ARUP

Framework for Waterway Restoration and Revitalisation Through Physical Form Typologies

Frankie Coen

15/10/2025

ARUP

Waterway restoration and revitalisation

- Erosion is a major issue in agricultural land across NSW
- Important to understand the site-specific drivers behind erosion to effectively restore waterways
- Tricky to understand and treat erosion in large reaches of creeks

(Source redacted - Used with Permission)

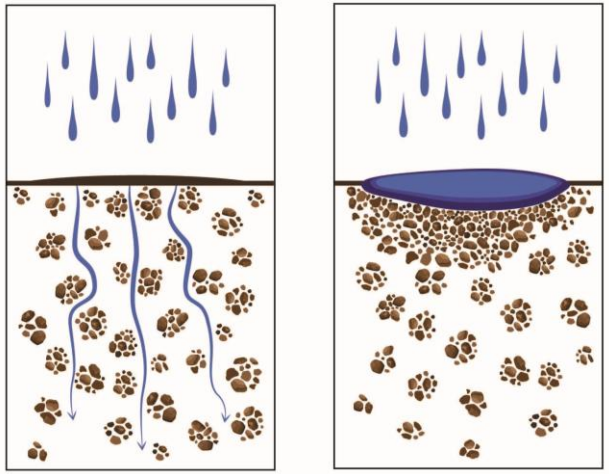
ARUP

Project example

- 4 km reach of creek
- 800 ha catchment
- Transition from agricultural to urban residential

Project example

- 4 km reach of creek
- 800 ha catchment
- Transition from agricultural to urban residential
- Sodic soil erosion
  - ➢ Erosion and tunnelling
  - ➢ Surface sealing
  - ➢ Restricted water movement

