

# **Aggressive SBR**

**a new way of operating SBR plants**

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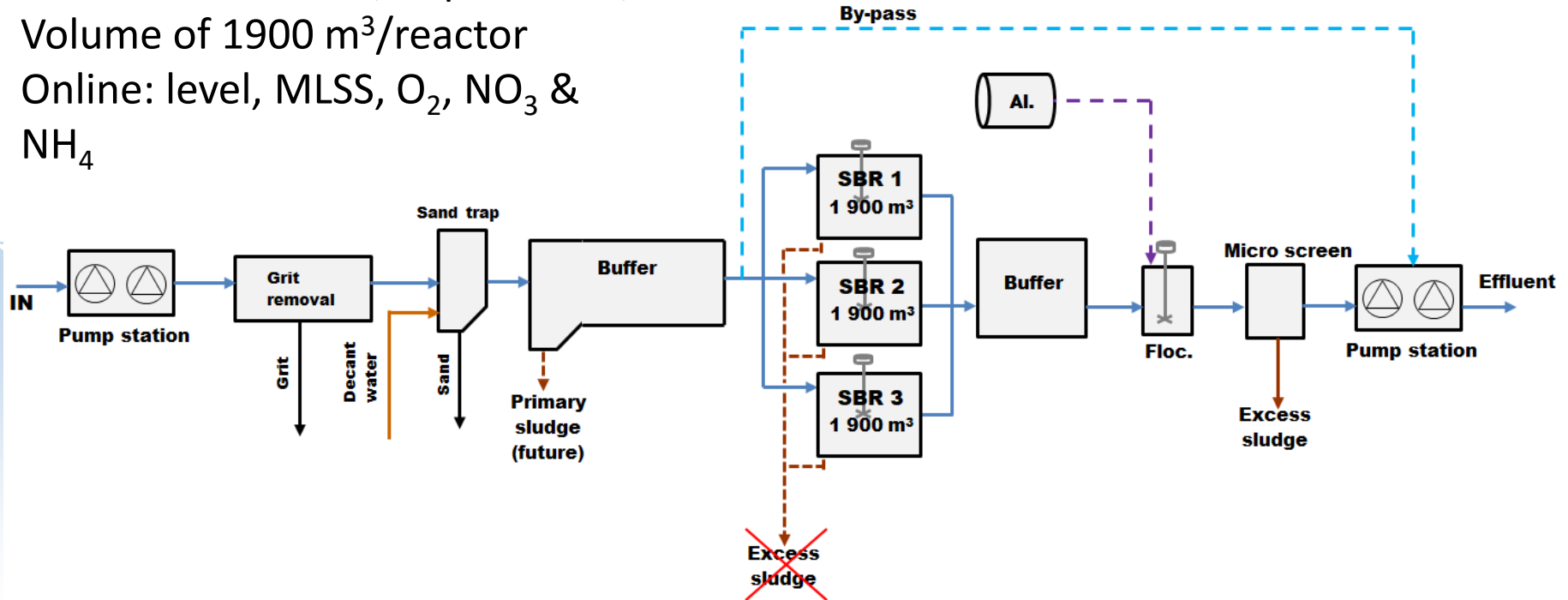
# Background

- Bodalen WWTP is located in the municipality of Tanum
- Built in 2012 as a conventional SBR for three villages. (Grebbestad, Tanumshede, and Fjällbacka). At the moment only Grebbestad is connected.
- The capacity is already limited due to high flows (diluted water) and very low winter temperatures
- Capacity primary treatment: 20 000 PE  
Secondary, biological treatment: 12 000 PE

