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3rd INTERNATIONAL CONGRESS
WASTEWATER IN SMALL COMMUNITIES

Design criteria on clogging of subsurface flow constructed wetlands

Full scale experiences

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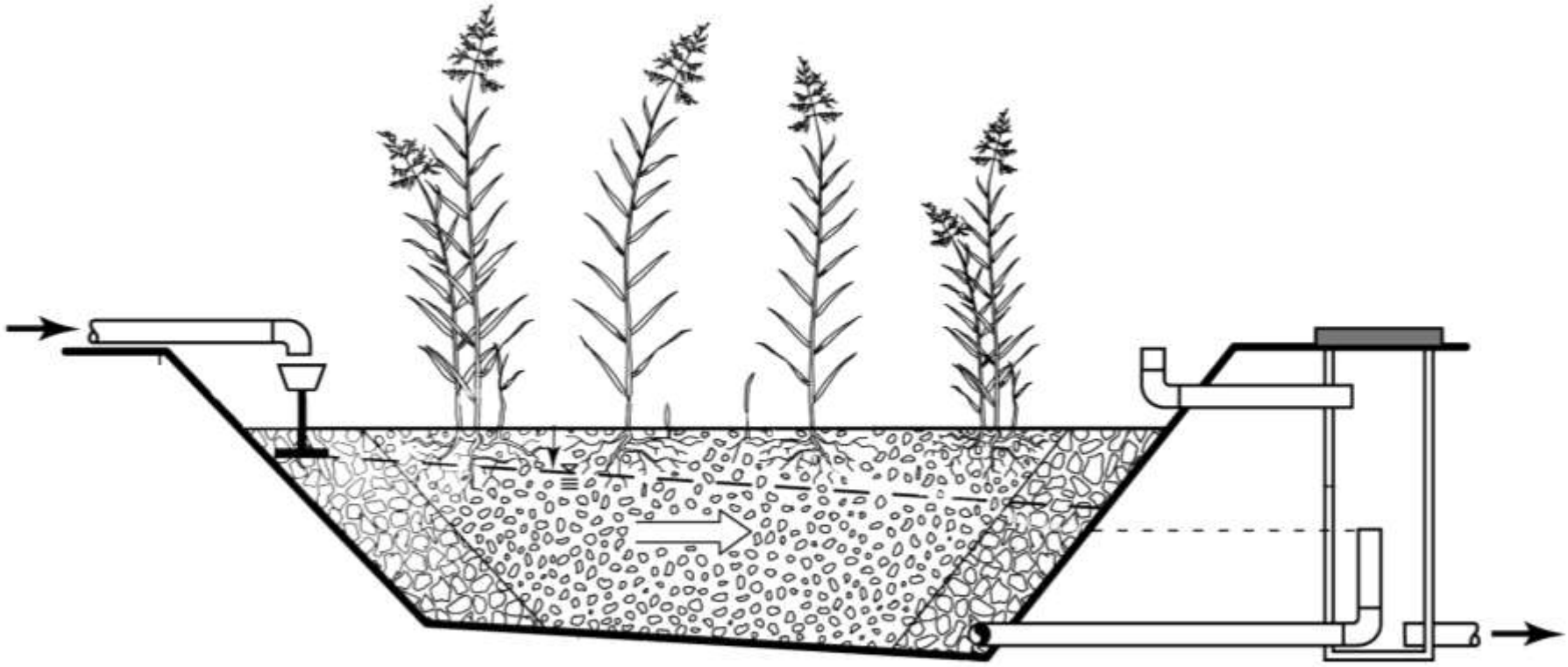
Constructed wetlands

La Fe
WWTP, Spain

Clogging

La Fatarella, Verdú, 2000 PE

Clogging development in horizontal wetlands with surface feeding



Adapted from Wallace and Knight (2006) and Knowles et al. (2011)

