the River Restoration Centre

Working to restore and enhance our rivers

Delivering River Restoration: Recipes for Success

13TH ANNUAL NETWORK CONFERENCE

Restoring Europe's Rivers

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Anastomosing on the River Trent: an update on river response

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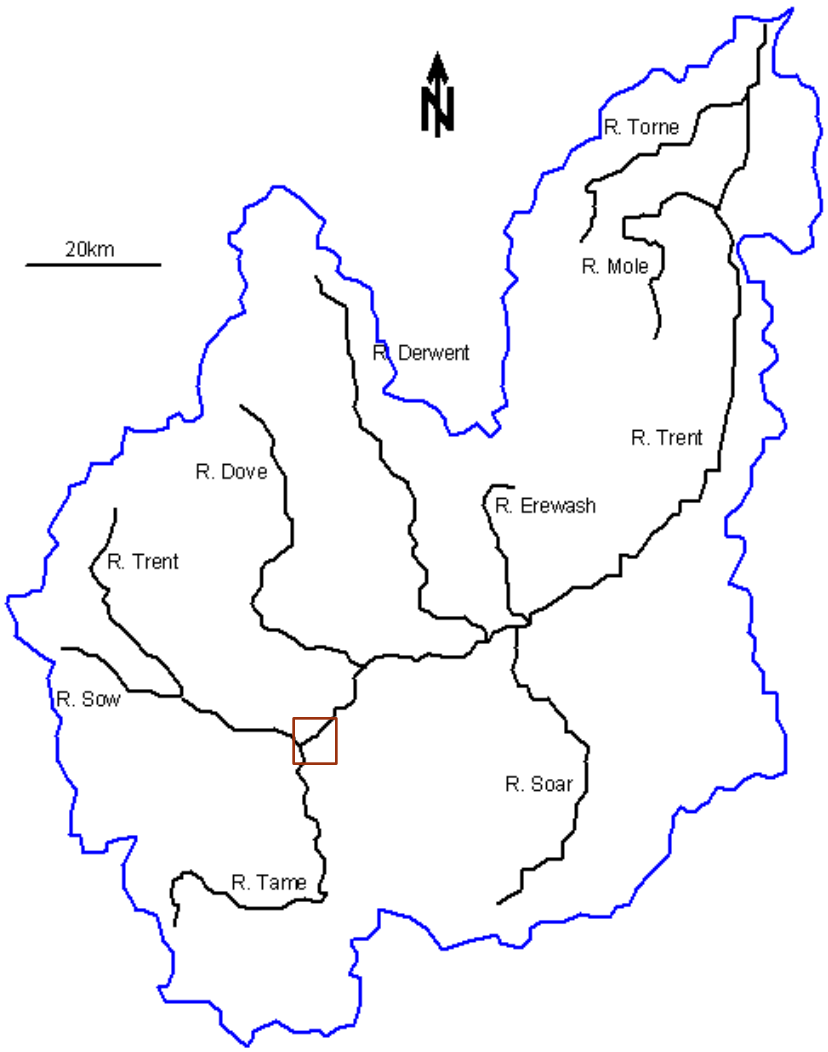
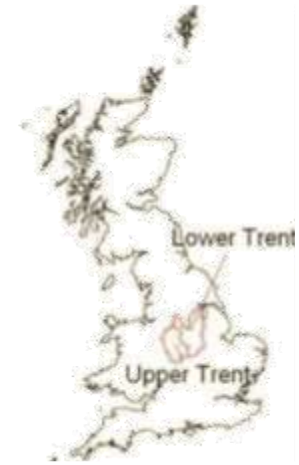
University of Salford MANCHESTER

JBA consulting

River Trent Catchment





River Trent Catchment

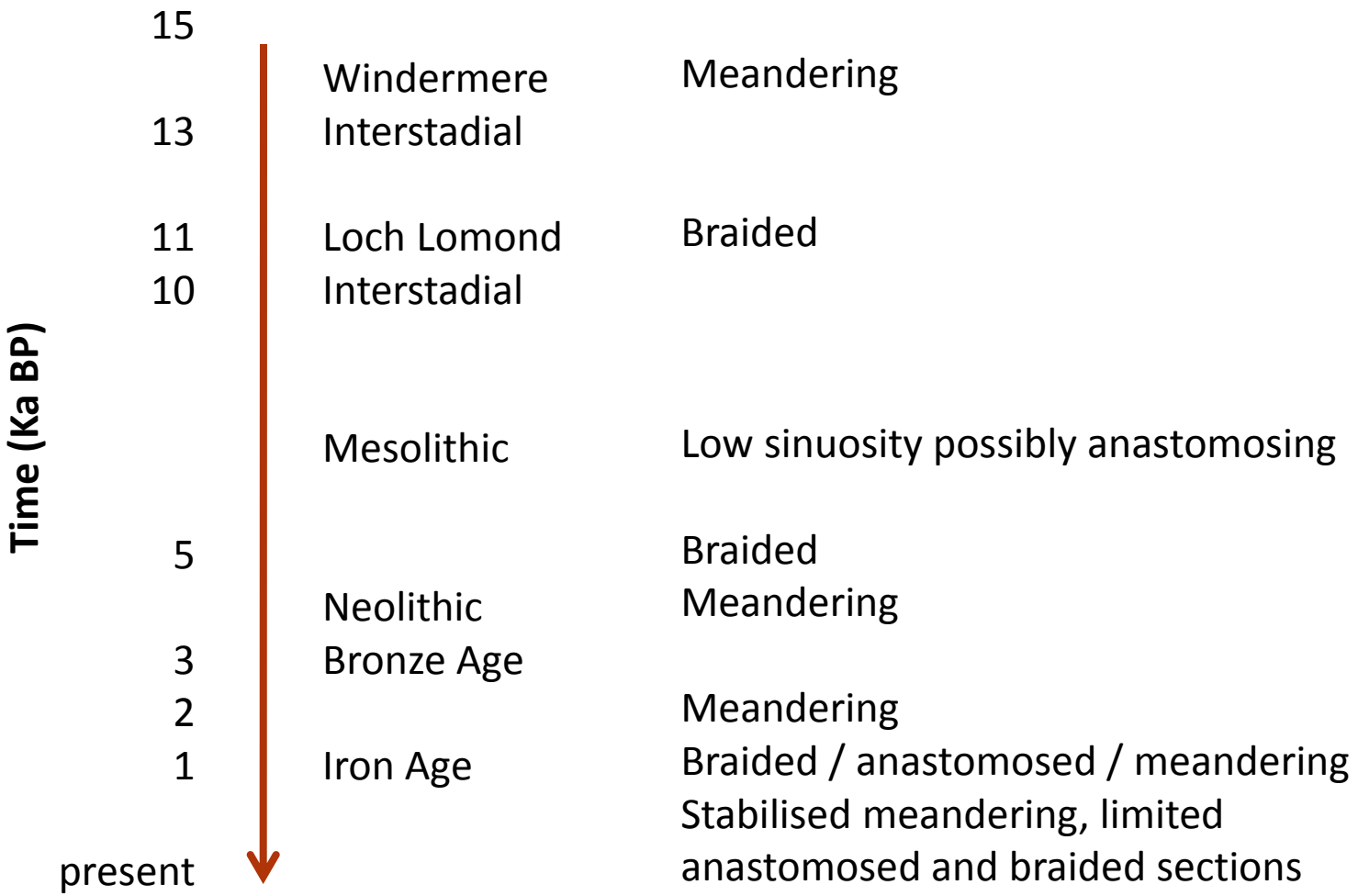
- Drains around 10,500 km^2 central England
- 2272 km^2 tidal influenced
- Subcatchments include Rivers; Sow, Tame, Dove, Derwent, Soar and Erewash
- **Mixed geology**; Limestones, sandstone, mudstones
- **Highly urbanised**; Birmingham, Nottingham Derby, Leicester and Stoke