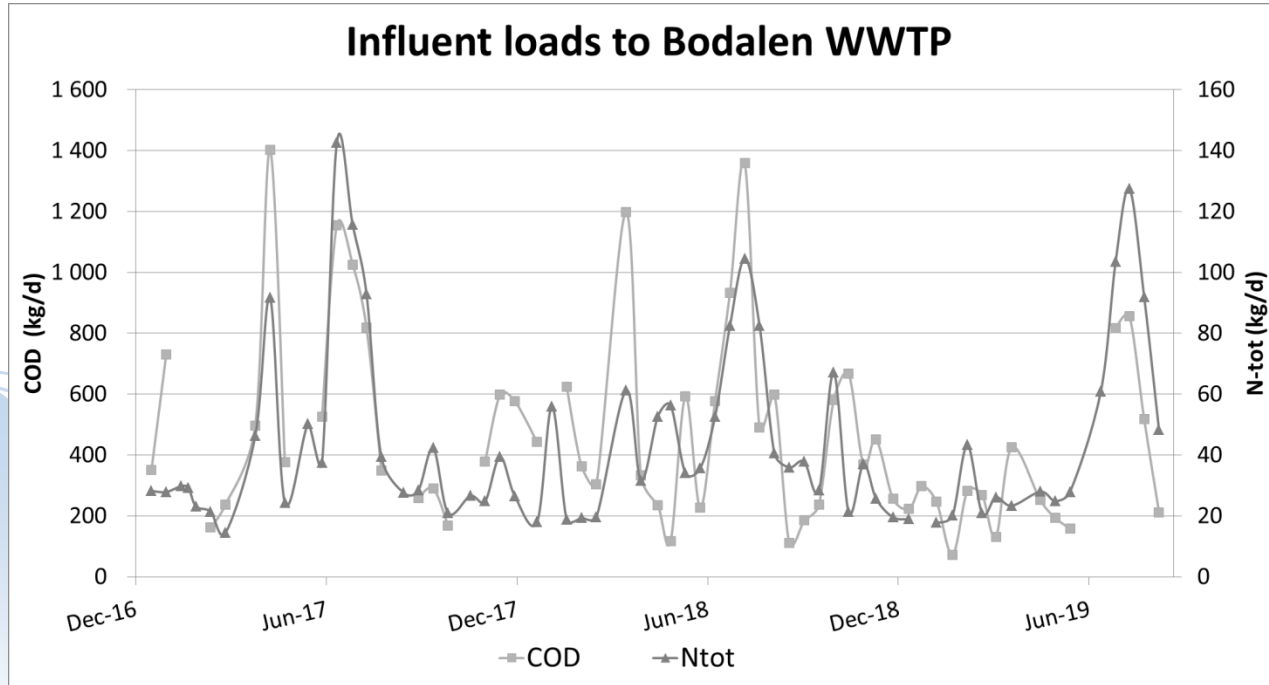


# Bodalen WWTP 2018

Three SBR-reactors, depth 6.5 m,  
Volume of 1900 m<sup>3</sup>/reactor  
Online: level, MLSS, O<sub>2</sub>, NO<sub>3</sub> &  
NH<sub>4</sub>