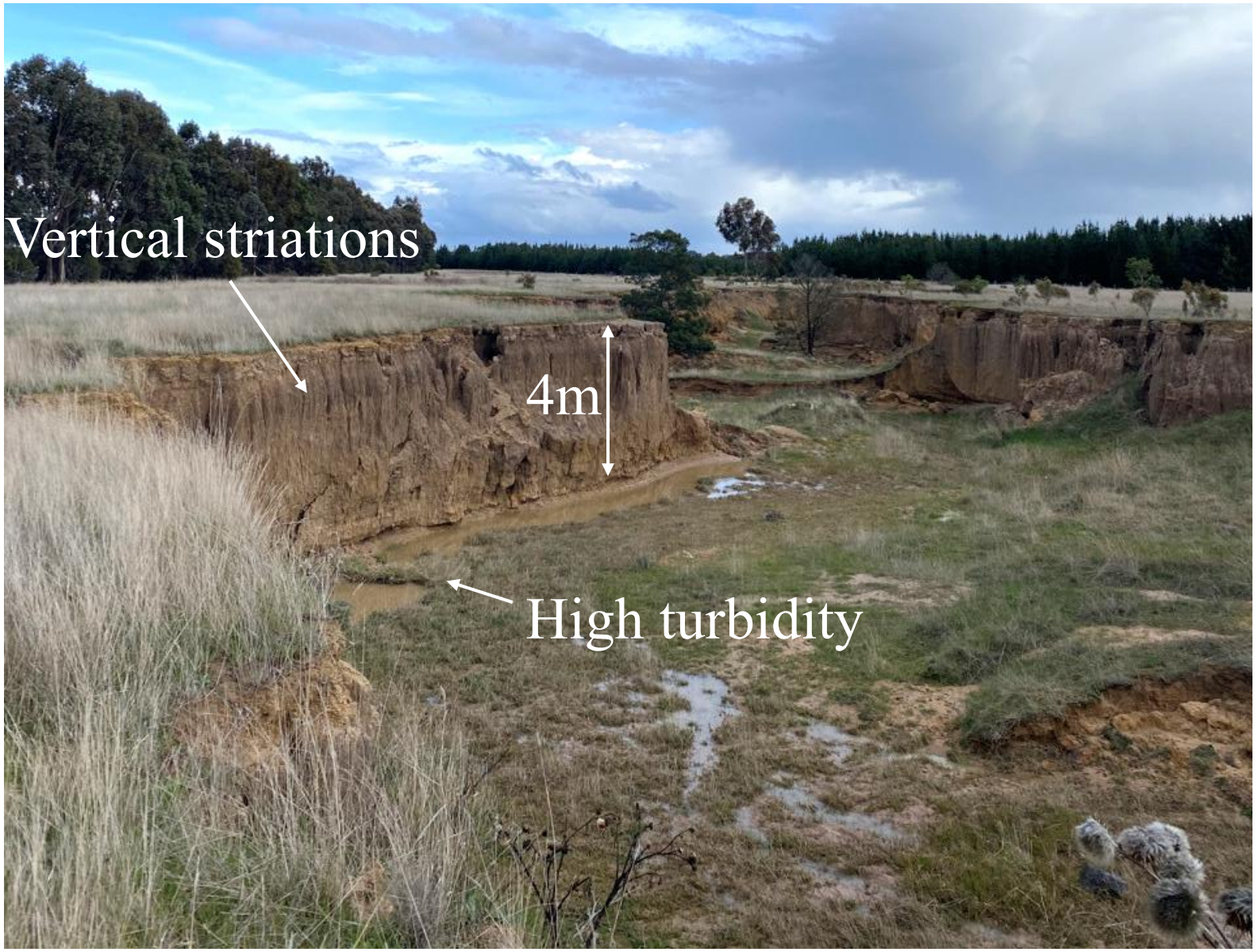


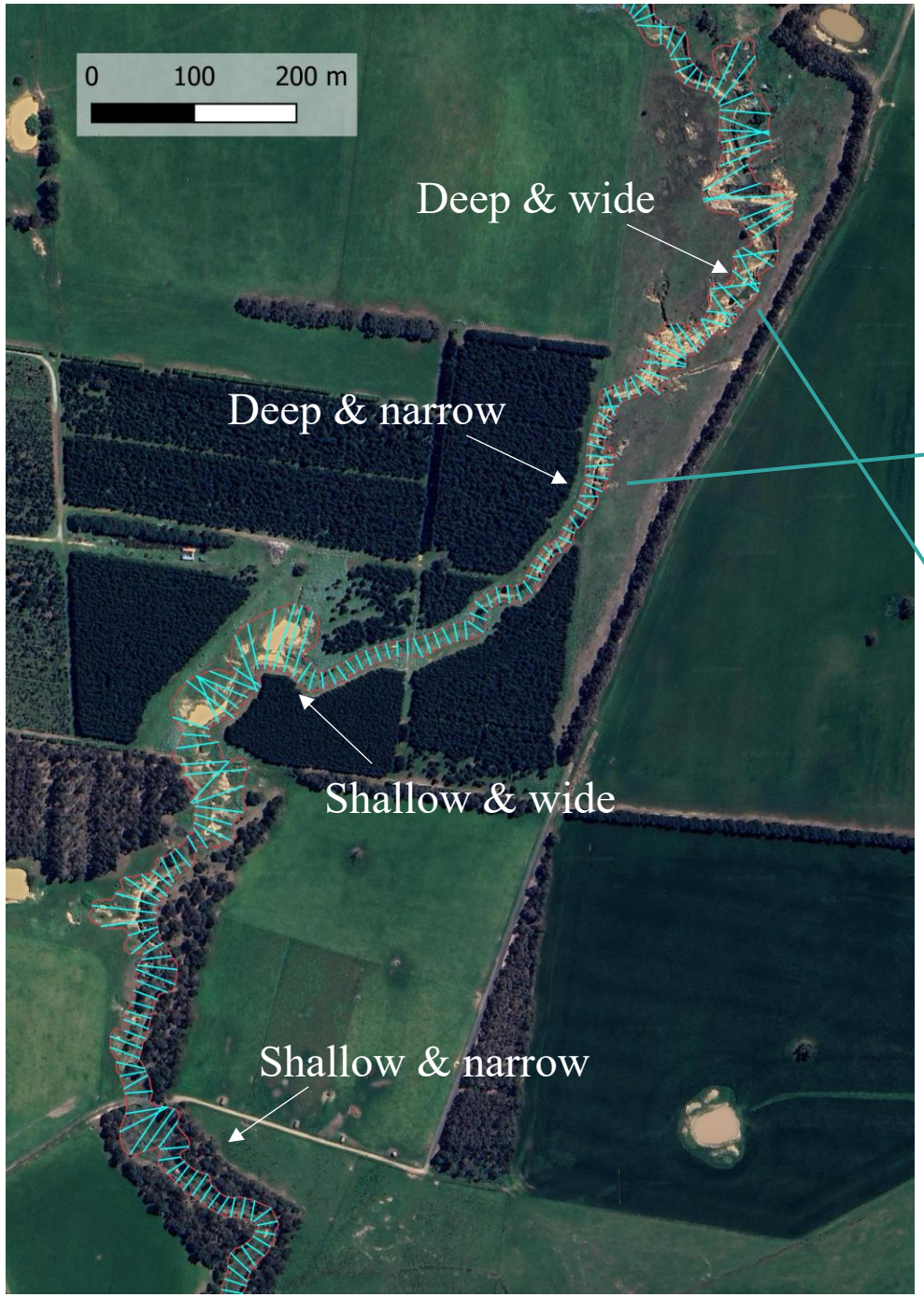
Rivka Fidel (2025), Salt-affected Soils: Salinity and Sodicity. https://iastate.pressbooks.pub/isudp-2025-201/chapter/salt-affected-soils-salinity-and-sodicity/

Project example

- Waterway rehabilitation process was guided by the outcomes to:
  - Stabilise the banks
  - Prevent future erosion
  - Manage flood flows
  - Enable spaces for community values, amenity, and ecological benefits
  - Develop an affordable, equitable and replicable design that is accessible for ongoing maintenance and management

