Planning of full scale ozonisation Lidköping

Agenda

- Requirements for the new waste water treatment plant
- Configuration of the waste water treatment plant
- Choice of technology for micropollutant reduction
- Configuration of the ozonisation step
- Configuration of the post treatment step

Requirements for the new waste water treatment plant

42 000 pe

$Q_{dim, bio}$	700 m^3/h
$Q_{max, bio}$	1400 m^3/h
$Q_{average}$	620 (460) m^3/h

Expected requirements from goverment

Total nitrogen <10 (8) mg/l (yearly weighted average)

Total phosphorus < 0,2 (0,20) mg/l (yearly weighted average)

Configuration of the waste water treatment plant

Conceptual study 2016.

Conventional activated sludge with digestion of sludge was found to be the best solution (ecomical, environmental, changeable and expandable).

Biological phoshorous removal with precipitation on filters to minimize input of chemicals and still reach below 0,2 mg P-tot/l.

Possibilities to configure to add phoshorous recovery, micropolutant reduction, further sludge treatment and side stream anammox in the future (if needed).

Choice of technology for micropollutant reduction

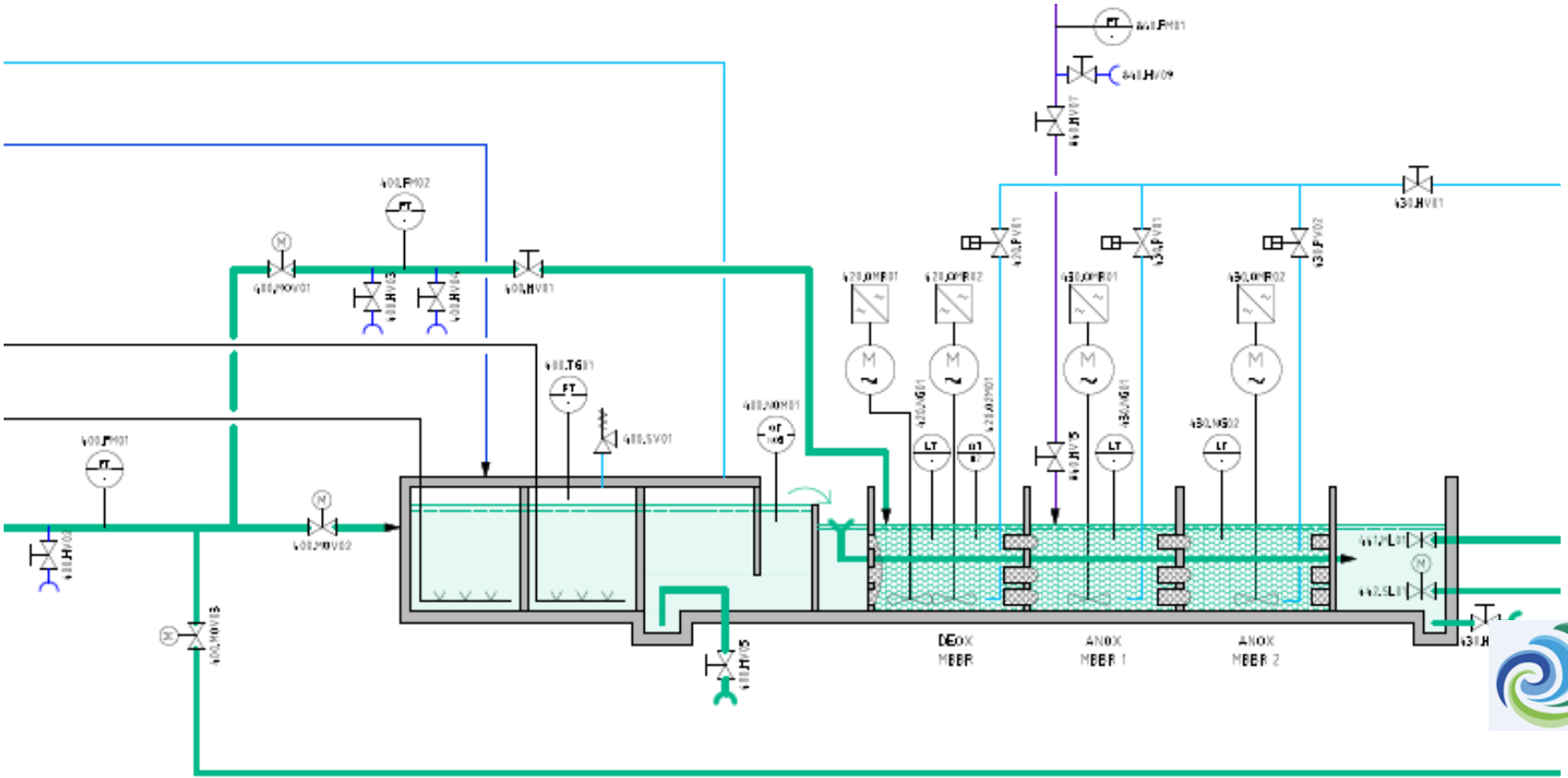
Comparison between

- Activated carbon as last step after filtration
- Ozonisation between bio sedimentation and filtration

Activated carbon was found to be more expensive when costs for investments, operation and maintenance was summed.

With a ozonsation step and a post treatment for degradation products other benefits made the choice even easier.

Configuration of the ozonisation step



Configuration of the ozonisation step

Configuration from literature and discussions with german colleagues and visits to WWTP Warburg (Germany) and Linköping.

$Q_{max,\ ozonisation}$ 1120 m^3/h (80% of $Q_{max,\ bio}$ or 95-99% of yearly flow)
- 25 min at $Q_{dim,\ WWTP}$
- 16 min at $Q_{max,\ ozonisation}$.