# Influent loads 2017-2018

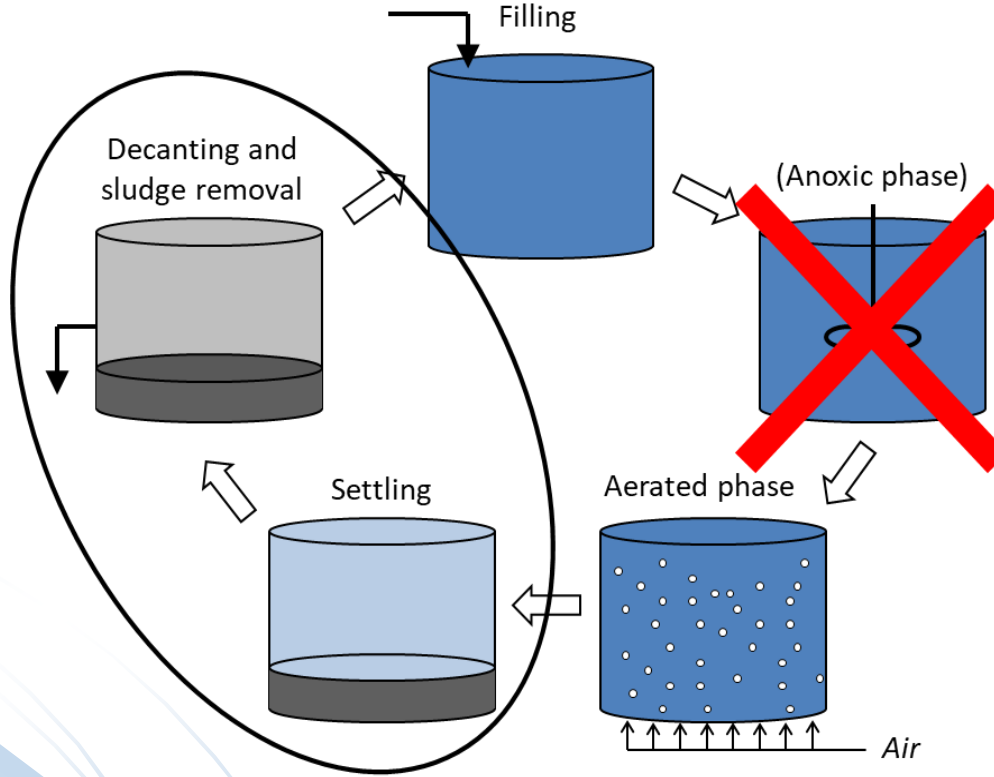


COD-load, summer:  
0.09 kg/kg MLSS.d  