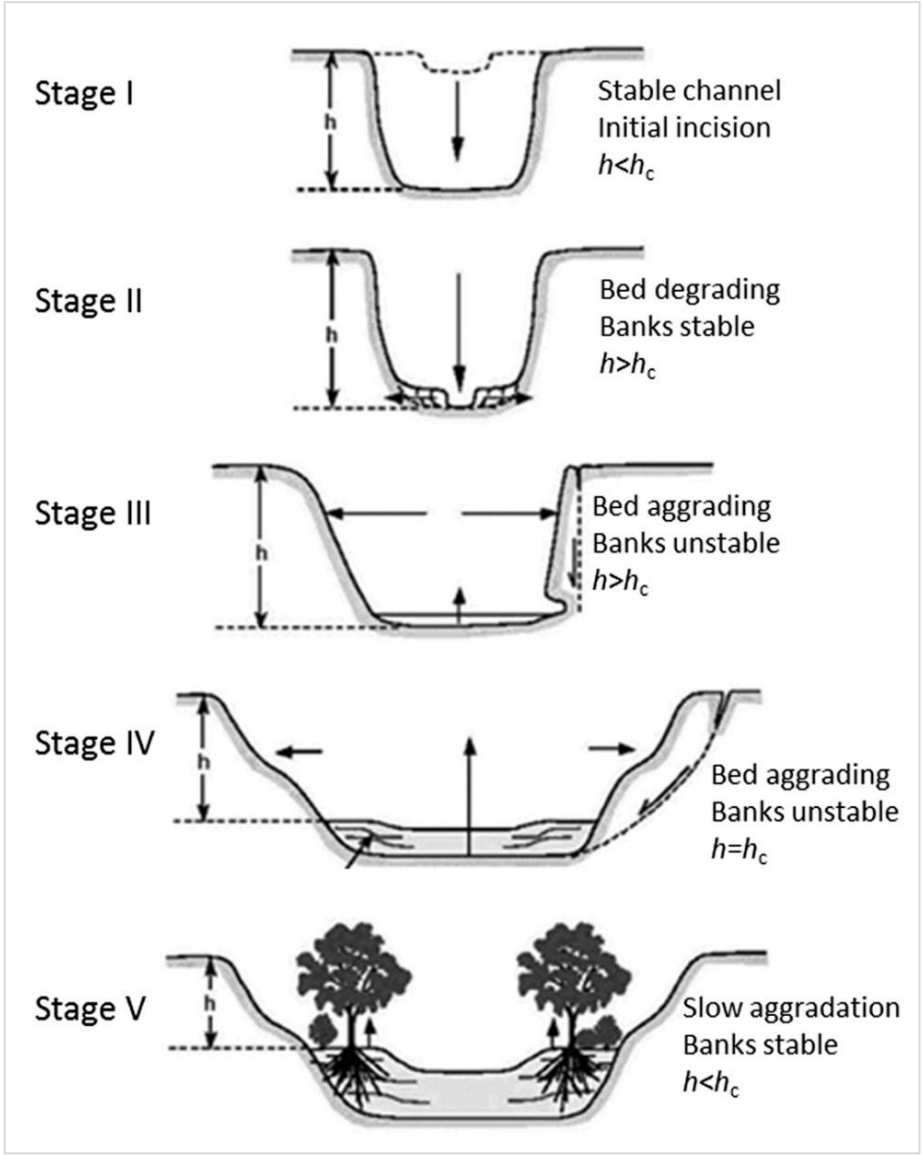
ARUP



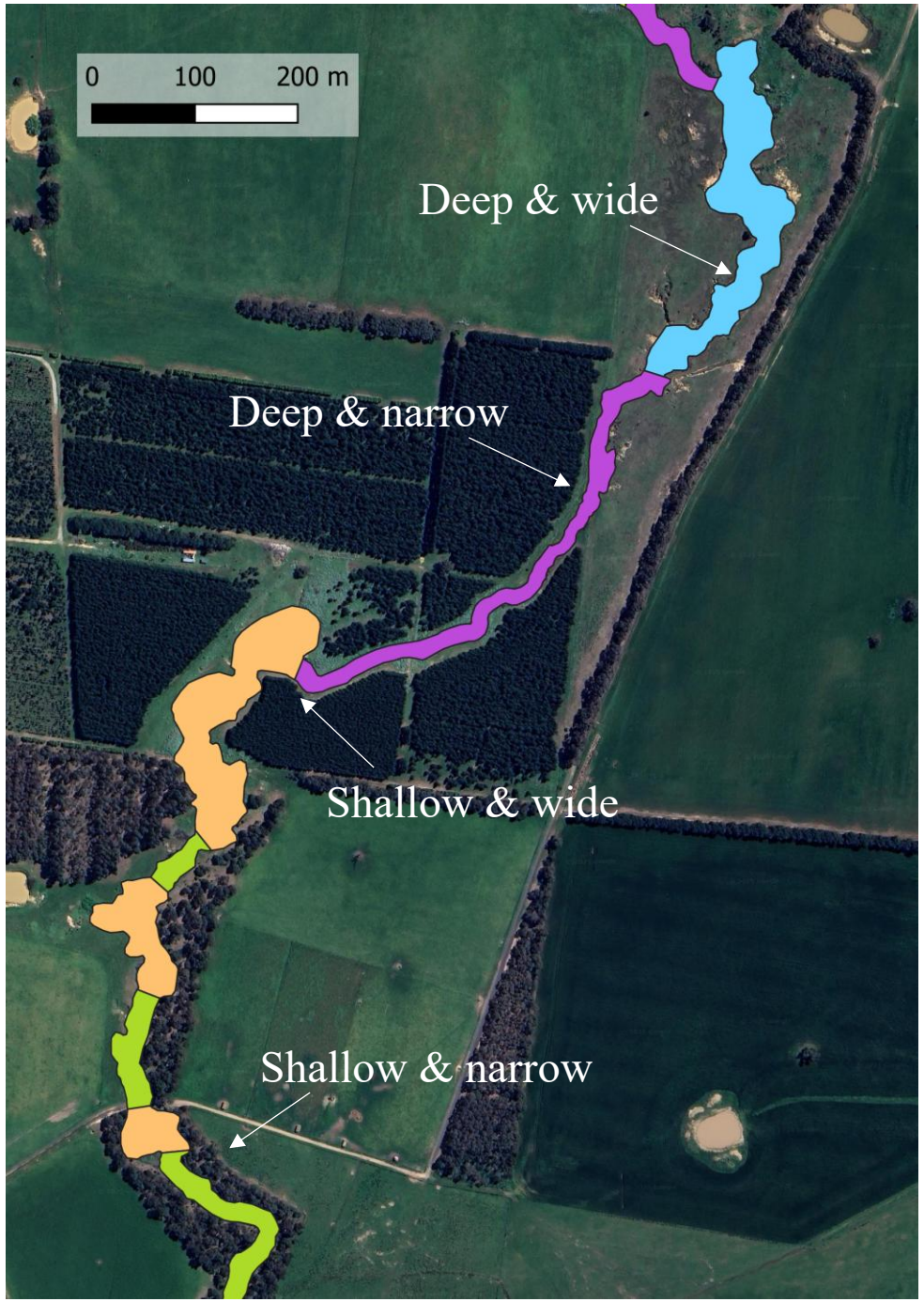


Conceptual channel evolution model for small-scale channel systems

ARUP



Thompson, C. J., Croke, J., Fryirs, K., & Grove, J. R. (2016). A channel evolution model for subtropical macrochannel systems. *Catena*(139), 199-213.



