



## Extrapolating performance indicators for annual overflow volume reduction of system-wide real time control strategies

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**Supplementary Information: Extrapolating performance indicators  
for annual overflow volume reduction of system-wide Real Time  
Control strategies**

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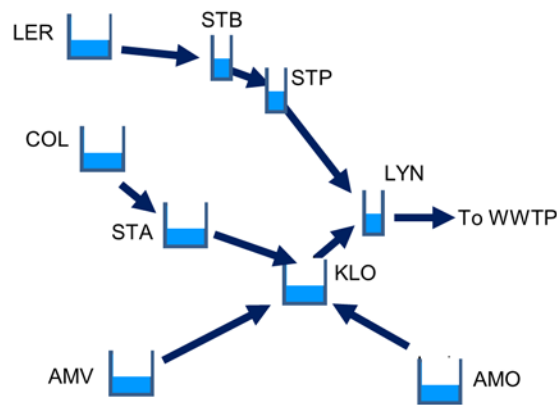


Figure S1. Schematic representation of the modelled Lynetten UDS, with connections among the analysed CSO structures (adapted from Löwe et al. (2016) and Vezzaro et al. (2014)).

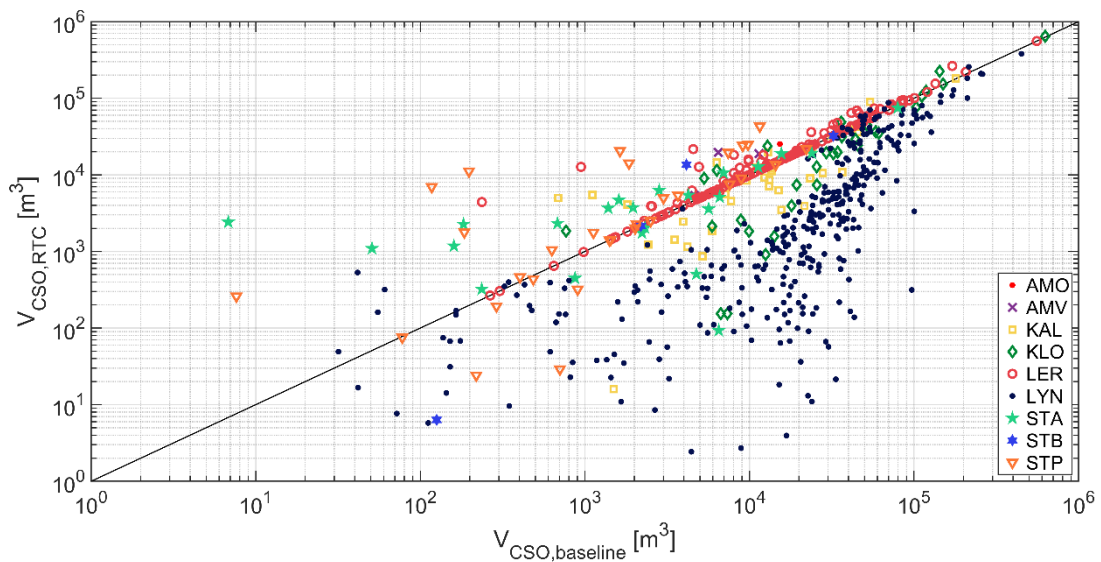


Figure S2. Comparison between CSO volumes without control (x-axis) and with control (y-axis) for all the analysed events in the Lynetten catchment for different CSO structures. The important CSO reduction in the downstream LYN structure is compensated by the increase in CSO discharges in upstream structures (such as KAL, LER, STB, or STP).

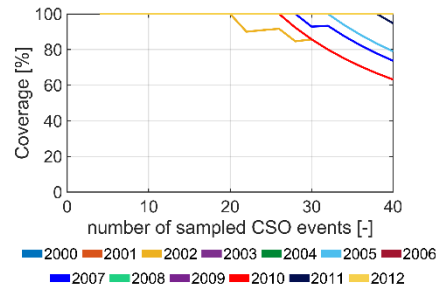


Figure S3. Uncertainty of the investigated method for the Lynetten example. Coverage of the estimated bounds (5%-95% percentiles) as function of sampled events.