(on the whole cycle),

Will be at least  
doubled in future

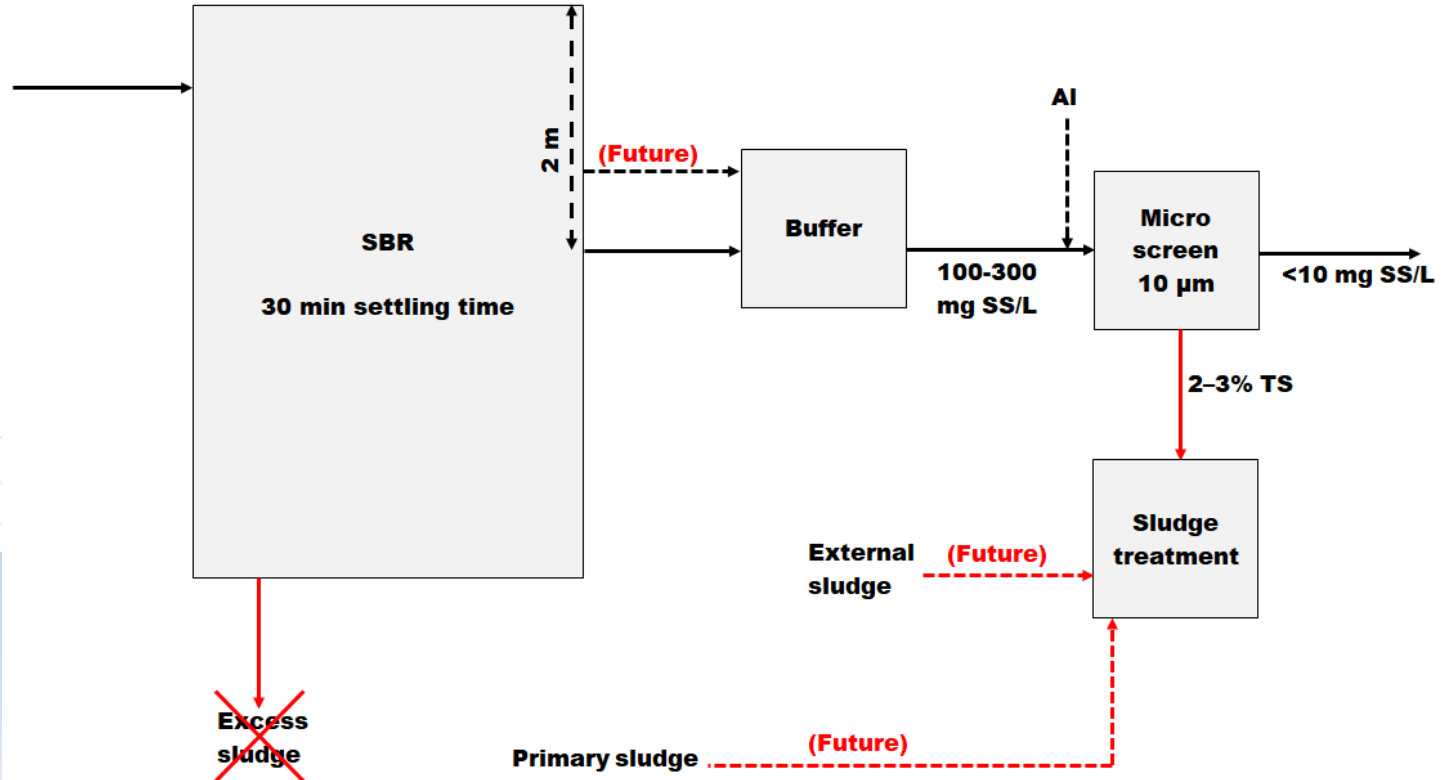
## What did we do?