ARUP

Developed 4 major typologies based on:

- Creek depth (>3m = deep)
- Creek width (>30m = wide)

ARUP

Developed 4 major typologies based on:

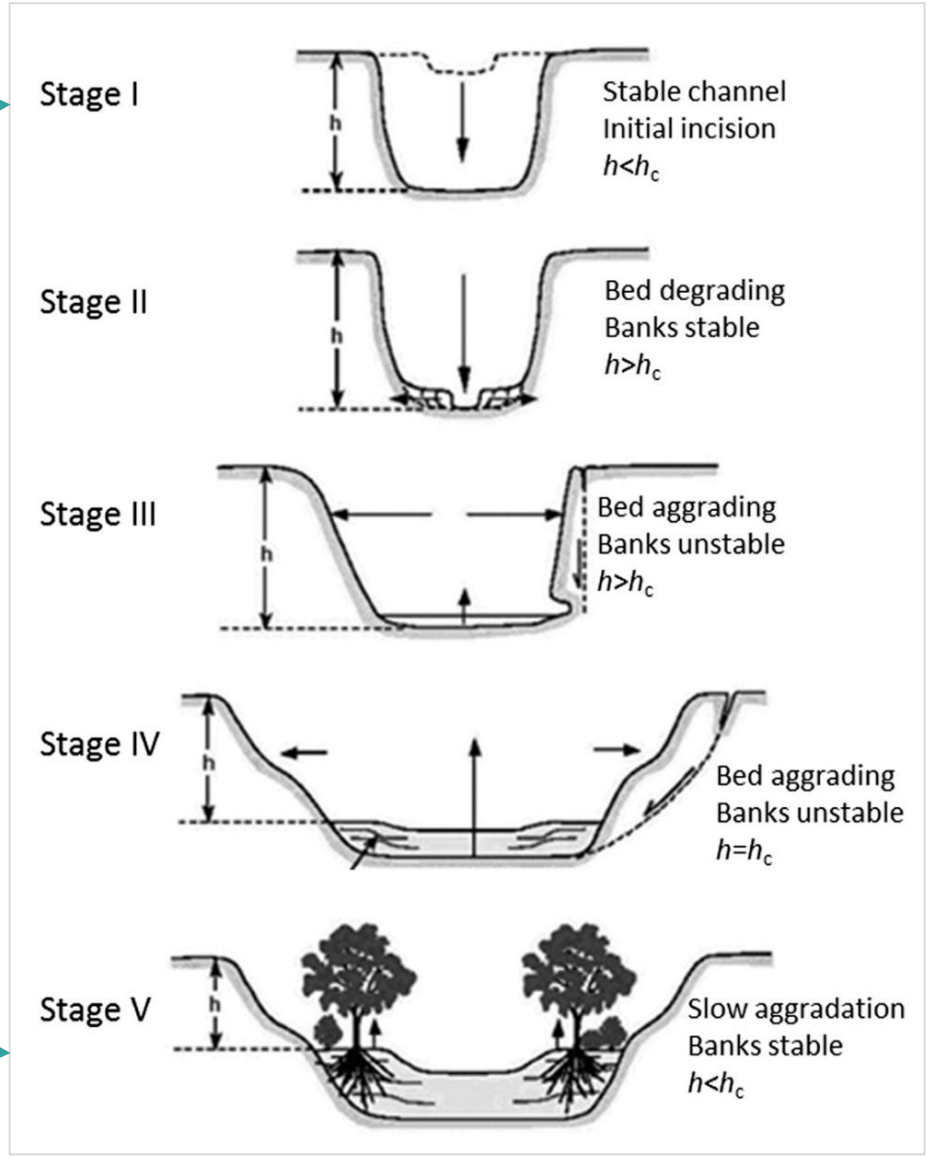
- Creek depth (>3m = deep)
- Creek width (>30m = wide)