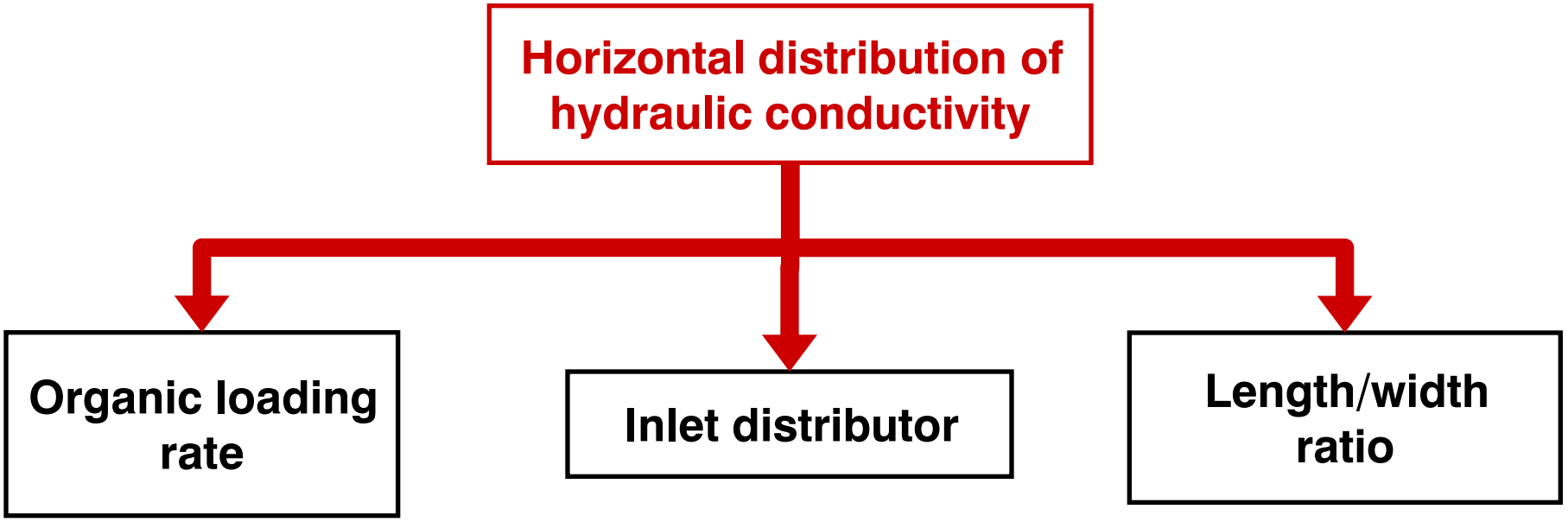
Clogging

Moreton Morrell, 1500 PE

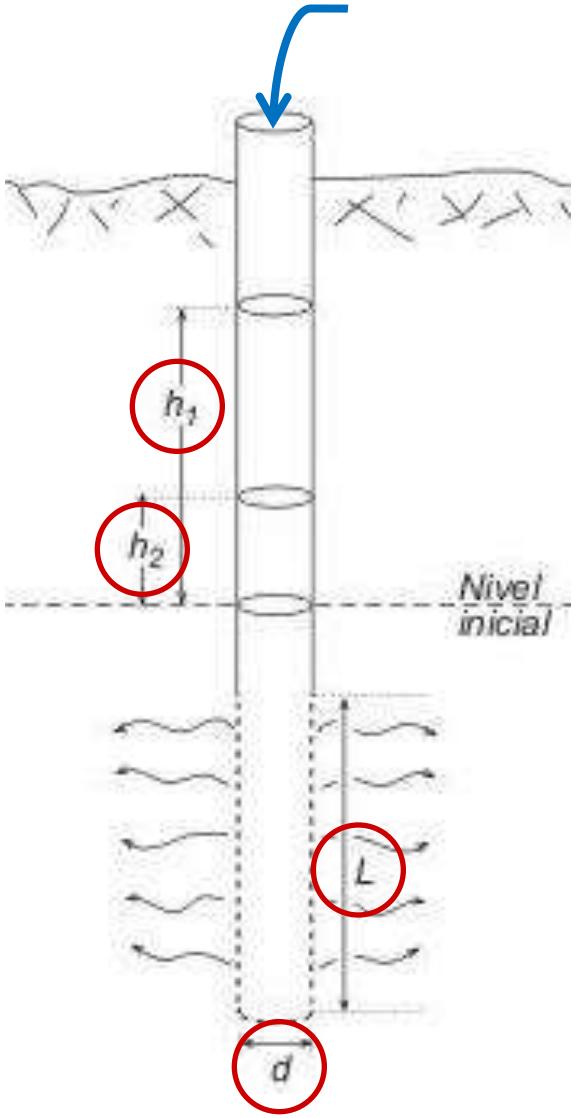
La Fatarella, 1170 PE

Objectives

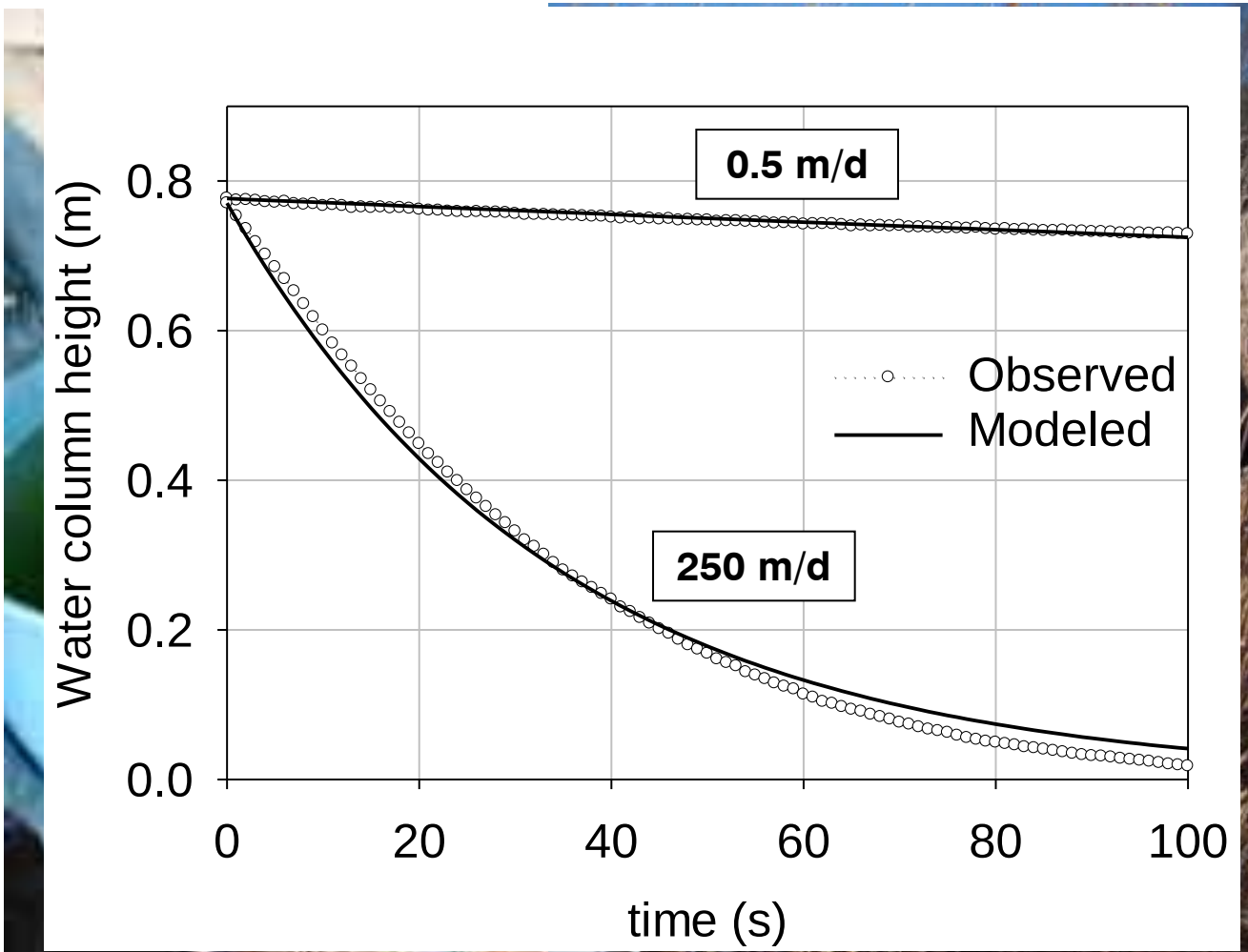
To assess the best operational and design strategies that can be applied to horizontal subsurface flow constructed wetlands (HSSF CWs) to minimize clogging development