Settling & decanting is more and more fused to one sequence

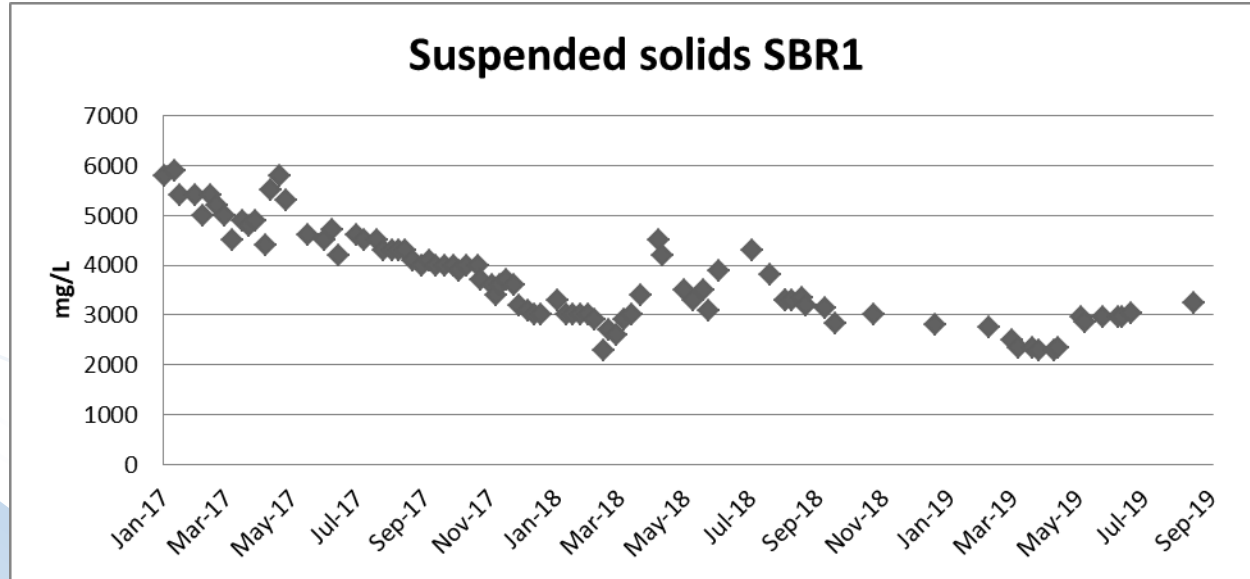


Not necessary, SND or post DN

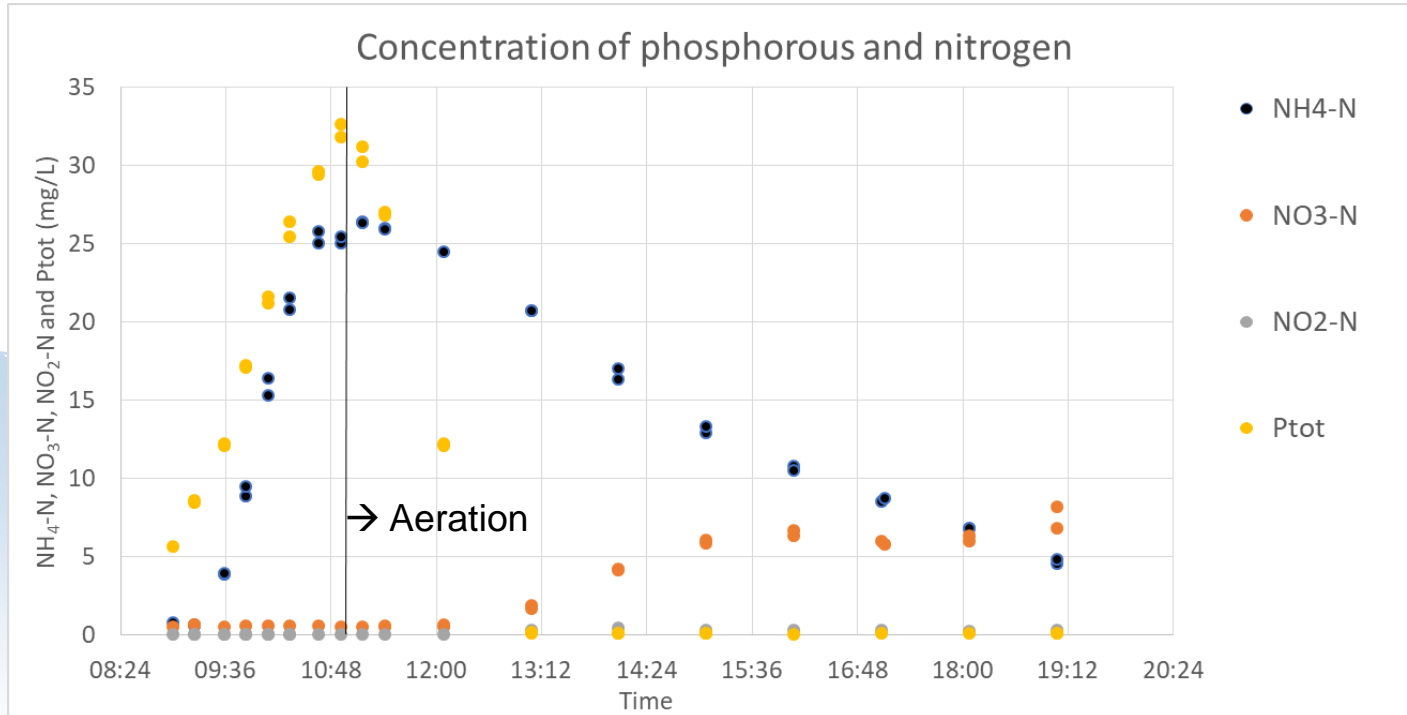
