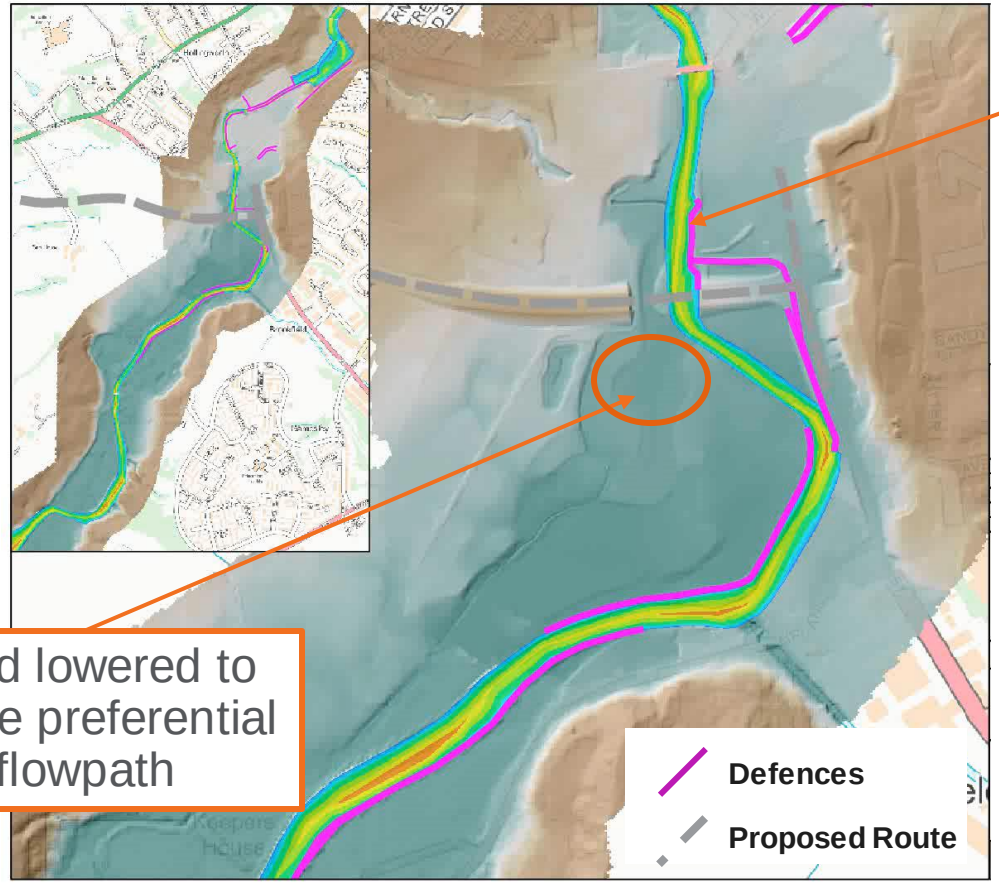
With Mitigation



Raising low spot on left bank

Land lowered to create preferential flowpath

- No requirement to fix existing problem
- Requirement to offset the increase we were going to cause

Evaluate mitigation options

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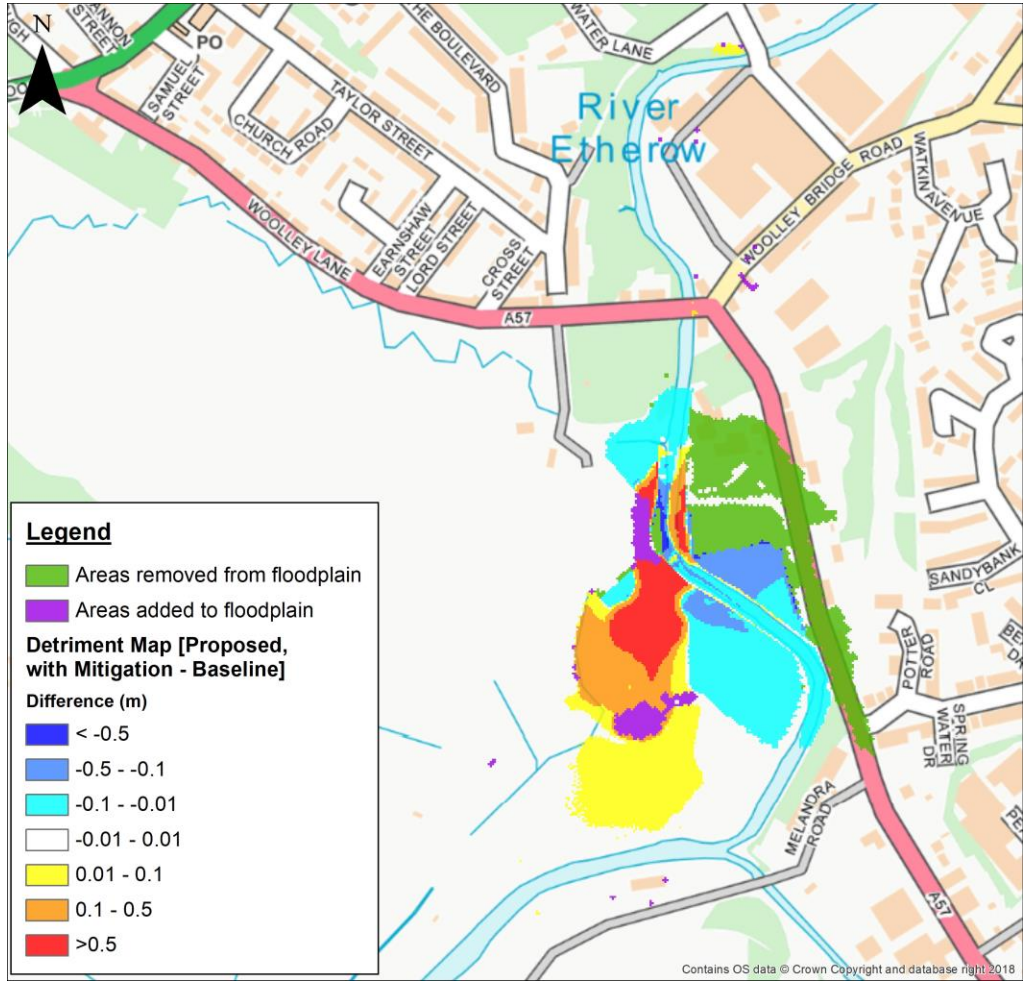
With Mitigation



With flood modelling, we were able to demonstrate:

- A resilient design, accounting for the impacts of climate change
- Volume for volume flood compensation provided
- No detrimental impacts outside of scheme limits

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Summary

- Flood modelling can be used to improve the understanding of existing and “with-development” flood risk

- Flood risk management should be considered early on in the design process

- With the help of flood modelling, as part of the Trans Pennine project, we were able to improve the long term resilience of the scheme and the surrounding area

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Thank you for listening

Any Questions?