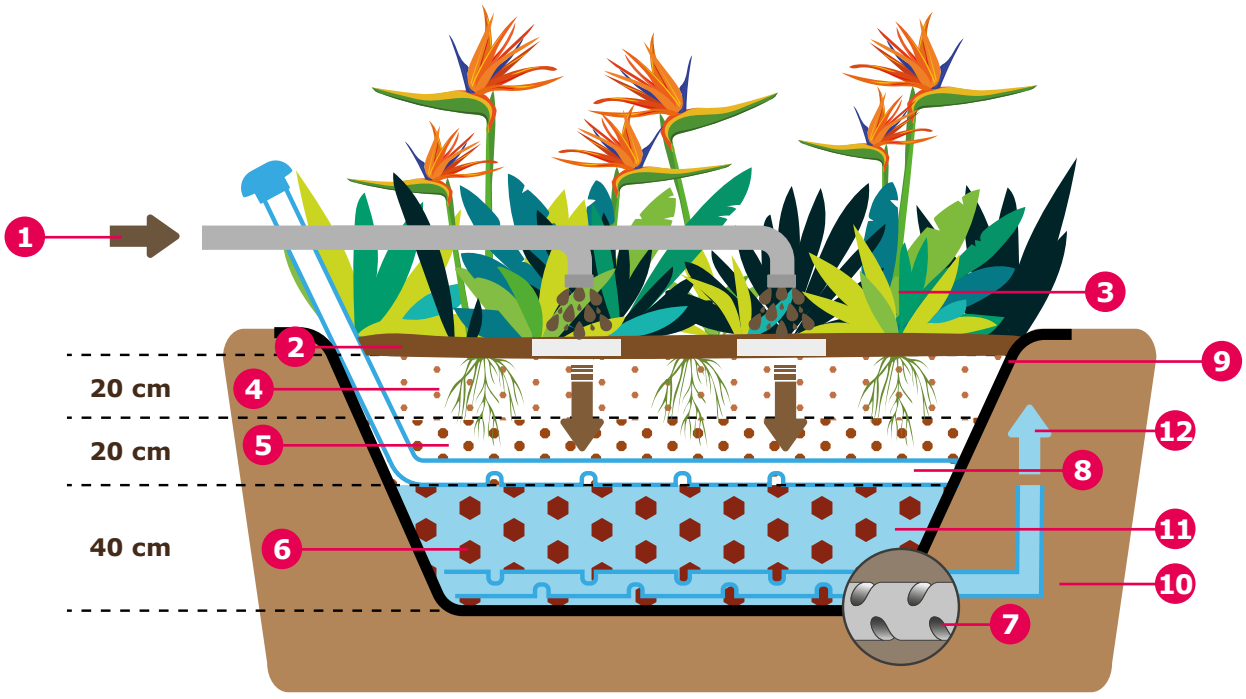
FRENCH VERTICAL FLOW TREATMENT WETLAND (WITH A SATURATED BOTTOM LAYER)

DESCRIPTION

This variation of the French system features a deeper drainage zone in which an outlet structure maintains a specific saturation level. This saturated bottom zone slows down flows and entraps more solid material. It also fosters anoxic conditions, which promote the denitrification of nitrates produced in the upper unsaturated part, and thus carbon degradation. This system performs better than standard French systems (SS, COD, BOD, TN), and maintains similar advantages regarding sludge treatment and management, robustness, and gravity feeding. In addition, it is recommended for seasonal variation activity as the saturated zone prevents plants from water stress during low/no loading periods. Different designs exist to improve performance (recirculation, depth of unsaturated and saturated layers, etc.) or to be used in association with additional treatment wetland stages.



1- Influent (screened raw wastewater)
2- Surface organic deposit (sludge)
3- The stem penetrates the organic deposit and prevents clogging
4- Filtering layer (fine gravel)
5- Transition layer (medium gravel)
6- Drainage layer (coarse gravel)
7- Drainage system
8- Aeration system
9- Waterproof liner
10- Original soil
11- Saturated layer (denitrification)
12- Effluent (treated wastewater)

TYPE OF INFLUENT

Raw wastewater, only pre-treatment by coarse screening is needed.

EFFICACITÉ DU TRAITEMENT

COD	BOD_5	TSS	TN	NH_4-N	TP
~85%	~90%	~90%	30 – 60 % Depending on design	60 – 90 % Depending on design	10–50%

ADVANTAGES / DISADVANTAGES

ADVANTAGES		DISADVANTAGES
Simple sludge management		
Feeding with raw wastewater (reduced operation and maintenance costs)		Additional energy consumption, operation and maintenance due to the saturated layer
Possible operation in separate and combined sewer systems		
Robust against hydraulic and organic load fluctuations		
Lower risk of clogging than horizontal flow treatment wetlands		
Possible low energy usage (feeding by gravity)		Feeding system may require electromechanical component (pumps) when feeding by gravity is not possible (low slope of the land)
No specific hazard of mosquito breeding		
Lower land requirement than horizontal flow systems		Deeper earth excavation than vertical or horizontal flow systems
Reuse potential (irrigation) with additional disinfection step		
		Need to identify local, non-invasive plant species. Plants harvesting once or twice a year.