Table S1. Main characteristic of the Lynetten example (adapted from Löwe et al., 2016)

Sub-catchment	Impervious area [ha]	Storage available for MPC [m3]	Input Rain Gauge
Colosseum (COL)	211	30,914	5725
East Amager (EAM)	228	44,425	5745
Kloevermarken (KLO)	777	27,500	5740
Lersoeledning (LER)	733	27,000	5694
Lynetten WWTP (LYN)	564	76	5665
St. Annæ (SKT)	77	7987	5740
Strandvaenget Basin (STB)	92	1020	5725
Pumping station (STP)	–	900	-
West Amager (WAM)	97	13,490	5755
Total	2279	153,312	

Table S2. Yearly input rain data

Rain Gauge	5694		5725		5740		5745		5755	
	Vol [mm]	# events [-]	Vol [mm]	# events [-]	Vol [mm]	# events [-]	Vol [mm]	# events [-]	Vol [mm]	# events [-]
2000	629	228	626	223	598	211	613	227	501	200
2001	592	212	649	224	643	216	613	207	634	209
2002	793	234	495	156	754	235	745	223	706	216
2003	545	175	594	184	539	166	557	180	716	191
2004	644	240	724	257	650	249	740	252	641	232
2005	524	192	528	182	454	179	547	175	528	175
2006	716	251	685	263	683	238	696	240	668	239
2007	869	275	875	275	771	255	830	271	773	257
2008	670	243	666	240	645	238	639	200	621	227
2009	668	219	639	207	607	200	675	218	555	185
2010	687	203	706	210	643	192	733	199	624	203
2011	758	211	800	223	829	227	967	211	743	201
2012	600	241	607	226	621	238	586	216	584	231
2013 (jan-jun)	216	104	193	90	208	96	193	86	234	106

Table S3. Overview of the simulated CSO volumes [m<sup>3</sup>] for each CSO structure for the period 2000-2012 (baseline scenario).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AMO	0	25235	0	0	0	0	0	7386	0	0	26495	76465	0	0
AMV	1227	21588	2721	1397	1175	2144	0	19707	9233	0	19945	93382	17	0
KAL	15296	48733	27814	13900	12817	31901	3459	96271	20970	1228	96276	244661	5584	0
KLO	20462	167191	43663	12369	35558	78836	1682	225120	44119	7386	236727	860432	1834	0
LER	265581	317816	170521	415251	349384	389282	232984	796397	180004	154563	481938	1050232	153093	1
LYN	113344	370313	661364	310439	475534	284393	256292	801170	213597	190384	592746	1119092	563671	6
STA	2145	23743	4009	3408	2541	5789	2374	28181	5426	1109	21476	94825	1832	0
STB	0	0	0	0	2541	6	486	0	0	0	13559	34514	0	0
STP	56314	4015	50391	2190	72196	9169	33962	13615	48124	7529	80505	39218	17579	1

Table S4. Overview of the simulated number of events [-] for each CSO structure for the period 2000-2012 (baseline scenario).

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
AMO	0	1	0	0	0	0	0	2	0	0	1	3	0	0
AMV	2	3	2	1	1	1	0	5	3	0	2	4	1	0
KAL	2	4	3	3	2	3	1	7	2	1	4	5	1	0
KLO	2	3	2	2	3	3	2	7	1	1	3	5	1	0
LER	11	14	9	17	15	15	11	19	9	14	12	20	14	70
LYN	12	41	32	32	20	29	19	37	22	38	21	39	20	8075
STA	2	4	2	2	2	3	2	8	1	1	4	8	2	0
STB	0	0	0	0	0	1	1	0	0	0	1	4	0	0
STP	6	3	9	2	11	3	7	6	7	1	6	8	3	335

Table S5. Overview of the simulated CSO volume reduction [%] for each CSO structure for the period 2000-2012.

CSO	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Average
AMO		<b>-65</b>										<b>-30</b>			<b>-47.4</b>
AMV		<b>-89</b>							<b>-99</b>		<b>-209</b>	<b>-23</b>			<b>-105</b>
KAL	2,8	32	59	70	68	48	58	<b>-12,3</b>	18	50	<b>-74</b>	6,8	22		26.7
KLO	63	27	44	66	60	28	44	<b>-3,6</b>	15	62	<b>-46</b>	2,4	82		33.9
LER	0,0	<b>-4,4</b>	<b>-2,0</b>	<b>-0,7</b>	<b>-0,1</b>	<b>-5,4</b>	<b>-3,0</b>	<b>-21</b>	<b>-29</b>	<b>-16</b>	<b>-43</b>	<b>-8,4</b>	<b>-6,3</b>		<b>-10.8</b>
LYN	82	60	85	65	84	64	71	40	70	75	50	44	47	96	64.2
STA	<b>-146</b>	20	<b>-67</b>	32	66	<b>-17</b>	2,5	<b>-67</b>	78	<b>-170</b>	<b>-37</b>	9,0			<b>-24.6</b>
STB						95					<b>-227</b>	0,1			<b>-44.1</b>
STP	<b>-227</b>	0,2	<b>-2619</b>	<b>-8,3</b>	<b>-573</b>	4,7	<b>-4442</b>	<b>-38</b>	-25882	0,6	<b>-585</b>	<b>-7,9</b>	<b>-1476</b>		<b>-2758</b>

## References

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