

Supplementary Information

Analysis of design criteria for biological post-treatment of ozonated wastewater treatment plant effluent

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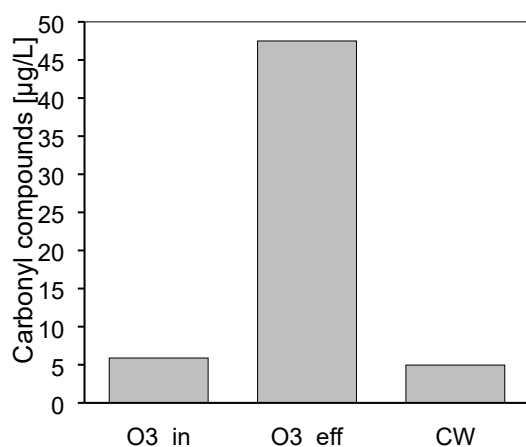


Fig. S1: Mean concentrations (n=2) of carbonyl compounds in the ozonation influent (O3_in), ozonation effluent (O3_eff), and the effluent of biological post-treatment with a constructed wetland (CW).

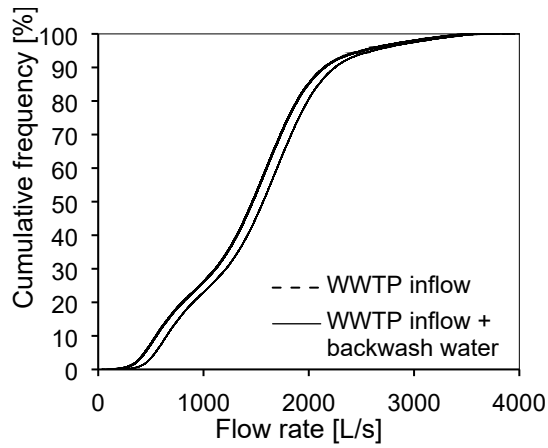


Fig. S2: Cumulative frequency of WWTP inflow data (15 min time steps) from the year 2021 with and without consideration of the backwash water.

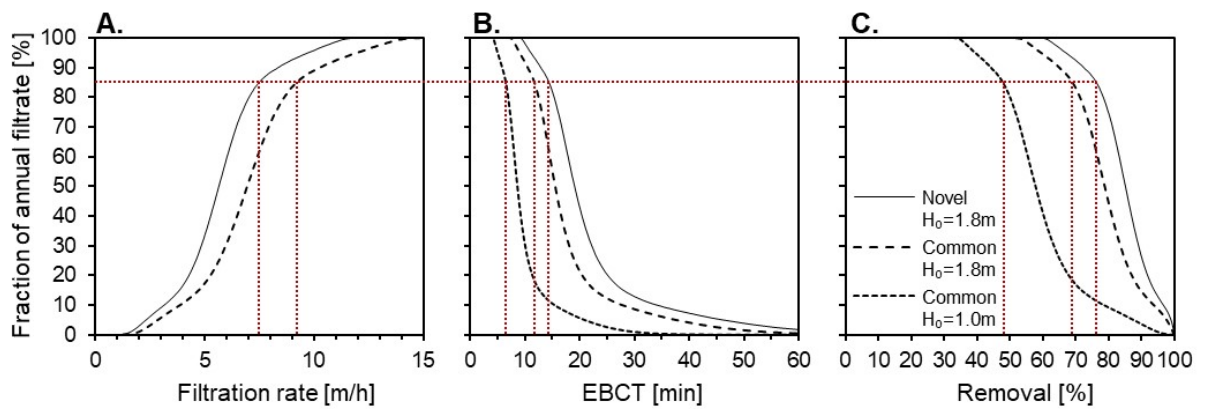


Fig. S3: Fraction of the annual filtrate as a function of the respective treatment parameters filtration rate (A.), EBCT (B.) and removal of carbonyl compounds (C.) for the novel ($H_0 = 1.8$ m) and the common practice ($H_0 = 1.8$ m and $H_0 = 1$ m) dimensioning approach. Calculated based on WWTP inflow data 2021 + backwash water. Red lines mark 85th percentiles.

Table S1: Mean values (n=9) of first order kinetic constants k of the carbonyl compounds used in this study. Values are calculated from previously published results on carbonyl removal at different EBCT.¹

Compound	k [min ⁻¹] in S/BAC filter	k [min ⁻¹] in S/A filter
Formaldehyde	0.11	0.10
Acetaldehyde	0.09	0.07
Propanal	0.14	0.14
Butanal	0.10	0.09
Glyoxal	0.21	0.16
Methylglyoxal	0.15	0.13
Acetone	0.09	0.06

References

- 1 D. Sauter, A. Dąbrowska, R. Bloch, M. Stapf, U. Miehe, A. Sperlich, R. Gnirss and T. Wintgens, Deep-bed filters as post-treatment for ozonation in tertiary municipal wastewater treatment: impact of design and operation on treatment goals, *Environ. Sci. Water Res. Technol.*, 2021, 197–211.