Further split into sub-typologies using:

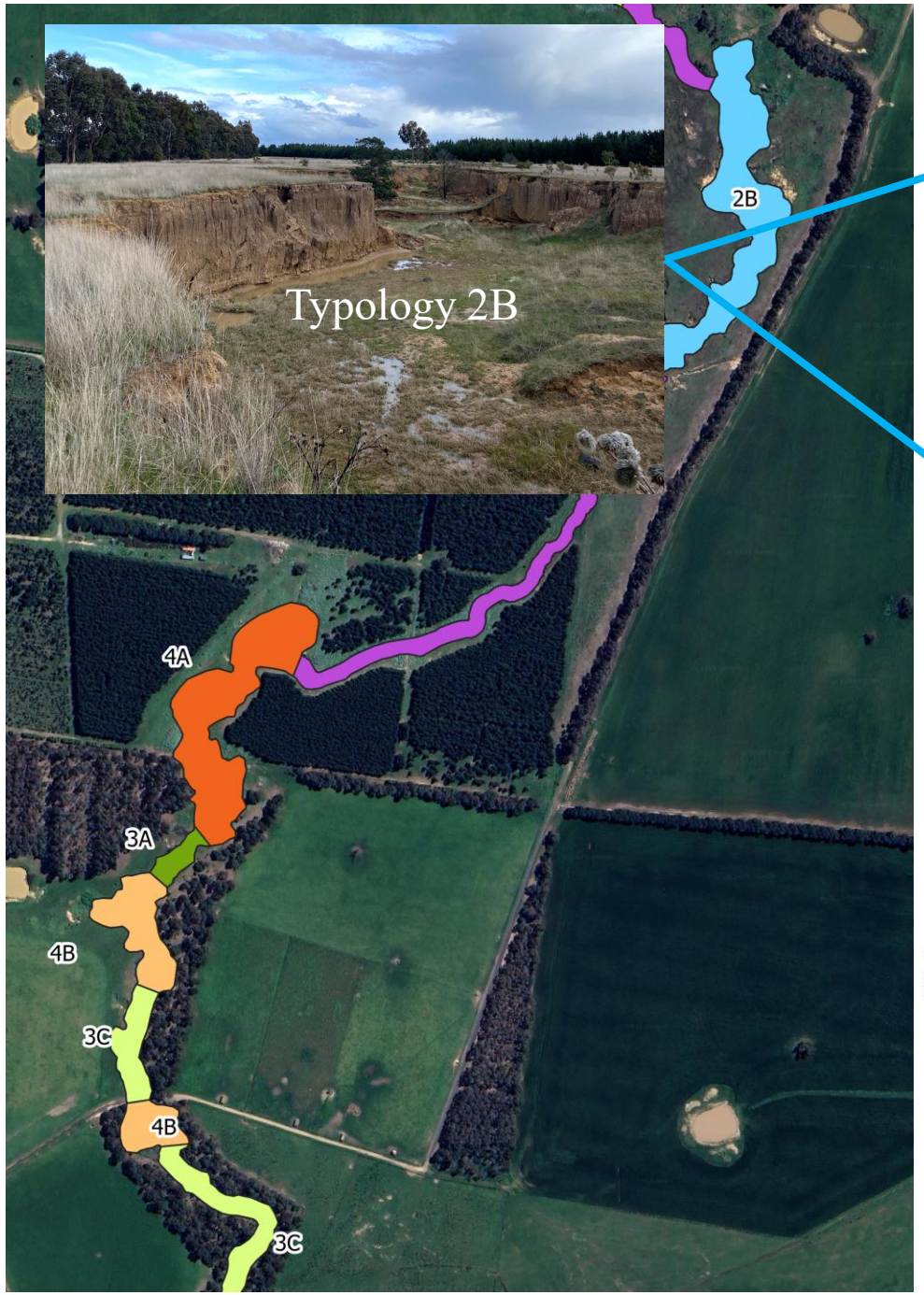
- Bank slope – amount of stabilisation required
- Longitudinal grade