River Trent Paleomorphology

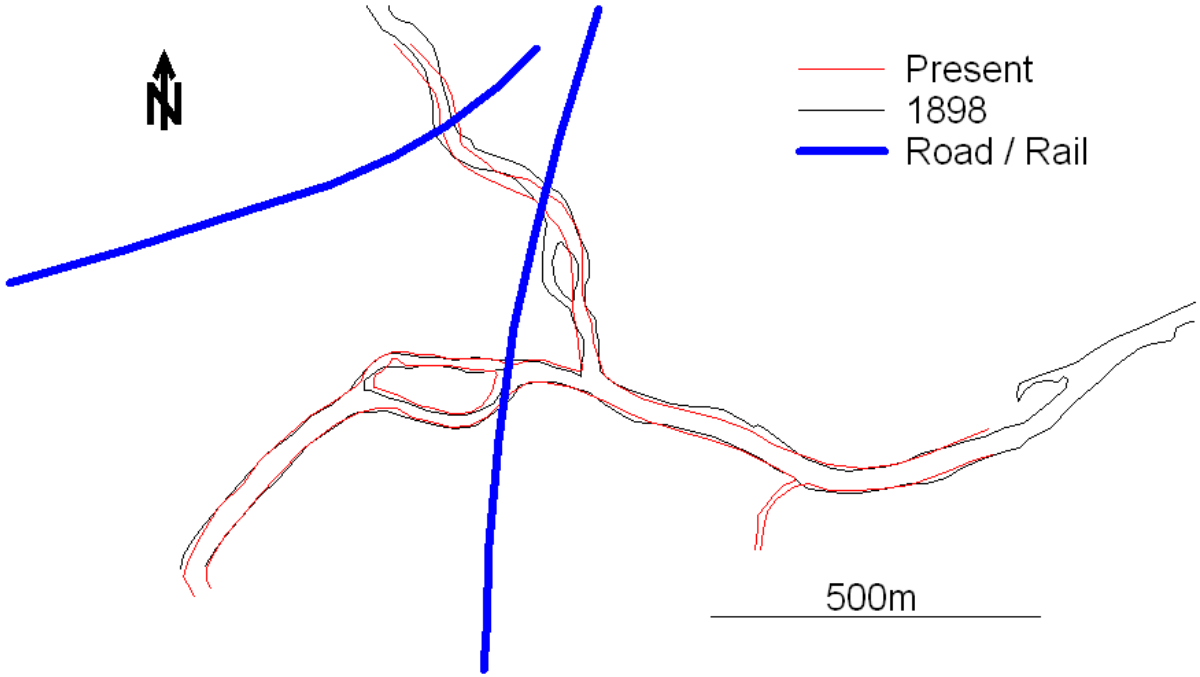
- R. Trent and tributaries tendency to braid and split to create gravel shoals and islands
- Important for biodiversity

Willington

Swarkstone


Epoch
Channel behaviour
Time (Ka BP)
15
13
11
10
5
3
2
1
present
Windermere Interstadial
Loch Lomond Interstadial
Mesolithic
Neolithic
Bronze Age
Iron Age
Meandering
Braided
Low sinuosity possibly anastomosing
Braided
Meandering
Meandering
Braided / anastomosed / meandering
Stabilised meandering, limited anastomosed and braided sections