# Changes in the process



# Suspended solids 2017-2019



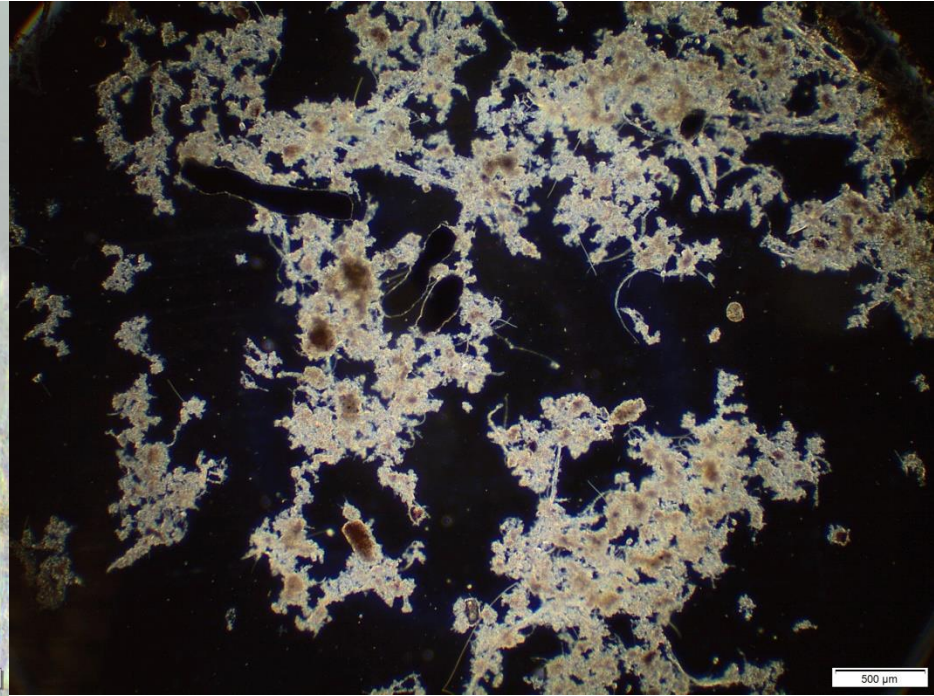
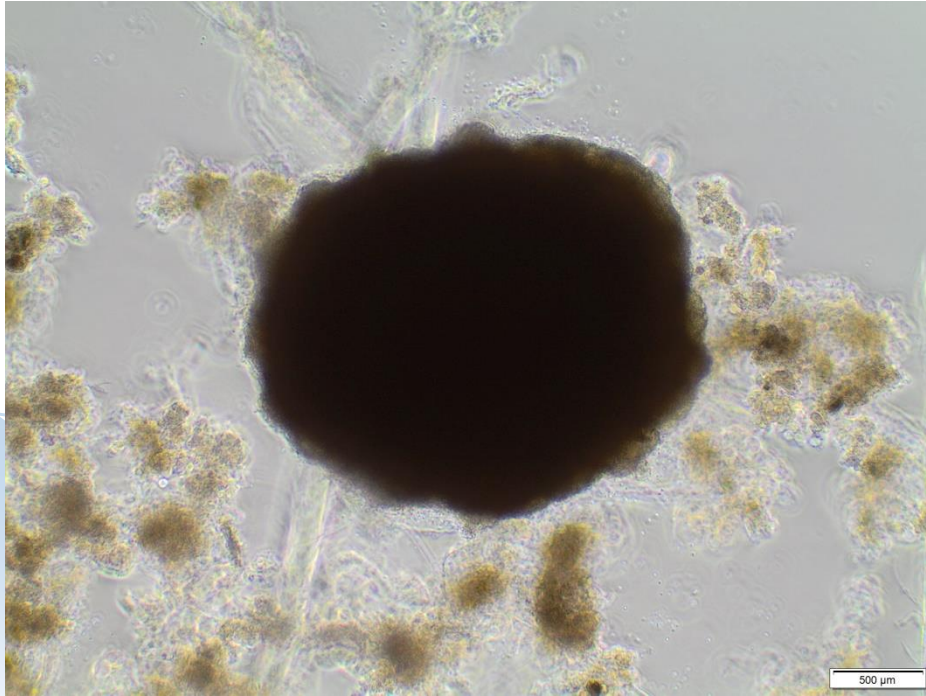
## SBR-cycle study



