Restoring natural geomorphic process to river environments influenced by practical design constraints.

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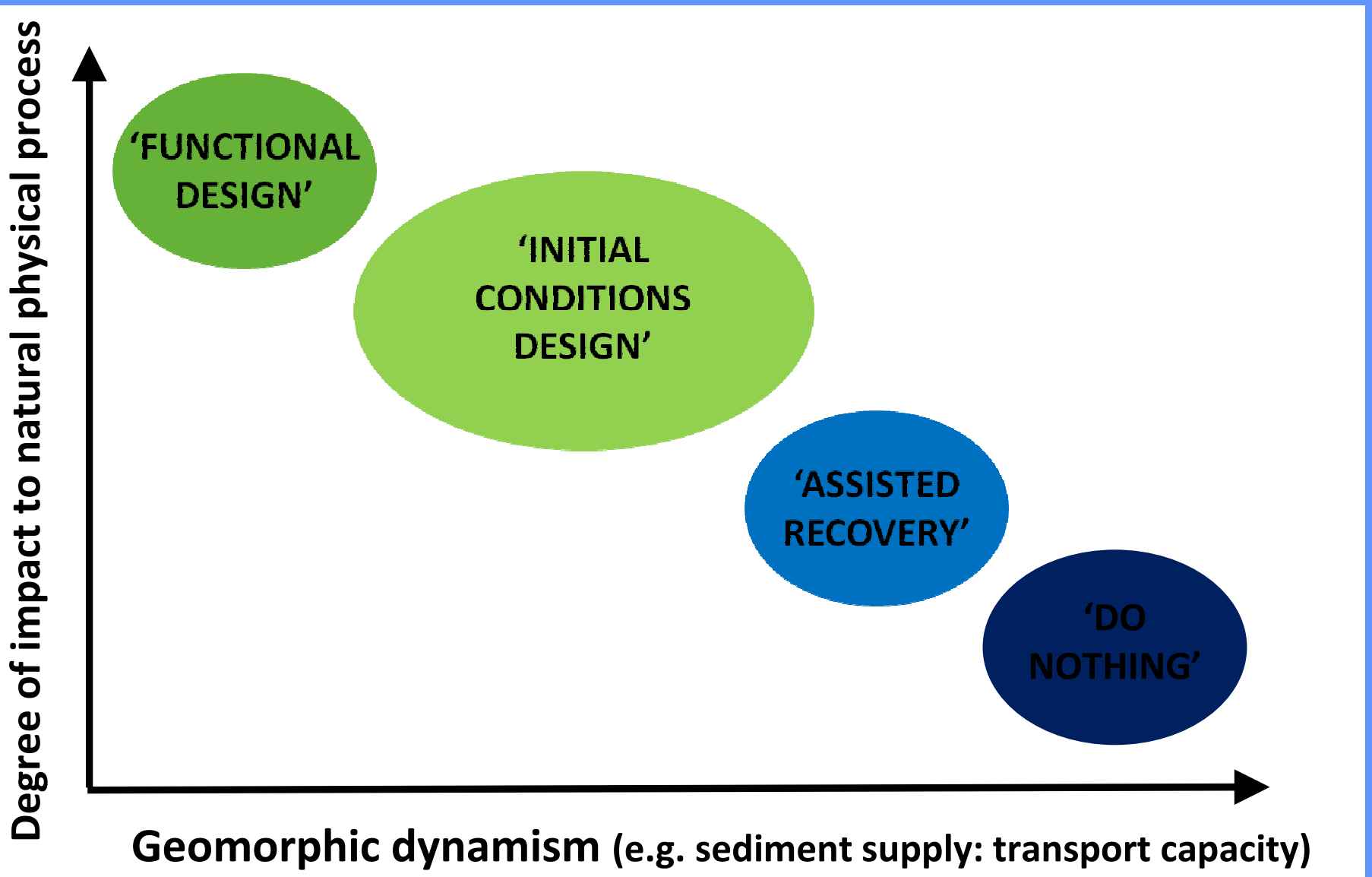
PROCESS RESTORATION

- **Over-arching philosophy:** restore catchment-scale river processes as much as possible.
  - Largest feasible spatial scales.
  - Restore process not local-scale design.
  - Longer temporal scales – not 'quick fix'.
  - Sustainable– let the river do the work!
- **HOWEVER,** constraints exist:
  - Land-use pressures.
  - Fragmented land-ownership.
  - Lack of catchment scale management plans.
  - Inappropriate timescales.