River Trent-Tame confluence

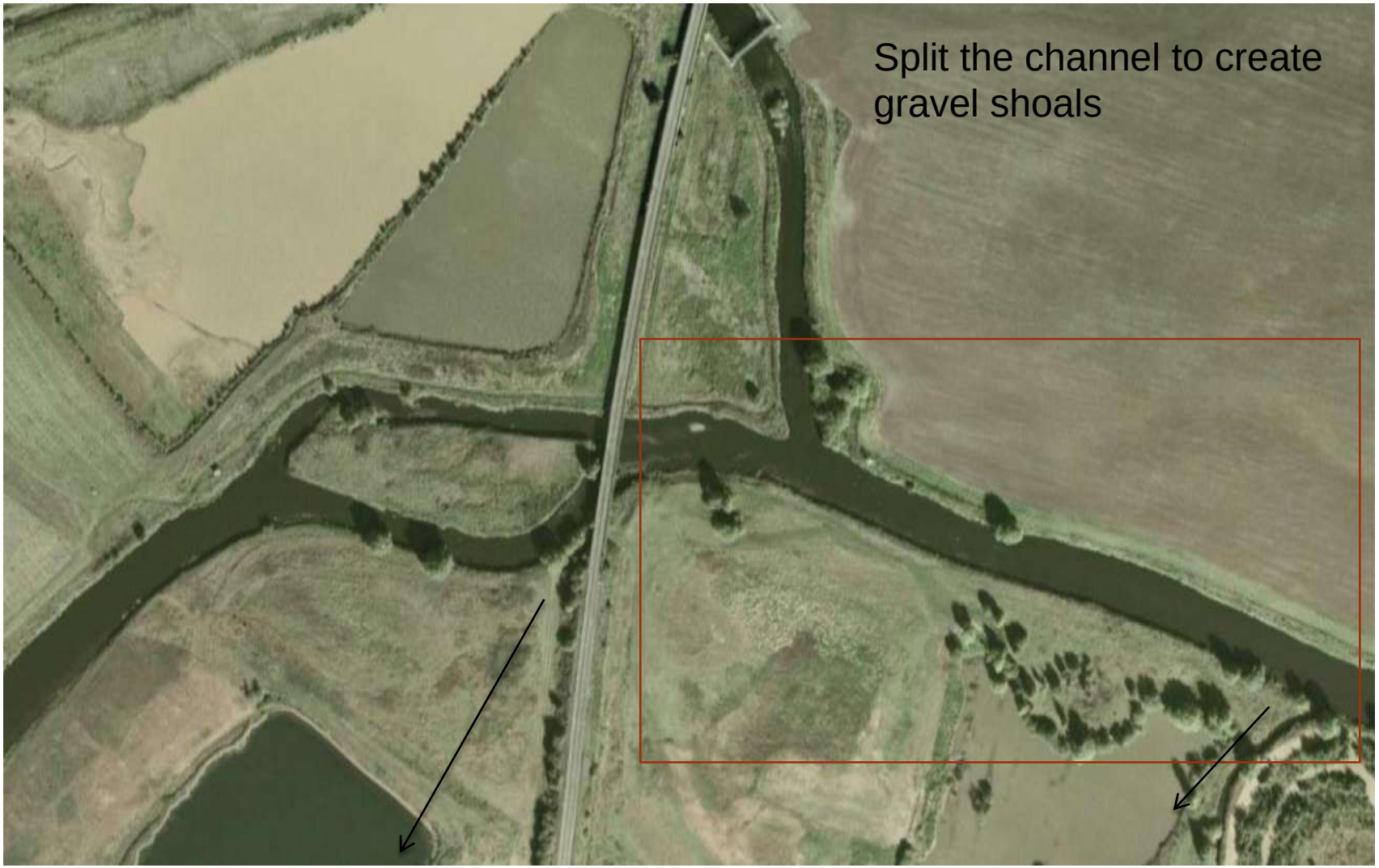


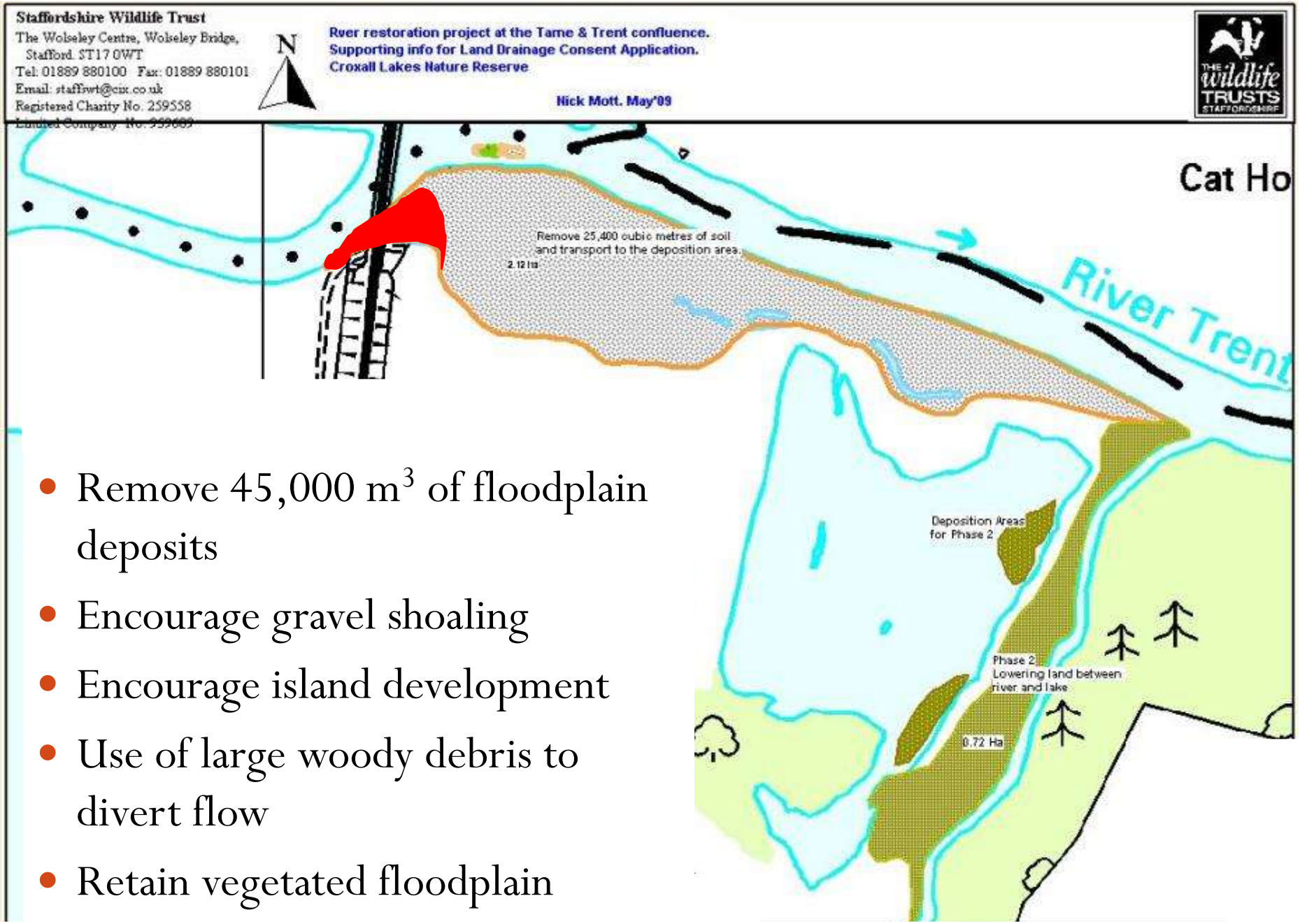
Why restore?