Conceptual channel evolution model for small-scale channel systems

ARUP

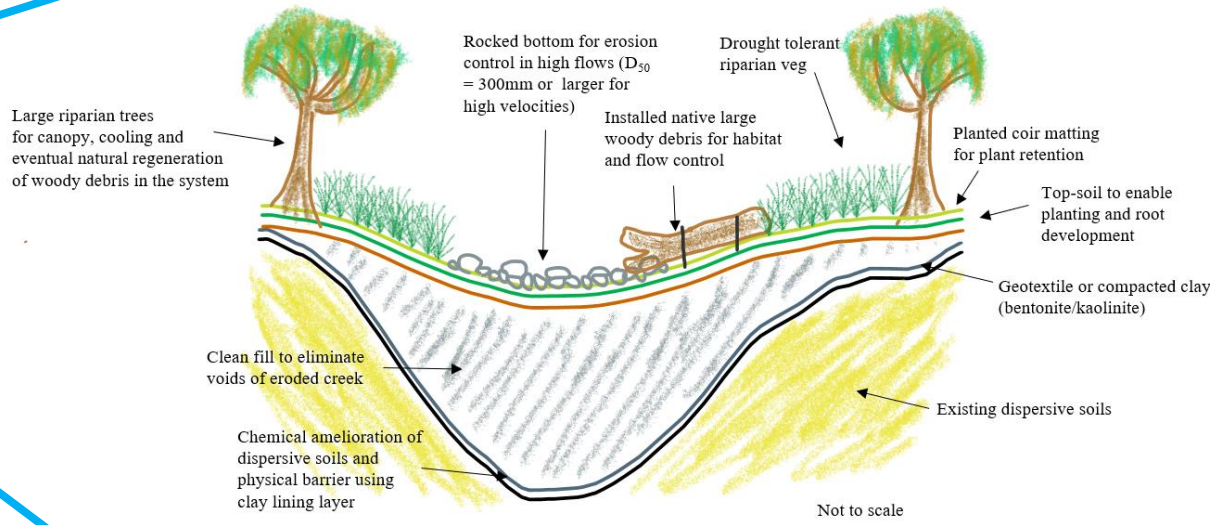


Thompson, C. J., Croke, J., Fryirs, K., & Grove, J. R. (2016). A channel evolution model for subtropical macrochannel systems. *Catena*(139), 199-213.