Bio-P  
SDN

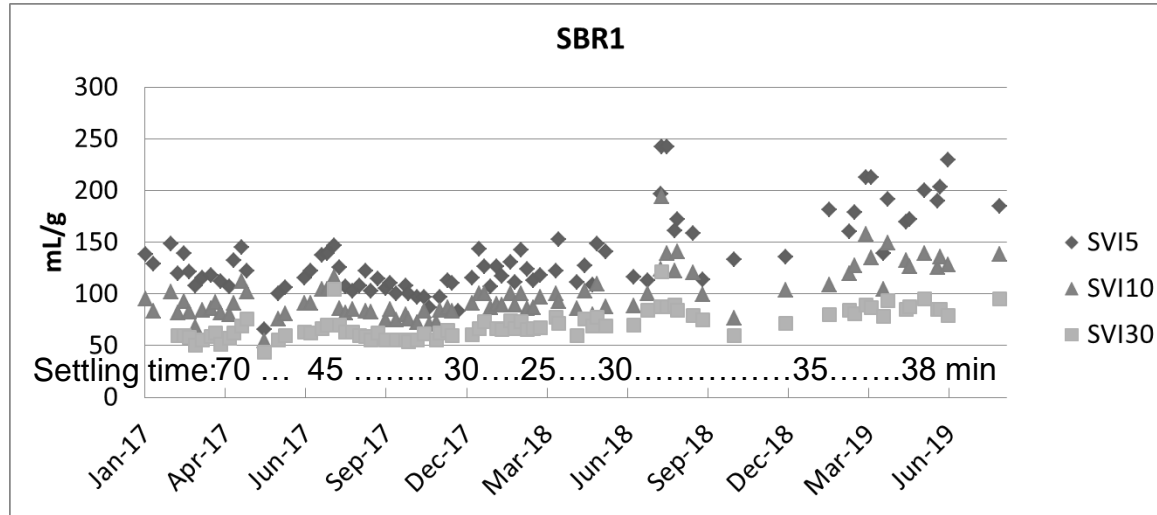


## Sludge, August 2019, SBR1



Pictures: Jennifer Ekholm, Chalmers University of Technology

# Sludge volume index



2017-2018

SVI<sub>5</sub>: 100 – 120 mL/g

SVI<sub>10</sub>: 70 – 90 mL/g

SVI<sub>30</sub>: 50 – 70 mL/g

Micro screen sludge, SVI<sub>30</sub>: 140 mL/g

2019

SVI<sub>5</sub>: 150– 200 mL/g

SVI<sub>10</sub>: 100 – 150 mL/g

SVI<sub>30</sub>: 50 – 100 mL/g

## Load on micro screen (10 $\mu\text{m}$ )

Maximum: ca 0.2 kg SS/m<sup>2</sup>.h

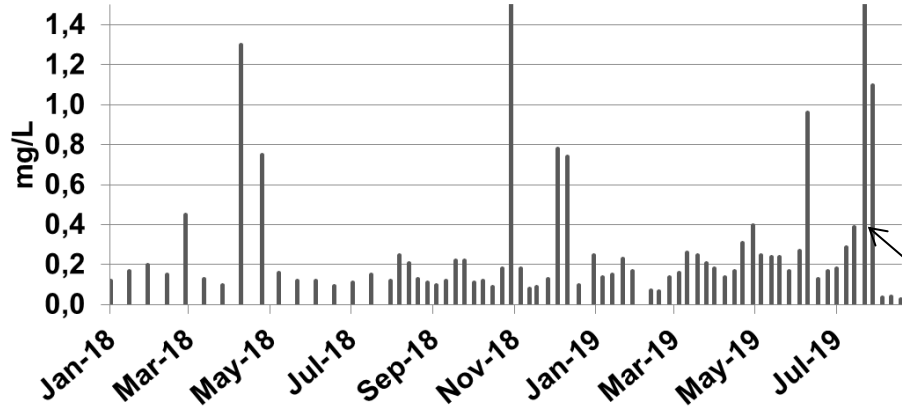
50 - 300 mg/L SS in, < 10 mg/L SS out



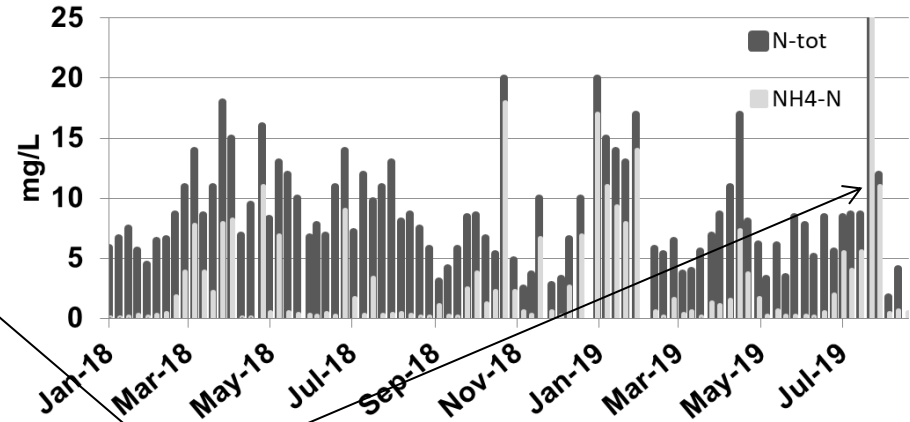
Picture:  
Karin  
Görfelt  
Tanum

# Effluent values, 2018-2019

Concentrations of P-tot in effluent



Concentrations of N-tot in effluent



Controlling failure,  
very short aeration time

## So ...

- The hydraulic capacity in a conventional SBR process can be improved significantly without major refurbishments
- Low concentrations of N ( $< 8$  mg/l) and P ( $< 0,2$  mg/l) in the effluent are reached (normally no addition of chemicals)
- Activated sludge with properties partly similar to granulated sludge is produced: Enhanced bio-P, accumulation of carbon during filling, SND or post-DN using internal carbon source, sludge with low SVI

### Major changes to the process:

- Sludge selection based on settling time
- No excess sludge removed in the SBR reactors but instead in the subsequent highly loaded micro screen

# Thank you!

**H2OLAND**

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