- Long, stable, canalised channel
- Disconnected from flood plain
- Morphologically uninteresting
- Limited biodiversity


Drayton Bassett (upstream)

Restoration

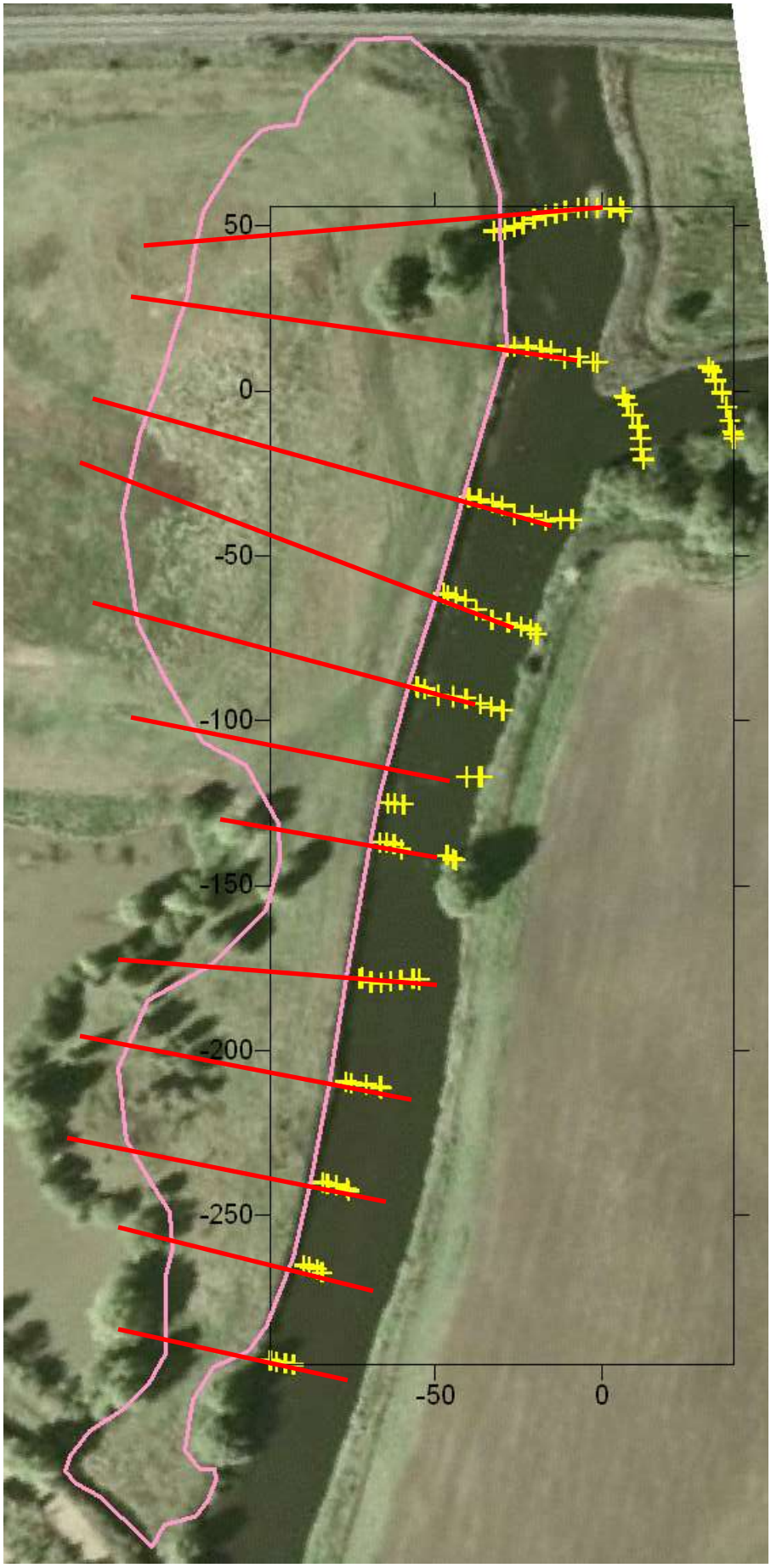


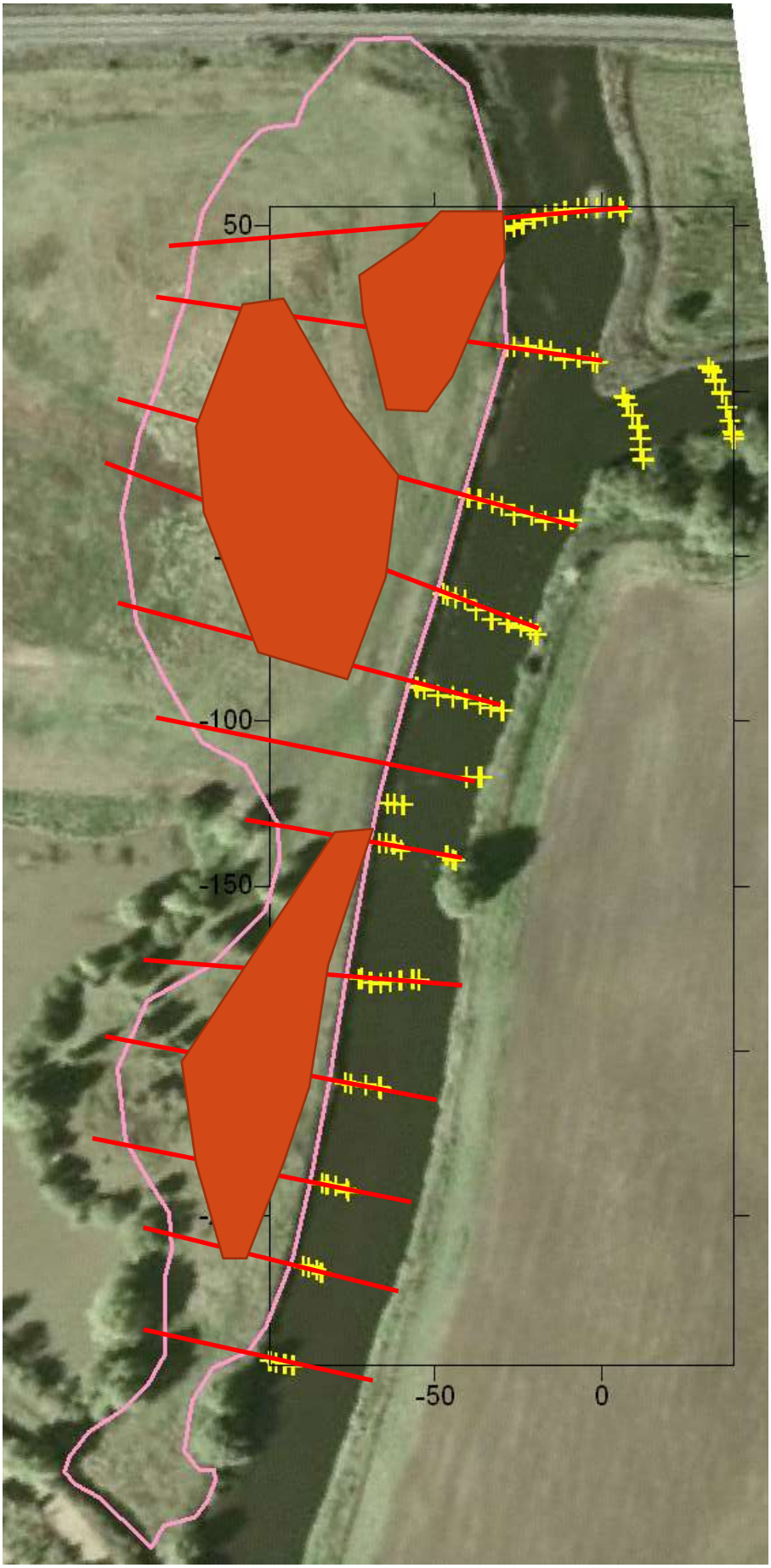


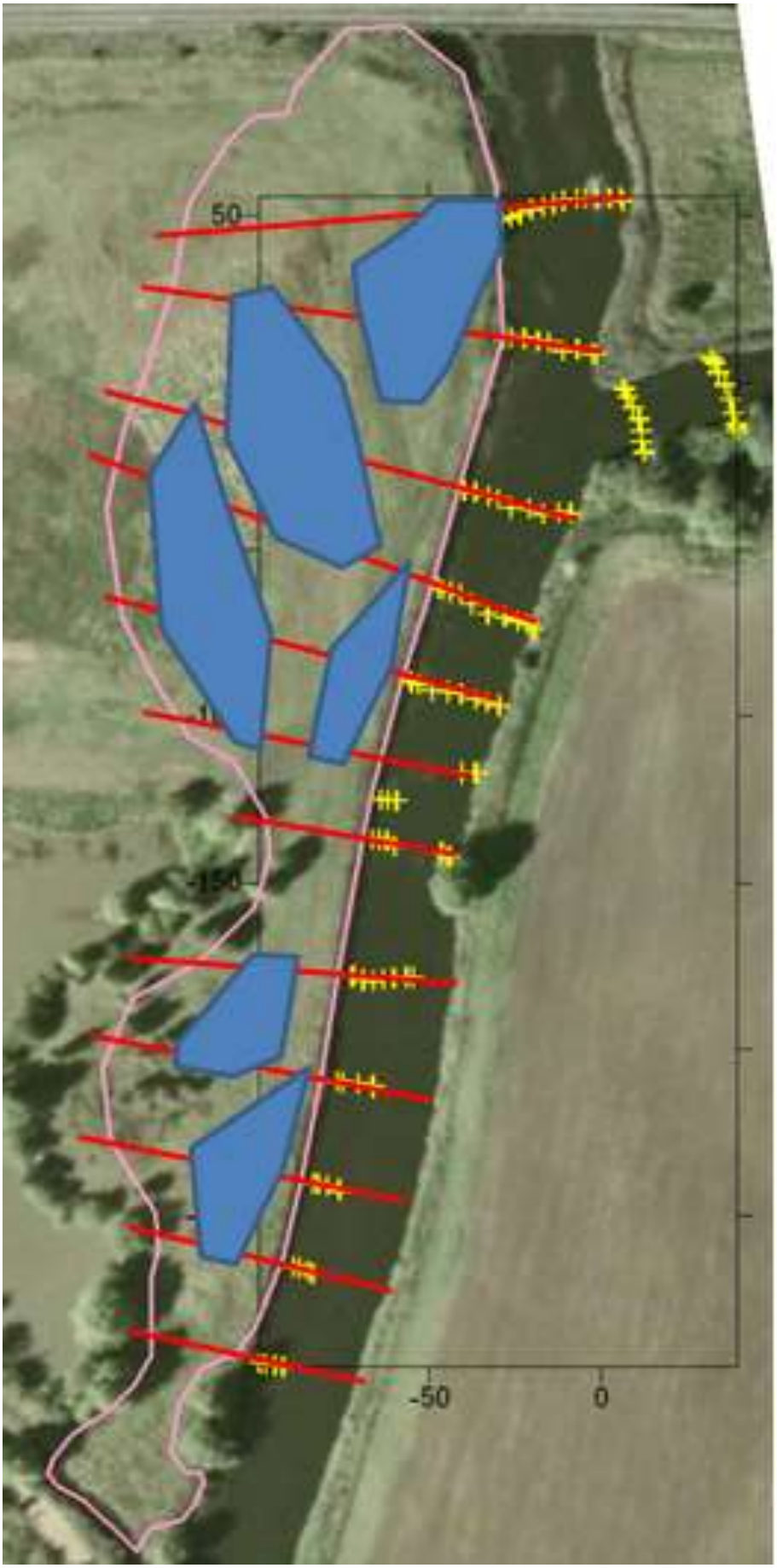
- Remove 45,000 m^3 of floodplain deposits
- Encourage gravel shoaling
- Encourage island development
- Use of large woody debris to divert flow
- Retain vegetated floodplain

Geomorphological assessment of River Trent modelling

- To obtain general values of flow depth & velocity for
  - Low summer base flow of 20 m^3s^{-1}
  - Median flow of 50 m^3s^{-1}
  - Bankfull flow of 130 m^3s^{-1}