GIVEN ENERGY AND IMPACTS, WHAT IS REQUIRED?



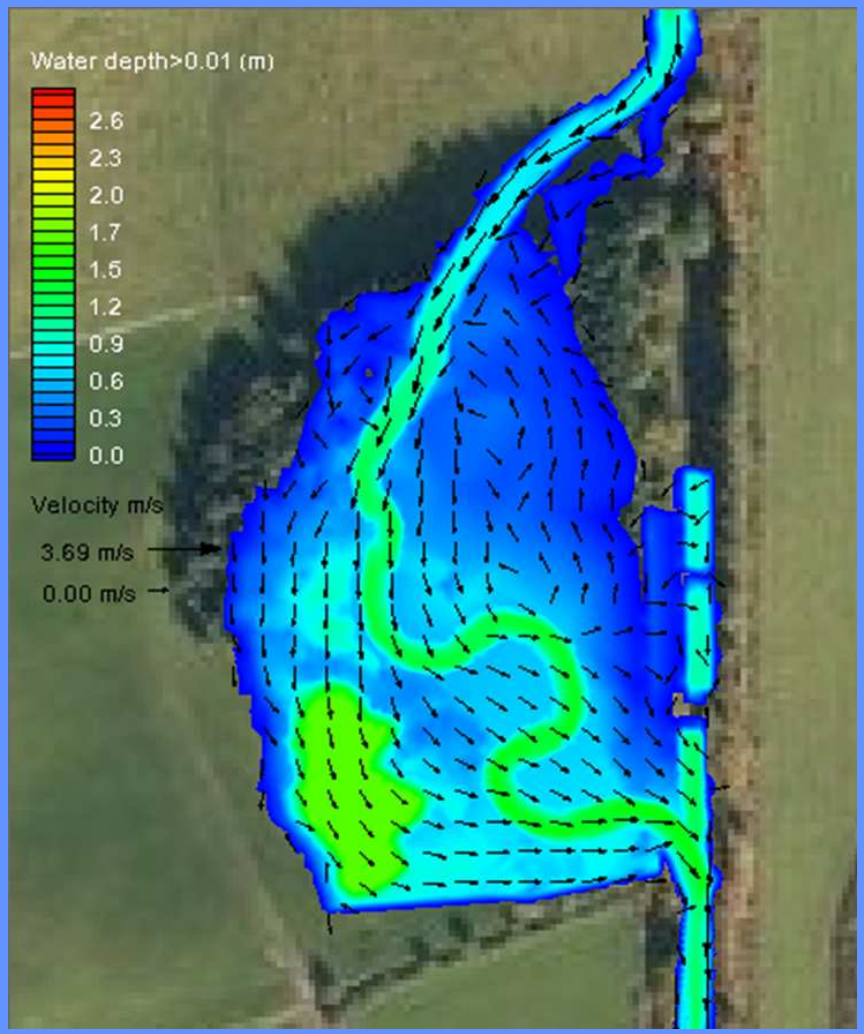
CASE STUDIES

1. Eddleston Water – Initial Conditions Design

2. Mains of Dyce – Functional Design

Case study 1: Eddleston Water - Initial Condition Design

Case study 2 – Eddleston Water - Initial Condition Design



- Imposed Q and slope
- Determine if new channel alignment is appropriate for modern controlling physical variables
- Determine general channel geometry (width, depth)
- Iterative 2D modelling – design modifications – progressively introduce compexity
- Final design is ‘initial condition’

