

Wetlands: a promising solution in a changing framework

Aquafin's perspective, the regional wastewater
treatment company of Flanders

Brooks and rivers revive in Flanders

Thanks to the expansion of sewage treatment infrastructure by Aquafin



More and more domestic wastewater treated

1990
30%

2022
86%

European Waste water directive

Aquafin: core numbers end 2021



Our goal?

Clean water for streams full of life and a living environment in harmony with water.



Aquafin



What are the tasks of Aquafin?

Produce drinking water

Transport drinking water

Treat municipal wastewater



Transport municipal wastewater



Build water treatment plants for industry

Operate water treatment plants for industry

Transport rain water



Set up stormwater and drought management plans



Blue-green actions



Aquafin: Our customers



R&D at Aquafin



Zero-waste watercycle



Robust and healthy water systems



Digital Water value chain



Eco-efficient business models



Wetlands@Aquafin

Built in the 90's

40 wetlands for municipal waste water treatment

- ❖ 5 systems with 2 stage reed beds (horizontal subsurface flow)
- ❖ 35 wetlands with SAF or biorotor
- ❖ Always with settling tank





Wetlands

In Flanders the effluent standards for SWWTPs became stricter in 2004.

Before 2004: BOD/COD/SS: 50/250/60 mg/l

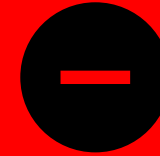
Since 2004: BOC/COD/SS: 25/125/35 or 60mg/l

More strict if imposed by environmental permits.

2 step reed beds



- ❖ resistance to incidental loads (toxic discharges,...)
- ❖ high hydraulic peak capacity
- ❖ buffering capacity
- ❖ 'green' purification

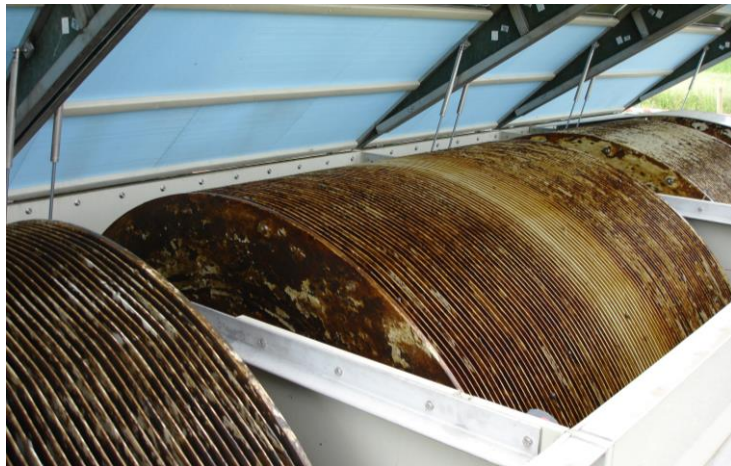


- ❖ Large surface (3-5m²/PE)
- ❖ Low nutrient removal 30% N, 10% P
 - Vs. Full scale WWTP 80% removal
- ❖ Adjustments are difficult
- ❖ Short lifespan (depending on waste load)

100PE < Hybrid system < 750PE



← **BIOROTOR**



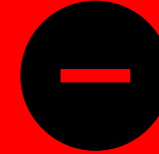
SAF
submerged
aerated filter



100PE < Hybrid system < 750PE



- ❖ Space-saving (much better treatment efficiency)
- ❖ Relatively favourable total cost
- ❖ Maintenance is in line with Aquafin's operating framework



- ❖ Limited hydraulic range
- ❖ Peak hydraulic capacity (6Q14) is a determining factor in sizing and cost estimation.
- ❖ Susceptible to failures and toxic discharges
- ❖ Risk of sludge leaching



Rules of design

Current < 2.200 PE no N and P removal

20PE < 2step reedbed < 100PE

100PE < hybrid system < 750PE

750PE < oxidation ditch with a central clarifier < 2200PE

>2200PE full scale biological WWTP

Maintenance costs

OPEX 14000 euro/ jaar

- ❖ sludge removal,
- ❖ personnel costs and
- ❖ electricity.