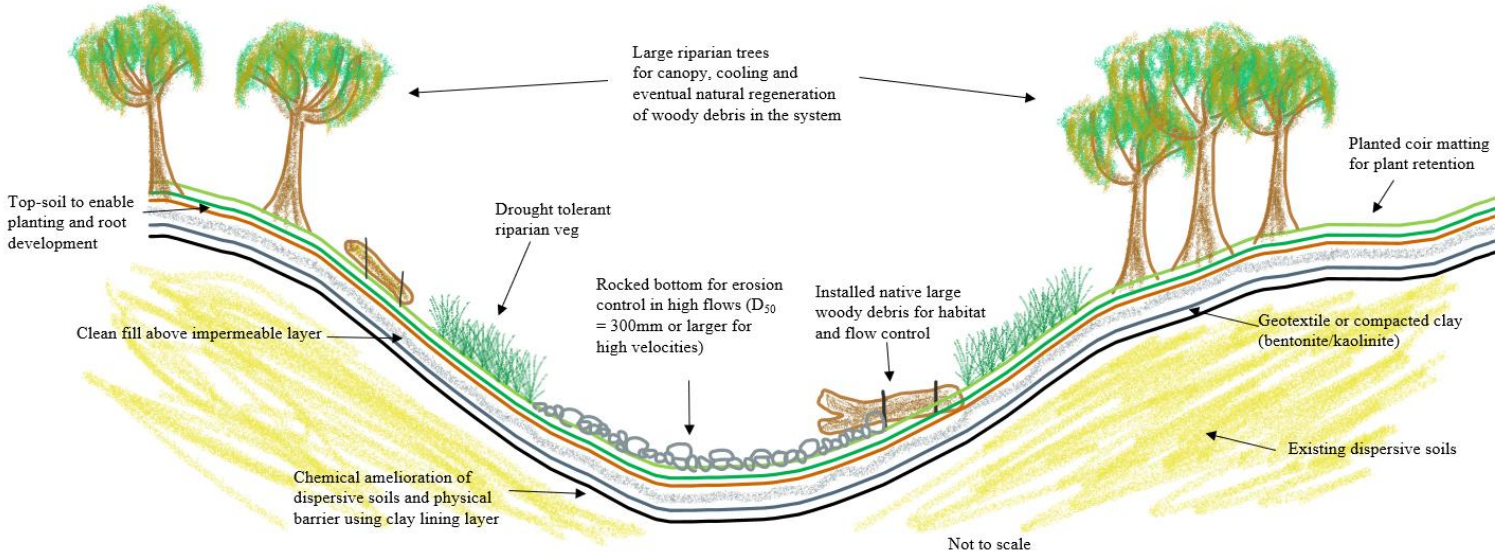


Maximum effort: fill the void

ARUP

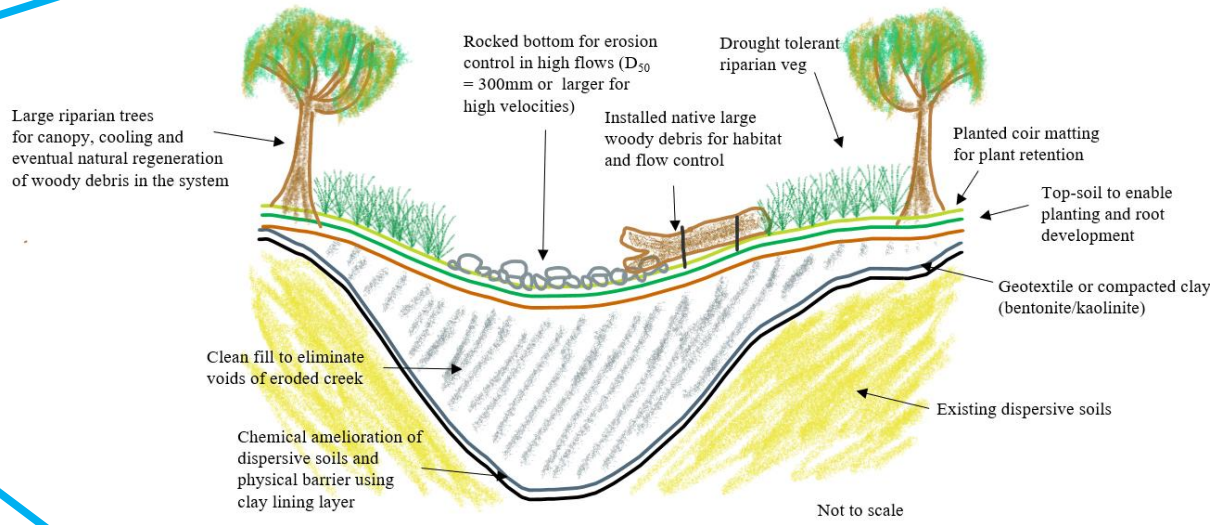


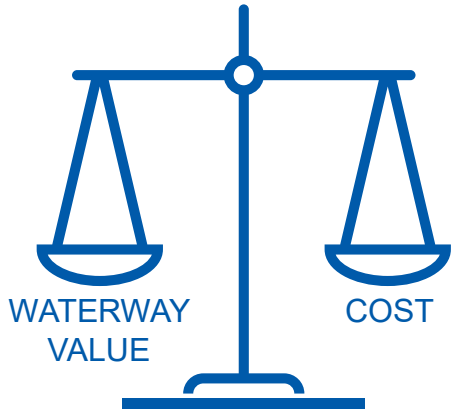
Minimum effort: cut and regrade



Maximum effort: fill the void

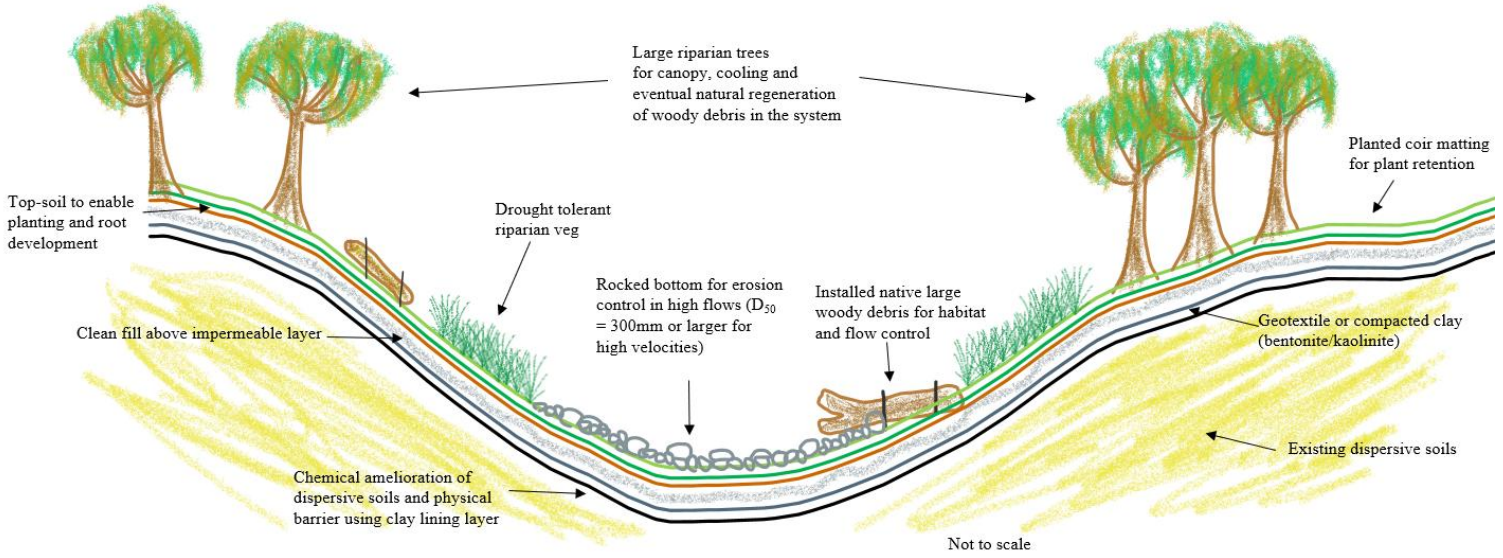
ARUP



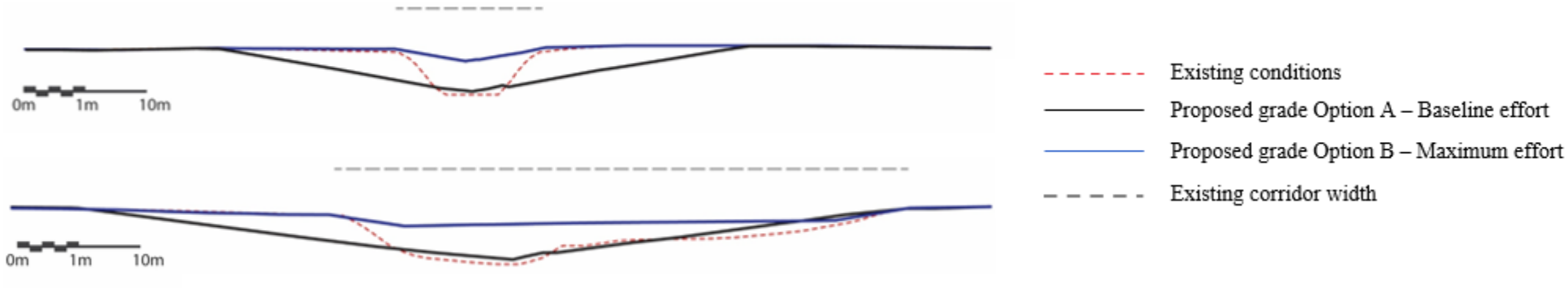


Which do we choose?

Minimum effort: cut and regrade



Typical cross sections of Typology 1 and 2:



Treatments proposed for <u>maximum</u> effort waterway rehabilitation:

Typology	Gypsum	Clay Liner	Geotextile Liner	Slope Regrading	Instream Rockwork	Instream Structures	Riparian Planting	Fill
1A	yes	yes	yes	yes	yes	yes	yes	yes
1B	yes	yes	yes	yes	no	yes	yes	yes
1C	yes	yes	yes	yes	no	yes	yes	yes
2A	yes	yes	yes	yes	some	yes	yes	yes
2B	yes	yes	yes	yes	some	yes	yes	yes
3A	yes	yes	yes	yes	no	yes	yes	yes
3B	yes	yes	yes	yes	no	yes	yes	yes
3C	yes	yes	yes	no	no	yes	yes	yes
4A	yes	yes	yes	yes	no	yes	yes	no
4B	yes	yes	yes	no	no	yes	yes	no

Treatments proposed for <u>minimum</u> (baseline) effort waterway rehabilitation:

Typology	Gypsum	Clay Liner	Geotextile Liner	Slope Regrading	Instream Rockwork	Instream Structures	Riparian Planting	Fill
1A	yes	no	yes	yes	yes	some	some	yes
1B	yes	no	yes	yes	yes	some	some	yes
1C	yes	no	yes	no	yes	some	some	yes
2A	yes	no	yes	no	yes	some	no	yes
2B	yes	no	yes	no	yes	some	some	yes
3A	yes	no	yes	no	yes	some	yes	yes
3B	yes	no	yes	no	yes	some	some	yes
3C	yes	no	yes	no	yes	some	yes	yes
4A	yes	no	yes	no	yes	some	some	yes
4B	yes	no	yes	no	yes	some	some	yes

ARUP

Benefits of method

- Ability to prioritise waterway restoration treatment based on site needs and budget
- Avoids applying uniform treatments along the entire waterway
- Encourages collaboration in early stages of work

ARUP