Reactor volume 300 m^3. Two screens to secure mixing and residence time.

Mixing water and ozone with the aid of diffusors in the reactor.

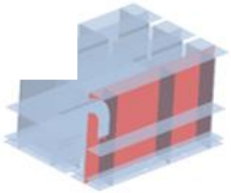
Residence time and mixing verified with CFD.

Configuration of the ozonisation step

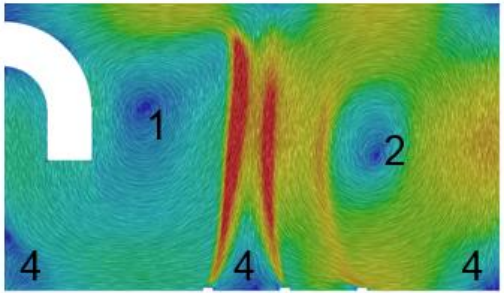
FS DYNAMICS

Resultat

Hastighetsfält för vattnet, XZ-planet första k



Min



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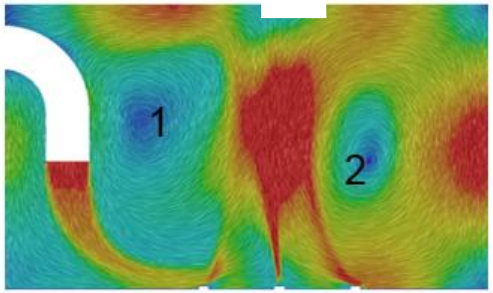

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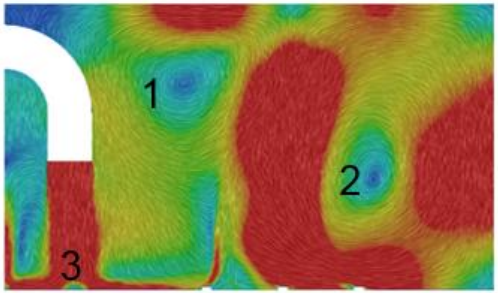


LIWE life

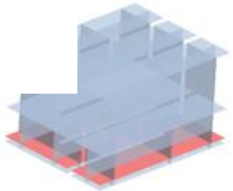
Lidköpings kommun

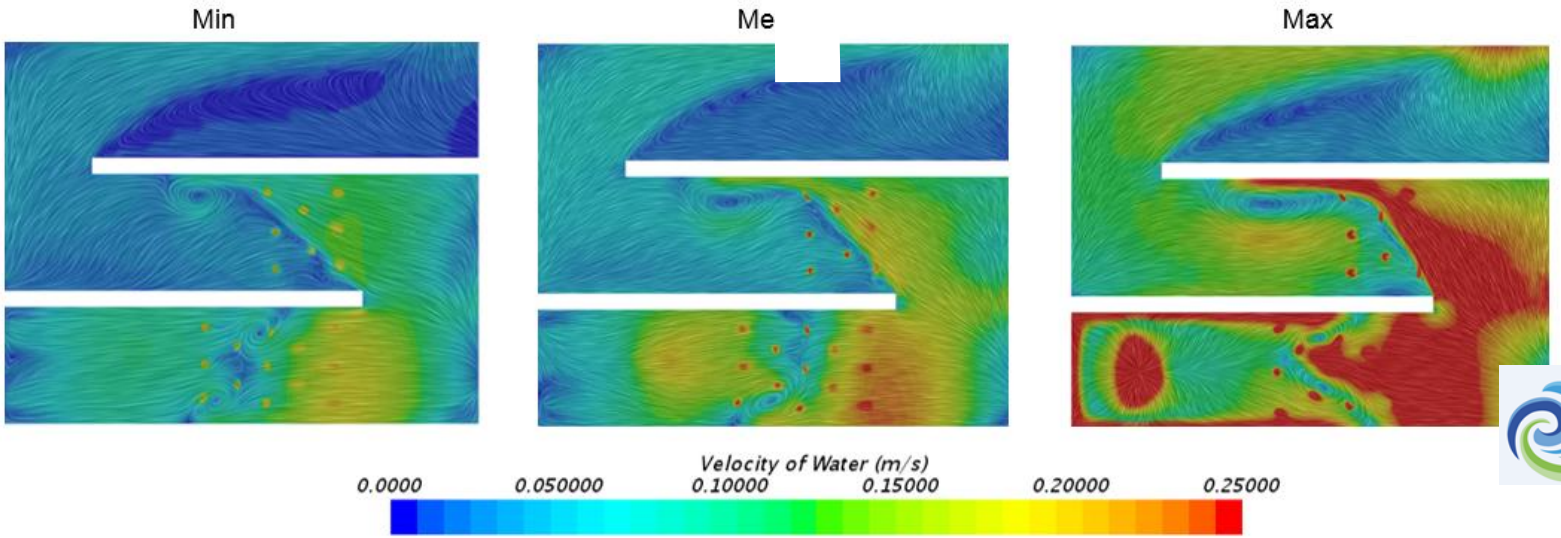
Configuration of the ozonisation step

FS DYNAMICS

Resultat

Hastighetsfält för vattnet, XY-planet Z=0.3 r





LIWE life

Lidköpings kommun

Configuration of the post treatment step

Possibility to bypass 20% of $Q_{max, bio}$ to post treatment of residues.

Post treatment reactor 350 m^3 with MBBR.

Possibilities to do post denitrication (external carbon source) if to much of the activated sludge volume is aerated or there is any problem with one of the activated sludge lines.

In short time nitrogen and especially ammonia are considered to be more important then micropollutants so bypass are accepted in those cases.