2 step reedbed: €30-60/PE/year

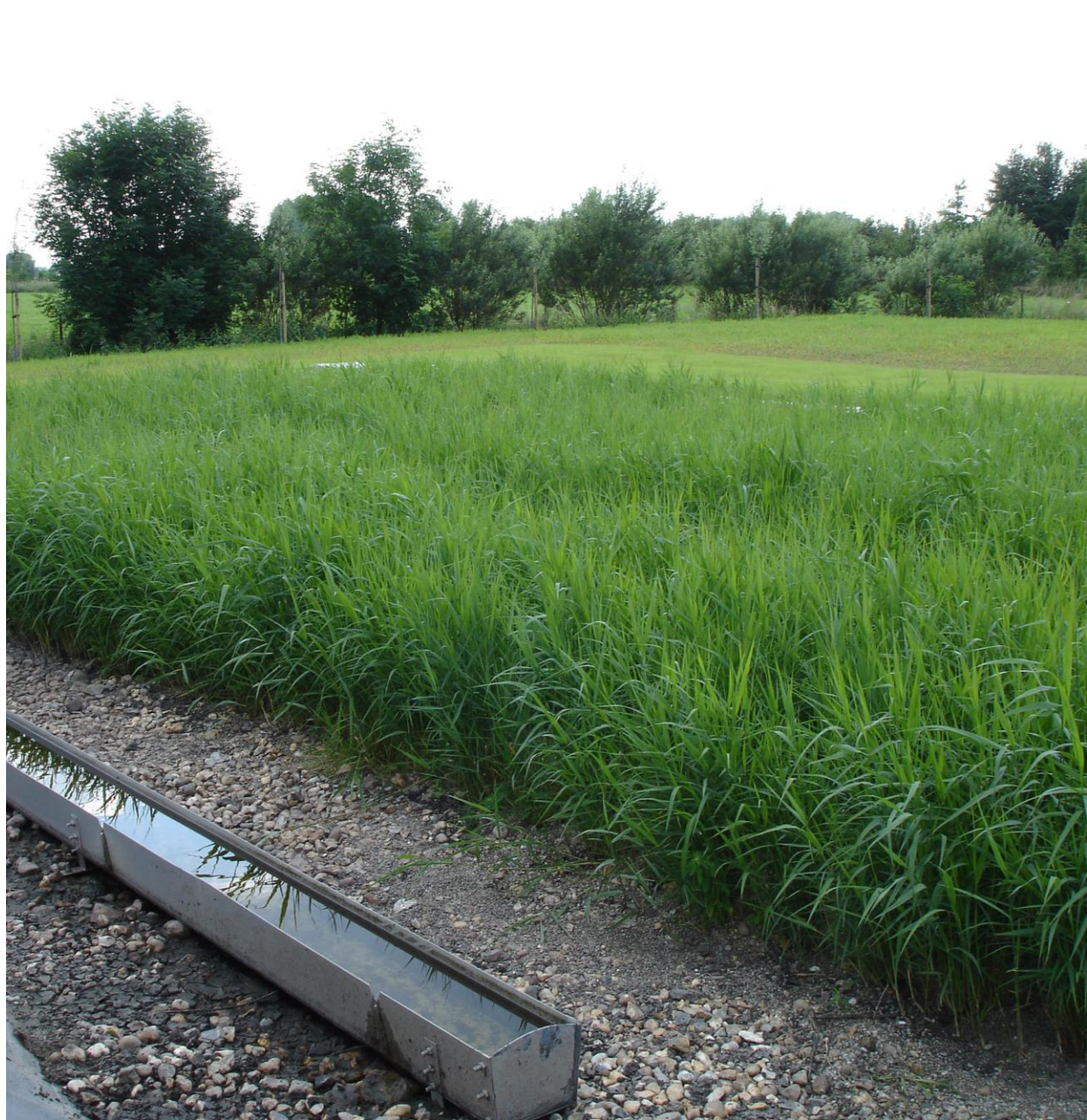
For a large scale WWTP this is only €20/PE/year





Maintenance settling tank

- ❖ Unstaffed
- ❖ Sensor check, maintenance visit turbidity sensor
- ❖ sludge clearance 1 to 2 per months settling tank



Maintenance reed

Reed field **mowed every 2 years**

Before every 3 years but this caused problems:
reed composting

New technique:

scraping of reed fields = €5000 (preventively)

Reconstruction €80.000

Monitoring: Check for sediment in reed field when freshly mowed and then dry for a long time otherwise not possible to see the sludge

Conclusions



Renovation: every 10 to 15 year



Costs are high for renovation



Space is a big issue in Flanders



Result: wetland is bypassed with pomp to bigger WWTP



Move a away from wetlands for conventional waste water treatment

What about the future?