Falling head permeameter (*in situ*)



$$K = \frac{d^2 \ln\left(2\frac{L}{d}\right)}{8Lt} \ln\frac{h_1}{h_2}$$



Wetlands analized

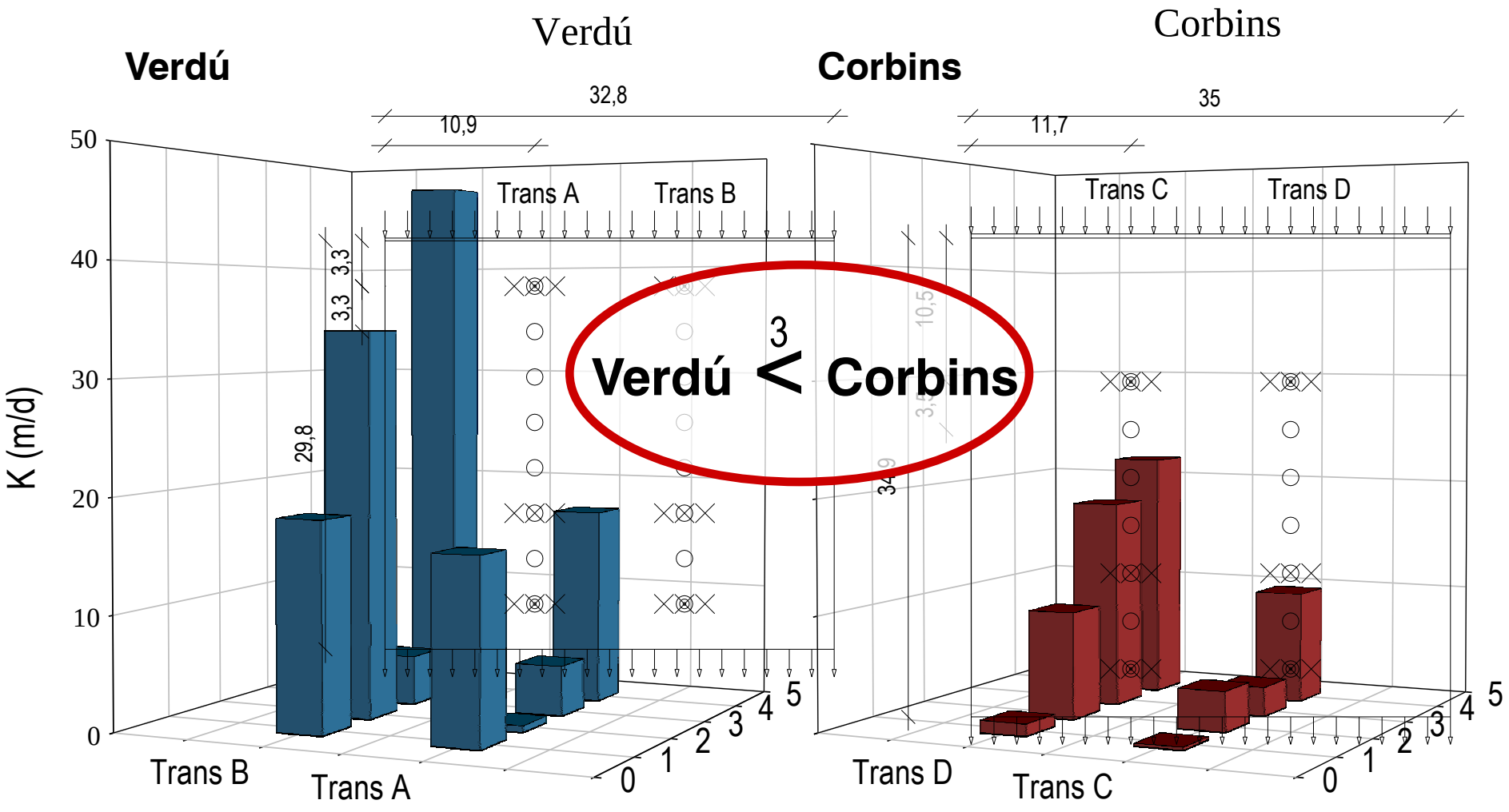
		Time of operation	Treatment	Solids loading rate	Accumulated solids
		(months)		(g TSS/m²d)	(kg TS/m²)
Verdú	Catalonia (Spain)	60	Secondary	3.4 – 10.4	1.2 – 14
Corbins	Catalonia (Spain)	60	Secondary	9.3 – 80.9	1.7 – 10
Gualba	Catalonia (Spain)	12	Secondary	26.5 – 89.9	1.8 – 18
Arnes	Catalonia (Spain)	120	Secondary	10.5 – 29.5	1.8 – 5.8
Fenny Compton	Warwickshire (UK)	192	Tertiary	-	-
Moreton Morrell	Warwickshire (UK)	180	Tertiary	-	2.4 – 9.4