50
0
-50
-100
-150
-200
-250
-50
0


50
-100
-150
-50
0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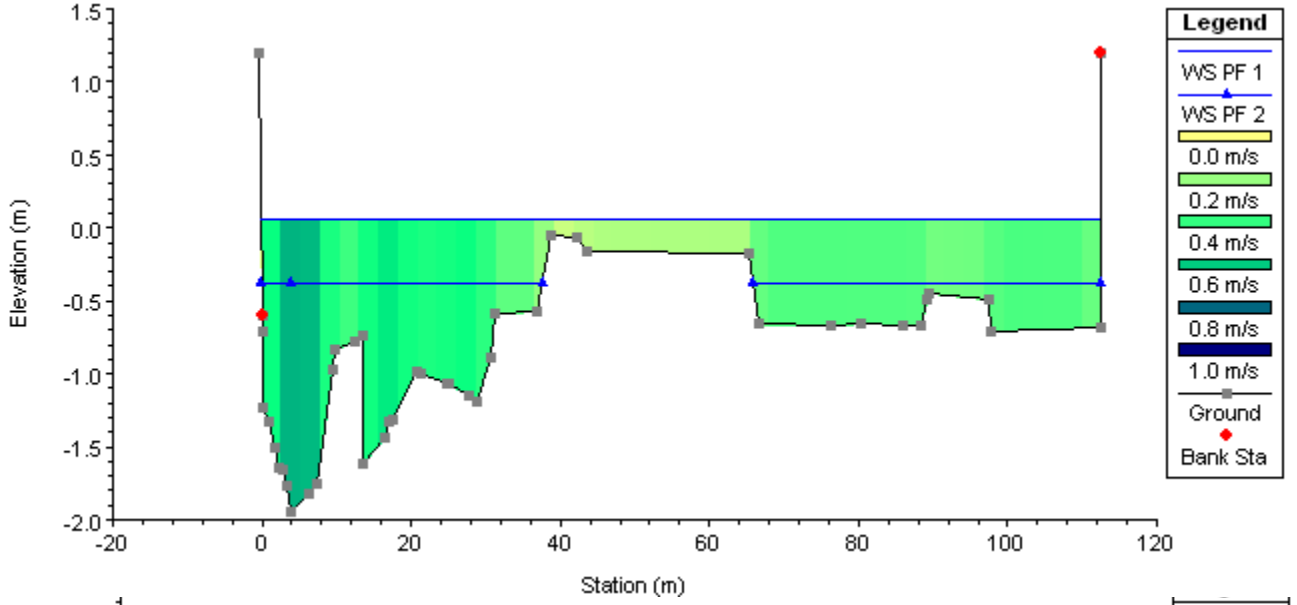
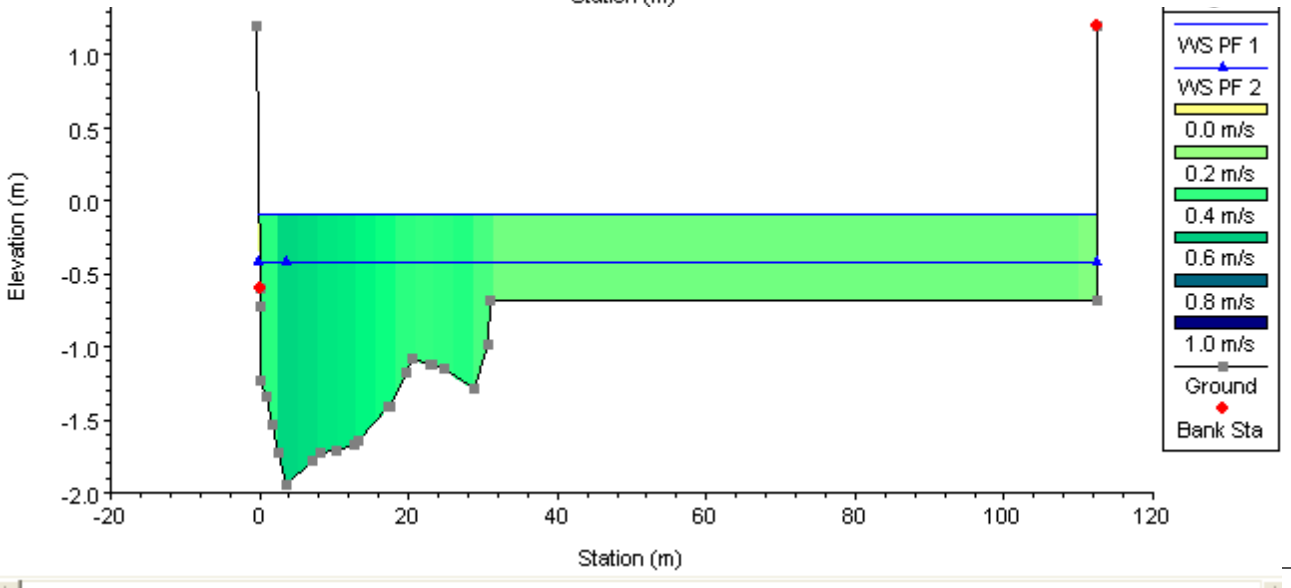
1D modelling