Benefits of wetlands

Landscape design

Ecosystem benefits

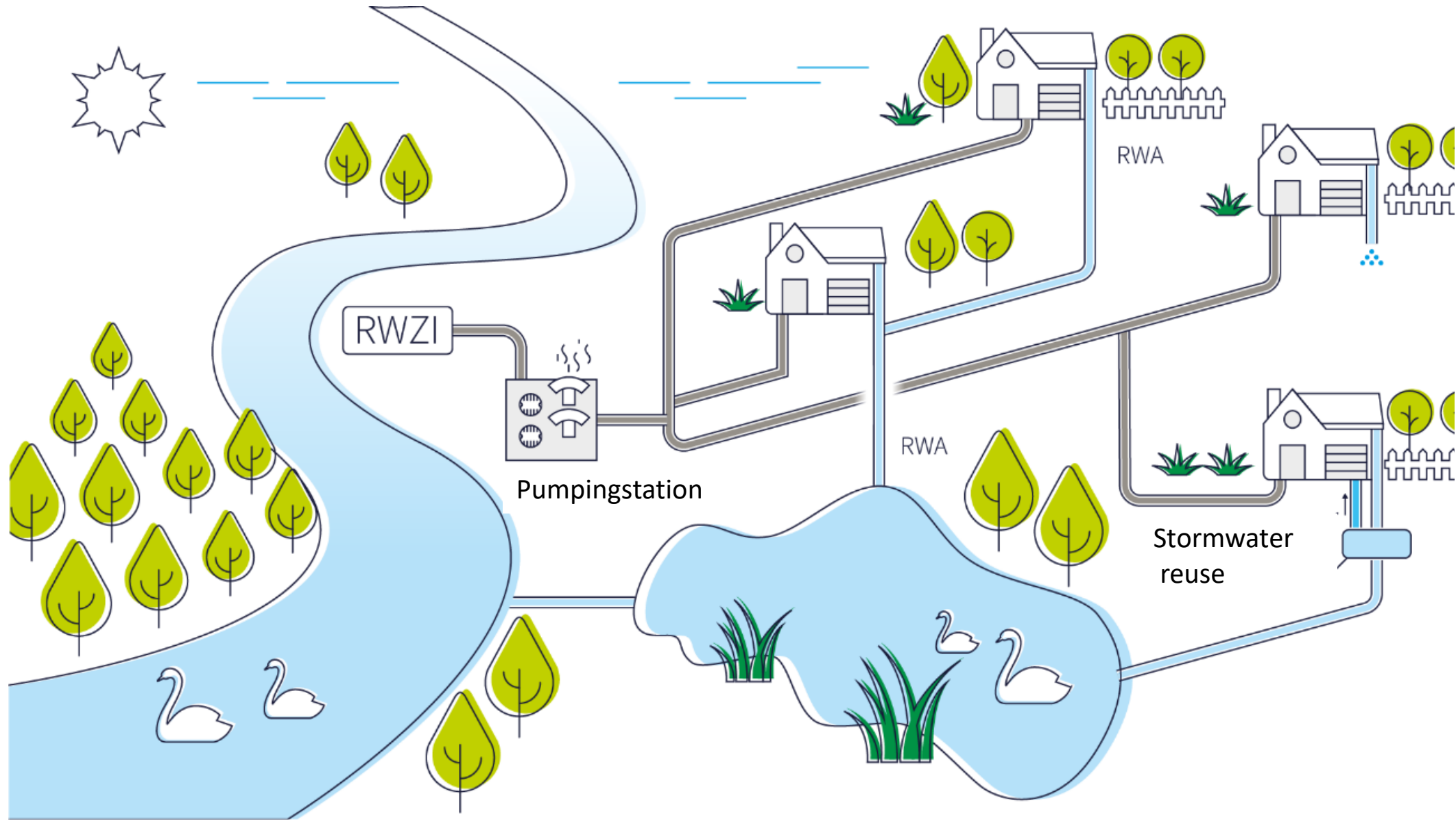
Robust

Low tech

Low energy



Taking a more integrated approach to storm and wastewater systems





Potential use as NBS

Look into wetlands for

- ❖ CSO treatment
- ❖ integrated in SUDS
- ❖ stormwater treatment



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