Case study 1: Eddleston Water - Initial Condition Design

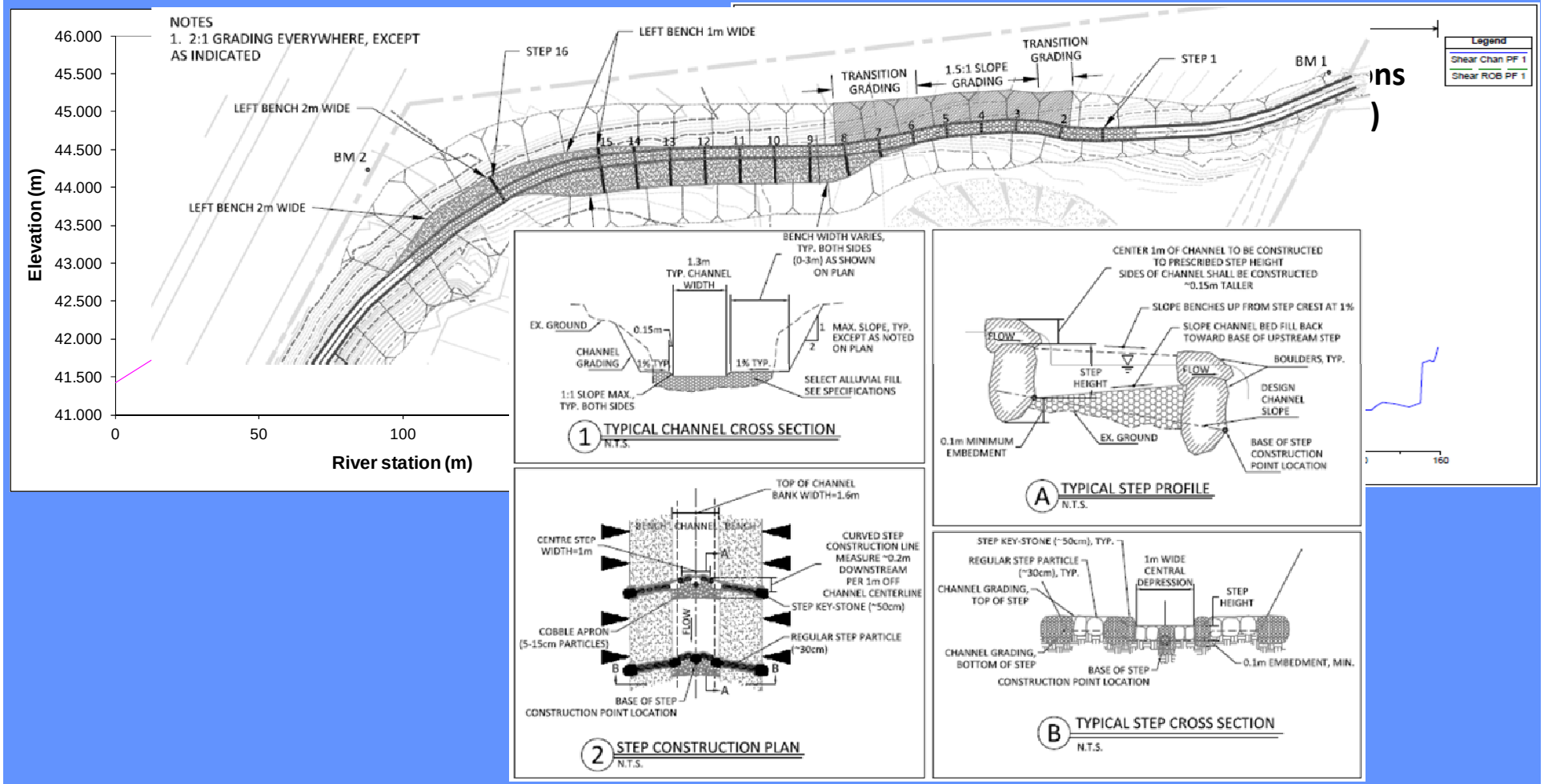
Case study 1: Eddleston Water - Initial Condition Design

Case study 2 – Mains of Dyce – 'Functional Design'

- Small culverted tributary flowing to the south of the River Don in Aberdeen city
- Catchment highly industrial and urban
- Course of channel tightly controlled by housing development – unnaturally high channel slope
- Initial construction good example of lack of consideration of appropriate geomorphic design

Case study 2: Mains of Dyce - Functional Design

- **Given site constraints, step-pool design had to be implemented - (H/L) × S = 1.25**



Case study 2: Mains of Dyce - Functional Design

Conclusions

Explicit consideration of physical process in restoration design is essential:

- **Ensures that some reproduction of natural process, regardless of constraints and scale**
- **Better understanding of risk to design if controlling processes (and related uncertainties) are understood**
- **BUT design methodology needs to be systematic and theoretically/ evidence based**

Further development needed on:

- **Further research needed to assess the assumption that instream ecology responds to natural physical process**
- **MORE carefully designed monitoring – feedback into design methodology and biophysical linkages**

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