View Day 1

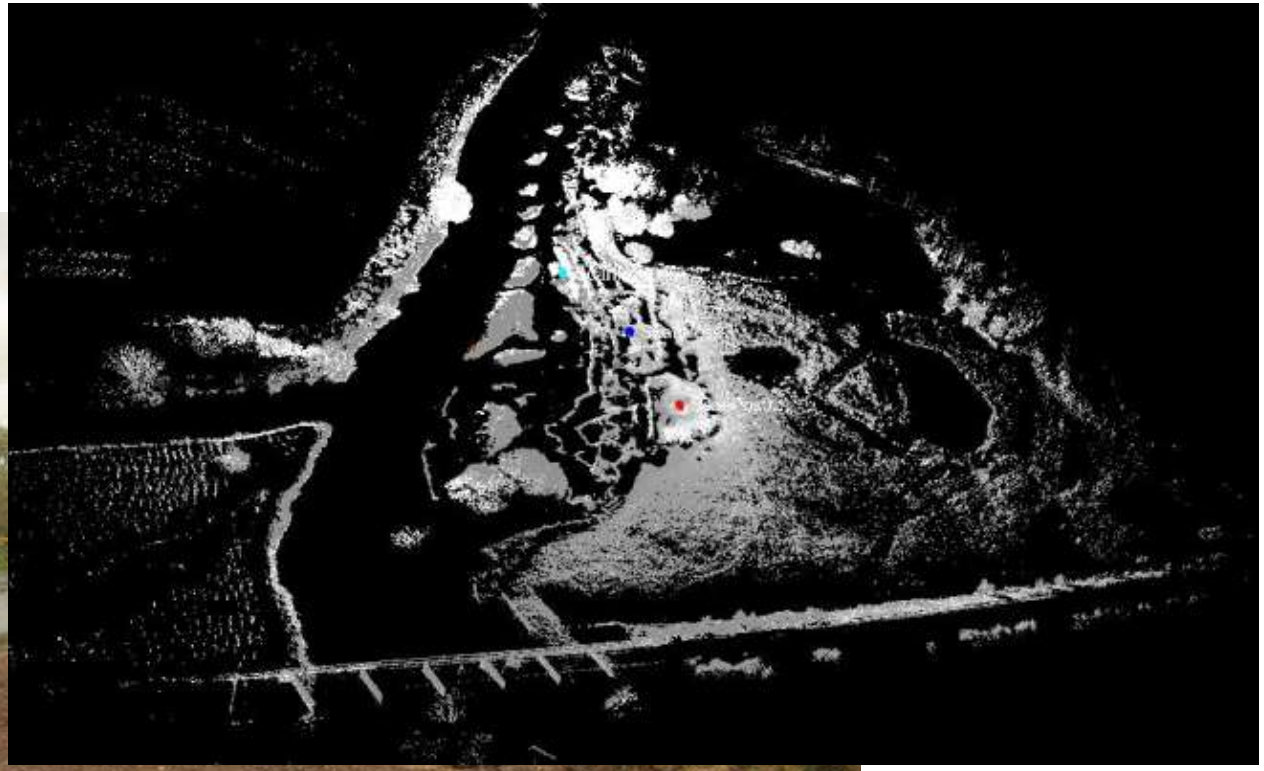
View Day 20

Re-profiling

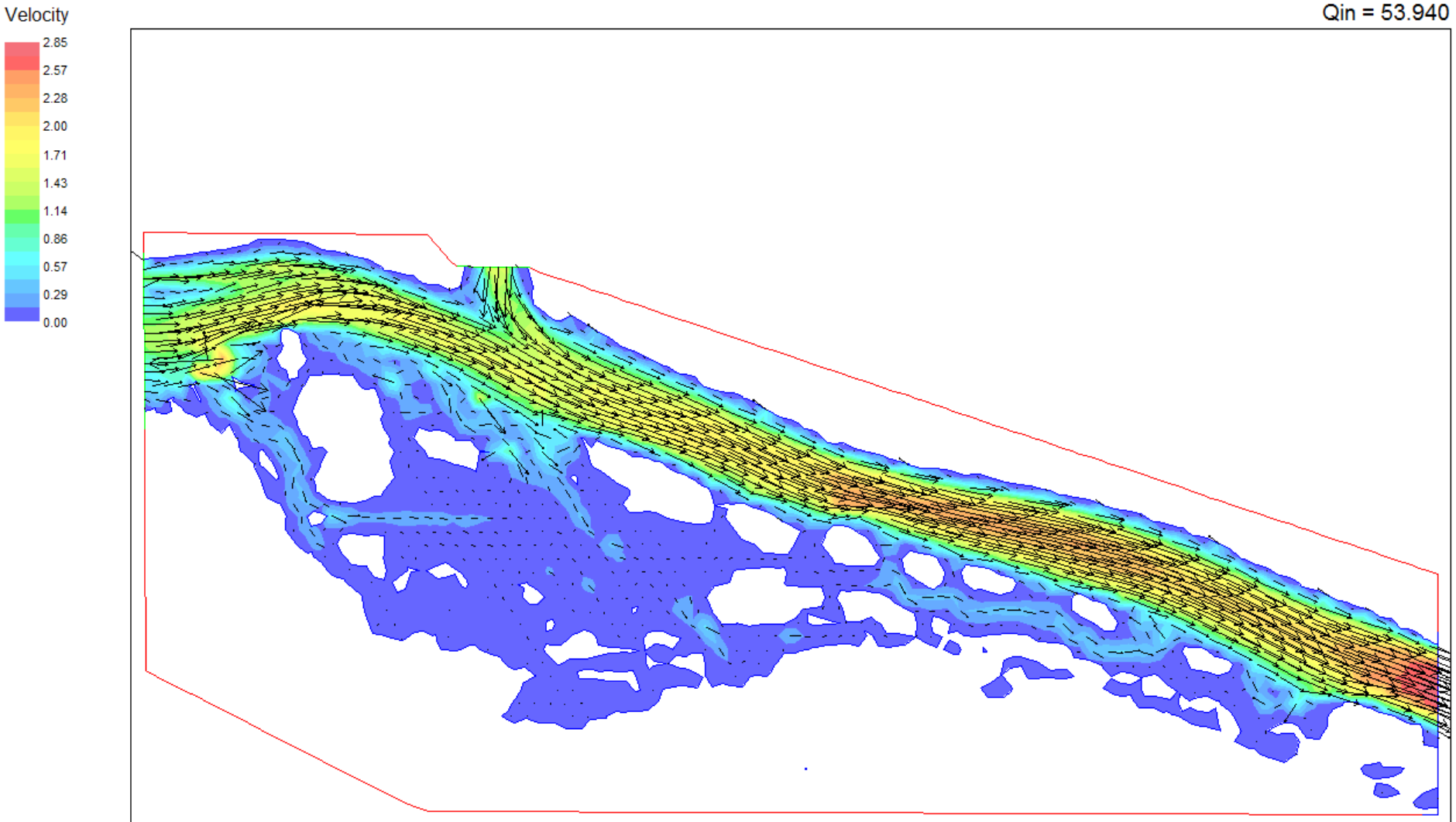
View upstream before works

Gravels retained for re-positioning

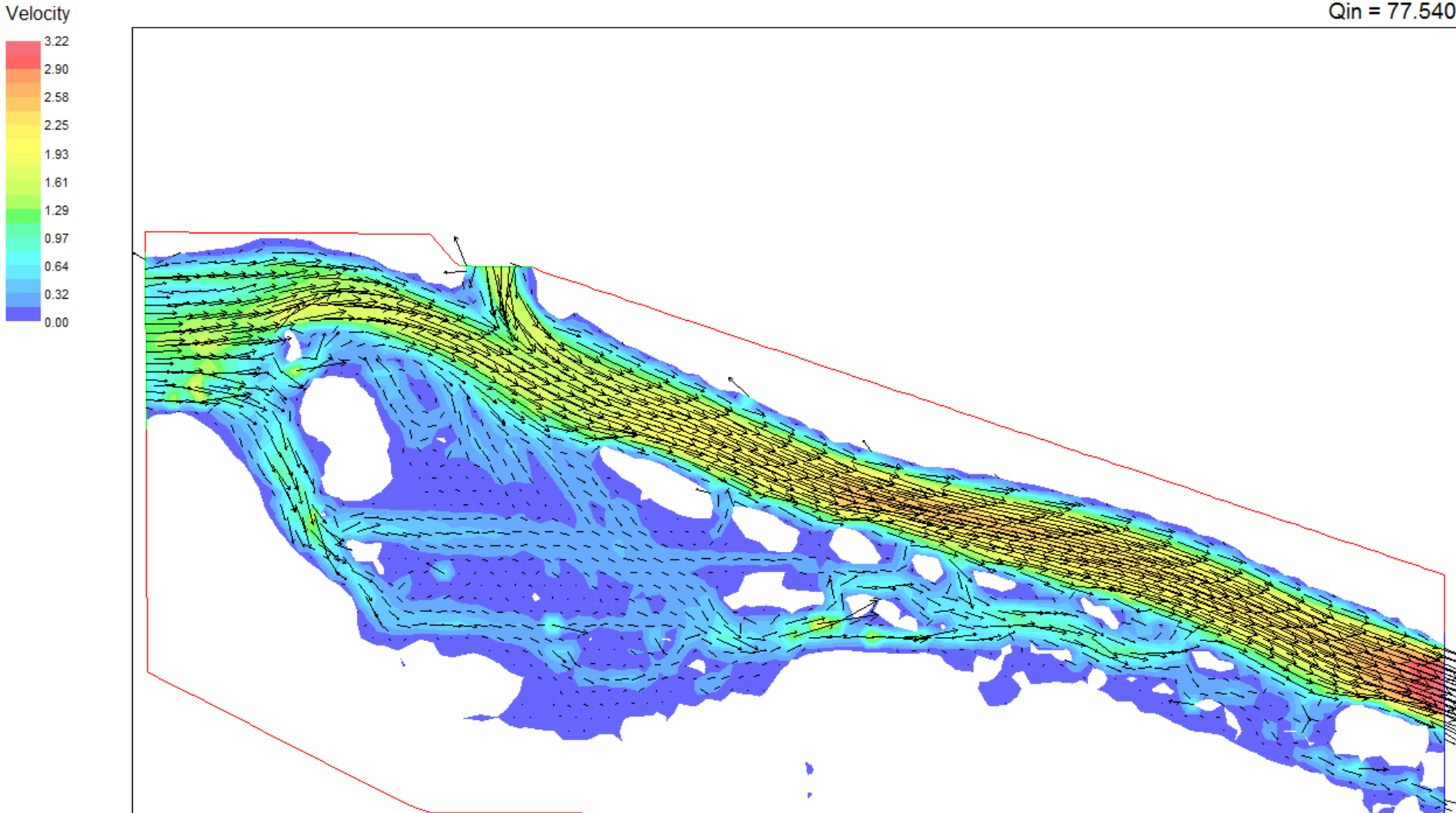
Post project appraisal



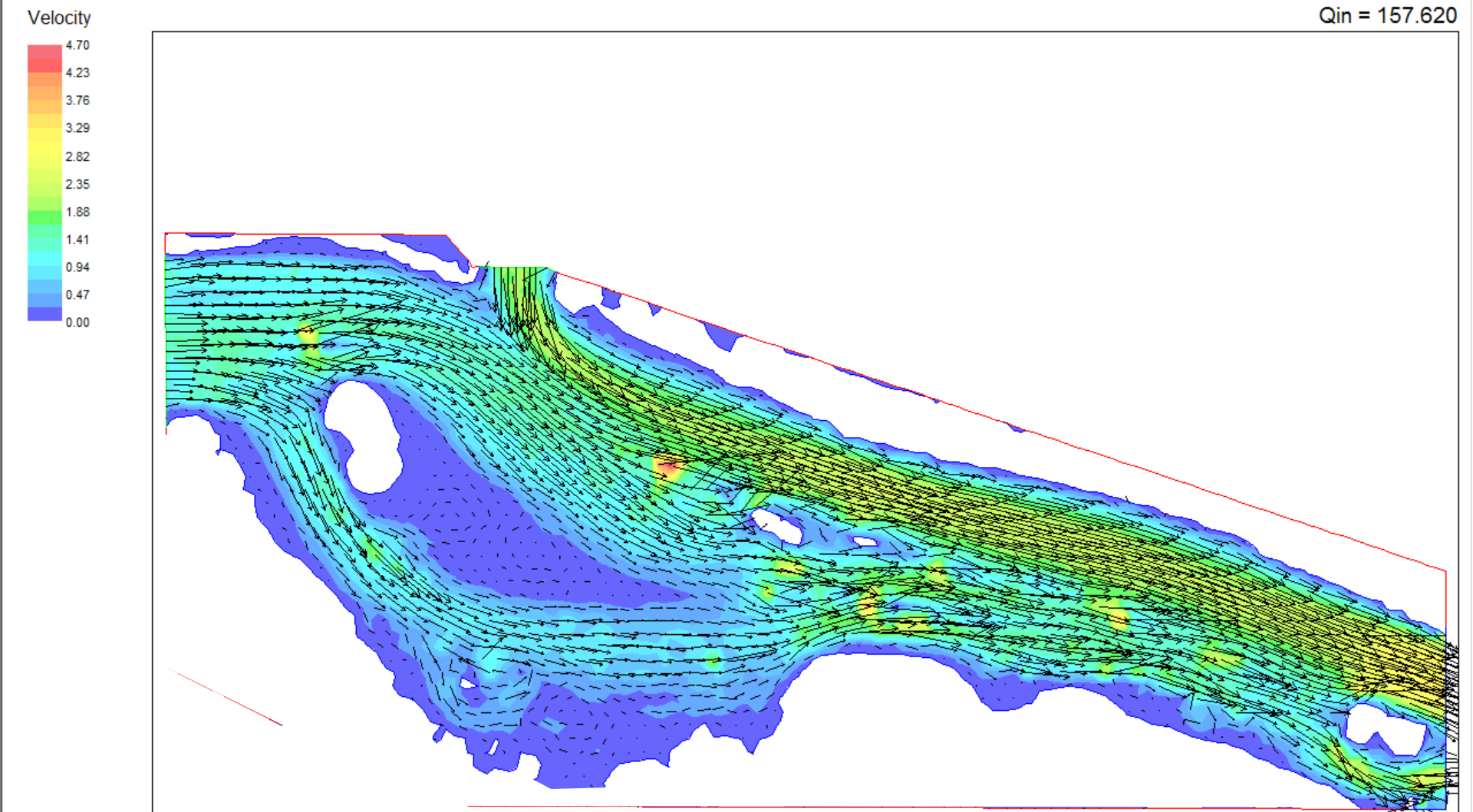
2D modelling



2D modelling



2D modelling

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Key post project findings

- Process from planning through to completion was sensible
- As built was not as designed; resulted in an overly protected area
- This area could be advantageous, the restored reach will have a fine material building to coarse material as velocities increase in connected floodplain. However, the protected area could silt too quickly and revert to vegetated floodplain.
- Overall, there are morphologic developments and made islands have remained quite stable, with encouraging areas of island erosion.
- River response shows care is needed, river can switch easily between functional to depositional, connected to disconnected, which on the Trent took only a small loss of flow to the restored area.
- Value of modelling and stick to what is proposed, specifically if modelling is behind the design, it could be crucial to success. The example shown is on the R. Trent, which is deemed not a particularly reactive river.

7th March 2011

11th August 2011

1st October 2011

9th April 2012

Thank you

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