Inlet distribution

Channel

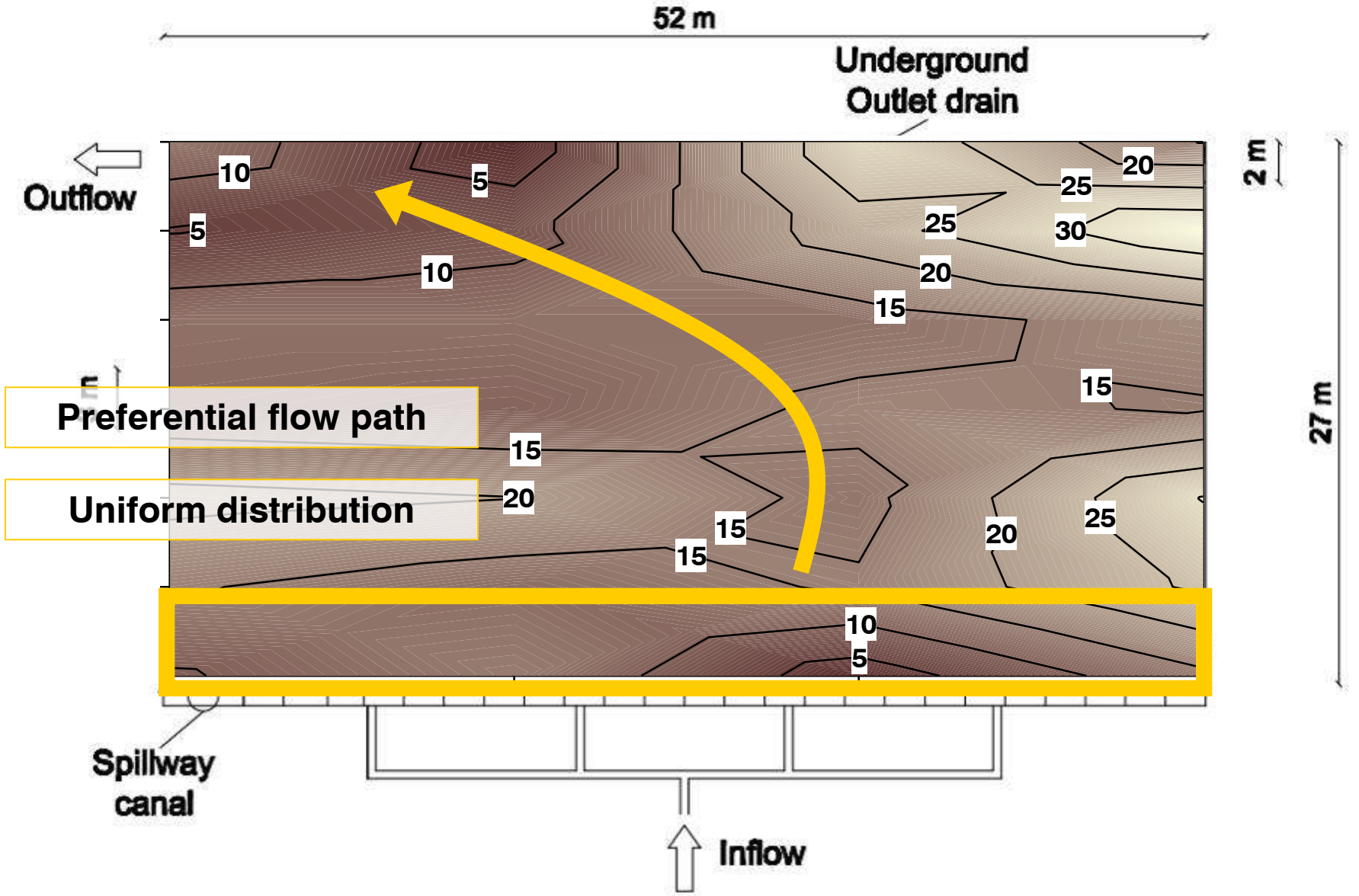
Results

Verdú & Corbins



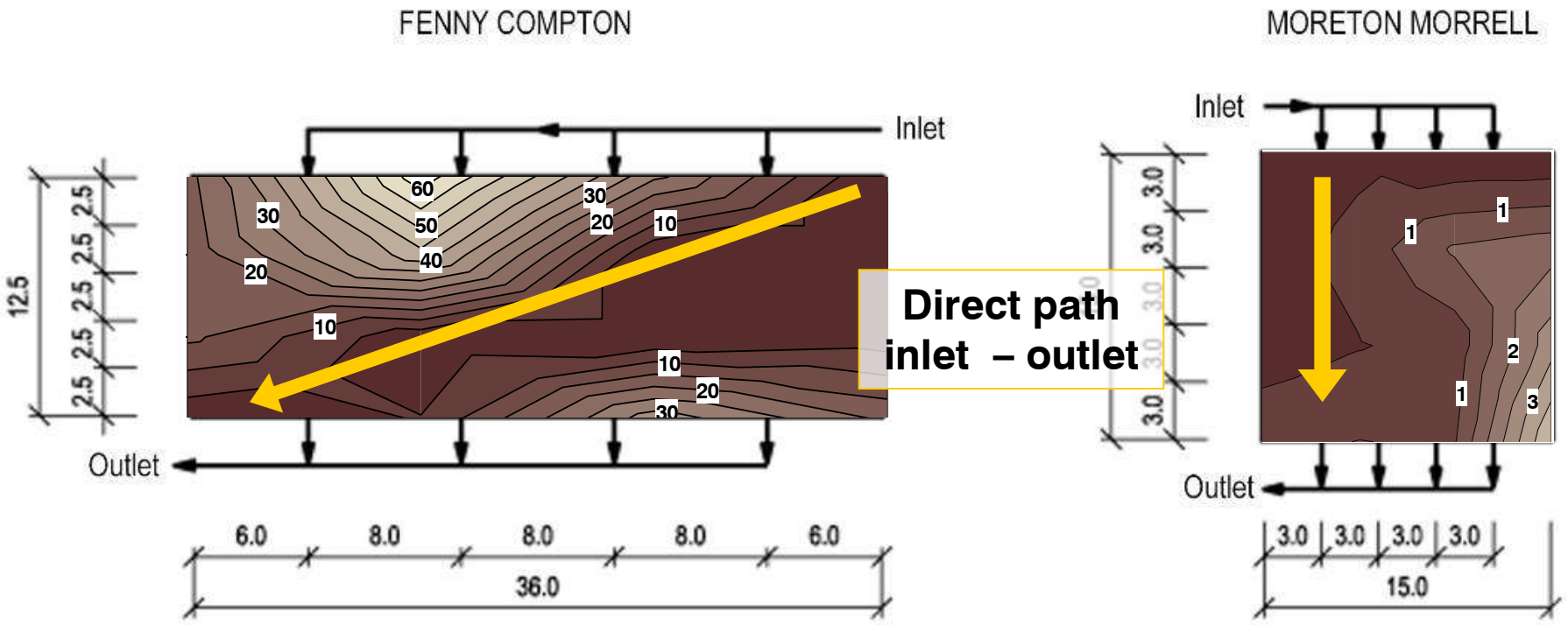
Results

Gualba



Results

Fenny Compton & Moreton Morrell

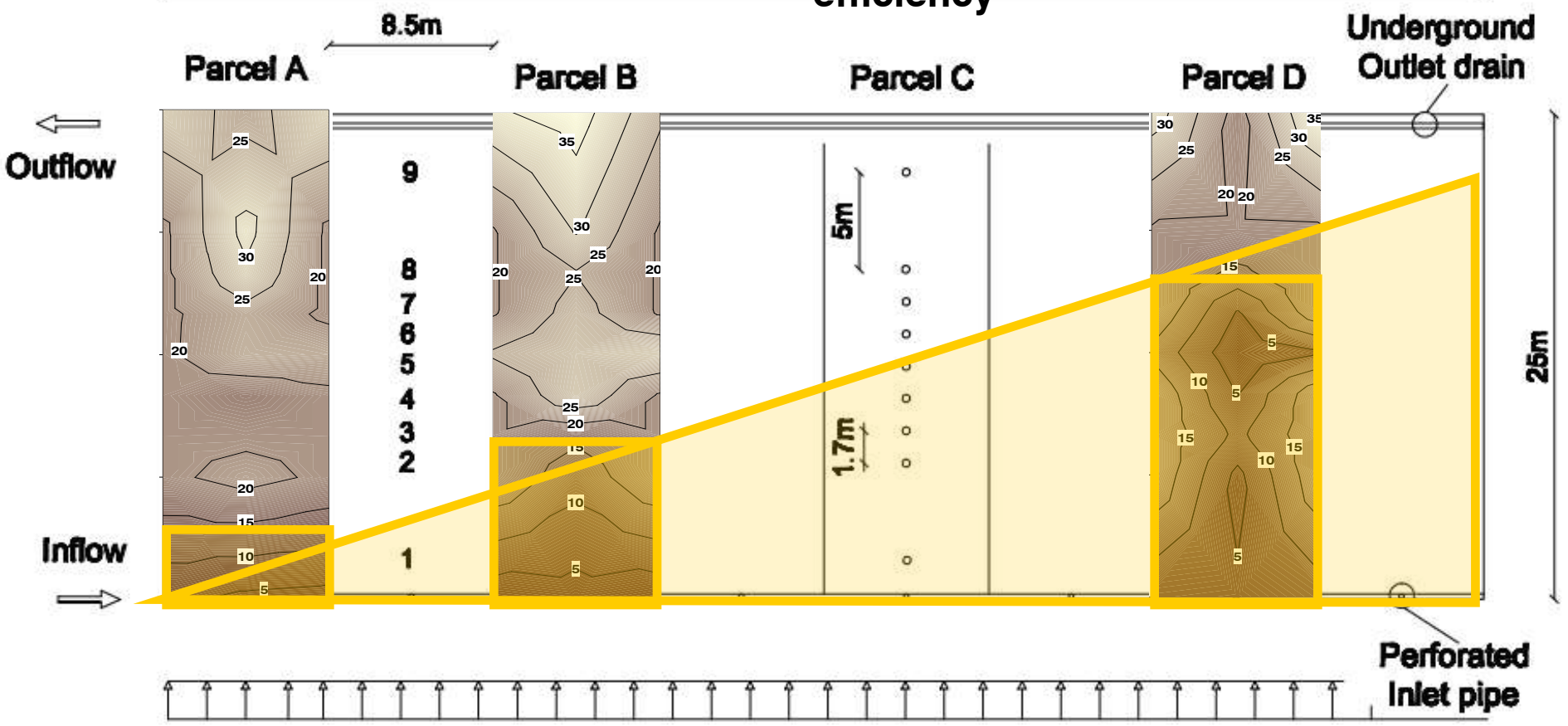


Results

Arnes

Inlet distribution

Length/Width > 1 → **Higher hydraulic efficiency**



Conclusions

Organic and solids loading rate

Related to the state of clogging. Therefore, in order to delay clogging processes it is necessary to decrease the solids loading rate at the inlet of the bed.

Dimensioning and influent distribution

To prevent preferential flow paths, thus having a more homogeneous distribution of clogging (logically, from inlet to outlet) it is recommended to construct wetlands with width to length ratios higher than one and to apply channels as a inlet distributor systems.

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